NORTH CAROLINA MARINE FISHERIES COMMISSION

FEBRUARY 2024

Business Meeting Briefing Materials

February 21-23, 2024

New Bern, NC

Contents

Marine Fisheries Commission Business Meeting
AGENDA

Doubletree Hotel, New Bern, NC
February 21-23, 2024

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).

Wednesday, February 21

4:00 p.m. Conservation Funding Committee – 2024 striped bass stocking supplemental funding request – Charlton Godwin, Steve Poland

6:00 p.m. Public Comment Period

Thursday, February 22

9:00 a.m. Public Comment Period

9:30 a.m. Preliminary Matters

- Commission Call to Order* – Rob Bizzell, Chairman
- Moment of Silence and Pledge of Allegiance
- Conflict of Interest Reminder
- Roll Call
- **Approval of Agenda ****
- **Approval of Meeting Minutes****

9:45 a.m. Chairman's Report

- Letters and Online Comments
- Ethics Training and Statement of Economic Interest Reminder
- Committee Reports
  - Northern Regional Advisory Committee
  - Southern Regional Advisory Committee
  - Finfish Standing Advisory Committee
  - Shellfish/Crustacean Advisory Committee
  - Habitat and Water Quality Advisory Committee

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

- Joint Meeting of the MFC Commercial Resources Fund Committee and the funding committee for the N.C. Commercial Fishing Resource Fund
- **Conservation Funding Committee Verbal Update- Doug Rader****

10:30 a.m. Director's Report – Kathy Rawls
- Reports and updates on recent Division of Marine Fisheries activities
  - Atlantic States Marine Fisheries Commission – Chris Batsavage
  - Mid-Atlantic Fishery Management Council Update – Chris Batsavage
  - South Atlantic Fishery Management Council Update – Trish Murphey
  - Habitat and Enhancement Section Update – Anne Deaton
  - Shellfish Sanitation and Recreational Water Quality Section Update – Shannon Jenkins
  - Fisheries Management Section Update – Steve Poland
  - Marine Patrol Update – Col. Carter Witten
  - License and Statistics Section Update – Brandi Salmon
- Informational Materials:
  - Protected Resources Update Memo
  - Rule Suspensions Update Memo

12:00 p.m. Lunch Break

1:30 p.m. Update on Strategic Habitat Areas (SHA's) Study Report – Anne Deaton

2:00 p.m. Fishery Management Plans
- Status of ongoing plans – Corrin Flora
- **Striped Mullet FMP Amendment 2 (Draft) – Jeff Dobbs, Willow Patten****
  - Review Public Comment and AC Recommendations
  - **Vote on Preferred Management Options****
- **Shrimp FMP Amendment 2 Implementation Items****
  - Information Paper Exploring a Shrimp Trawl Observer Program – Jason Rock
  - **Submerged Aquatic Vegetation Protection Through Shrimp Trawl Area Closures Issue Paper – Chris Stewart****

Friday, February 23

9:00 a.m. Rulemaking
- Rulemaking Issues Update – Christine Ryan
- Rulemaking – Catherine Blum
  - 2023-2024 Rulemaking Cycle Update
  - 2024-2025 Rulemaking Cycle
    - **Vote on preferred management option and associated proposed language for rulemaking for "False Albacore Management" issue paper****
    - **Vote on preferred management option and associated proposed language for rulemaking for "Simplify Pot Marking Requirements" issue paper****
    - Preview of additional rulemaking issues under development

10:00 a.m. Issues from Commissioners

10:30 a.m. Meeting Assignments and Preview of Agenda Items for Next Meeting – Kathy Rawls

10:45 a.m. Adjourn

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

*****Probable Action Items***

Marine Fisheries Commission Business Meeting Minutes
DRAFT
Islander Hotel & Resort
Emerald Isle, North Carolina
November 15-16, 2023

The Marine Fisheries Commission (MFC) held a business meeting November 15-16, 2023, at the Islander Hotel & Resort in Emerald Isle, North Carolina. 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://www.deq.nc.gov/marine-fisheries/marine-fisheries-commission/november-2023/online-public-comments/open.

The briefing materials, presentations, and full audio from this meeting are available at: https://www.deq.nc.gov/about/divisions/marine-fisheries/marine-fisheries-commission/past-marine-fisheries-commission-meetings#QuarterlyBusinessMeeting-November15-172023-13913.

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

BUSINESS MEETING - MOTIONS AND ACTIONS

November 15, 2023

Chairman Rob Bizzell held a public comment session that began at 5:58 pm. and ended at 6:23 p.m. The following comments were received:

Public Comment Period

Maurice Mann said he is here to understand what the MFC does with mullet fishing. He has been commercial fishing his whole life, but he sees the regulations and they do not make sense to him sometimes. He said a lot of people depend on fishing every year, so he does not understand what the MFC does. Mr. Mann said the only thing he sees is the MFC closes fisheries down and he does not see anything behind it. He said mullet fishing is substantial. Mr. Mann said there are plenty of mullets, and always have been mullets. Not like some of the other fish. He has seen problems with flounder but wonders why the closure, why a moratorium, it does not make sense to him. He asked the MFC if it is here to help the commercial fishermen or some other agenda he does not know about. He said closing mullet fishing to all the other fishing is flat out wrong; he does not know how the MFC got the information, who it got it from, and he asked the MFC to explain it to him. (Chairman Bizzell said staff can explain it to him after the public meeting.)

John Rich thanked the MFC for holding the public comment period. He said about one week ago he had bait and went to South Carolina to get flounder, where the limit is five fish per day, year-round, with a 16-inch slot limit, and he caught eight flounder in two nights with three guys and all the fish were 17-19 inches. He said he heard about the mullet situation when he got home. He said the tractors (stop net fishery) caught more mullet than they have caught in 50 years; they caught 70,000 roe mullets but he said he cannot use mullet for bait. He said he knows that guy and he is a

nice guy who is working hard, but he has coolers of finger mullet that he takes to Maryland to sell them and now he has to go buy them back. He said he started a petition; he acknowledged he is just one man, but he is getting signatures by going to tackle stores, on the beach, on the web, on Facebook, in Facebook groups, and he is just getting started. He said he has loads of names, sees the problem, and has done a lot of research. Mr. Rich said part of the problem is this commission. He acknowledged the MFC works hard, and it is a complicated process and he said it is not personal, but this format in North Carolina is not working. He said the MFC has nine people: two at-large, one scientist, and six others, but there are 300,000 recreational fishing license holders and less than 3,000 commercial fishing license holders. He suggested turning over the fisheries to the wildlife agency up to four miles. He urged the MFC to work on it together. He said his heritage is gone, he has fished for 20 years here, and fished since he was three years old. Mr. Rich said he is going to stand up and fight, go to the governor, go to senators, and vote. He thanked the MFC for its time.

Sterling Singletary said he can only speak for the county he is in. He said he has true records for 10 years of every roe mullet he has caught and has personal experience. Bryan Spain, retired Division of Marine Fisheries (DMF) Marine Patrol, patrolled Pamlico County and he had 34 full-time commercial fishermen; when he retired, he had eight. Mr. Singletary said the decline of fishermen should say something. If commercial fishermen are catching too many roe mullet, if eight commercial fishermen can catch what 34 did, must be a lot of fish, or they must be supermen. He said fish is not the issue. There is a fading waterfront, in fact working waterfronts are gone, there are far less fishermen; the problem is global warming. He said he has 10 years of documentation for every catch he has made, and it shows that every year it starts three days later. He said it was the 21st last year and the 24th this year. He said the mullet is just like the shrimp, where there are more than can be pulled over the rail. Mr. Singletary said this is nothing man has done; it is global warming. He said the mullet are thicker than they have ever been. This state is too hard on its residents. He said he does not know what we have done to make everyone hate us.

Joe Romano is a commercial fisherman and one of the owners of CV Crab Company in Wilmington. He said he is a commercial fisherman, fishmonger, and a former NC Fisheries adviser. Mr. Romano said his company employs over 70 folks and they procure seafood from fishermen and fish houses up and down the coast. He said he has been coming to these meetings for over 12 years and has watched as so many fellow commercial fishermen and fish market owners have given up on this process. Mr. Romano said they have few advocates, at the DMF or on the MFC. He said he can speak for many in saying, that they feel trapped and without a voice. Mr. Romano said when he served on the flounder and blue crab committees in 2018, he watched the DMF quietly take over the messy process of stakeholder debate, motions, and votes. He stated they (DMF) basically eliminated the democratic process of inquiry, debate, and committee driven motions. He said the DMF now listens to stakeholder discussions and makes their own proposals for fisheries management. Mr. Romano said this is a dangerous, unchecked power that was never a part of the Fisheries Reform Act. He said it is a shame that we have so many intelligent, knowledgeable, and creative fishermen in this state that are consistently ignored and written off. Mr. Romano said those in the seafood industry are in a desperate place. Mr. Romano said their necks are always on the chopping block, and that they do not have the regulatory consistency needed to invest in the future, due to the constant threat of new rules every quarter. Mr. Romano said, for those of you on this committee whose livelihood and work culture are not affected by these votes, try to put yourselves in our shoes. He said, this goes way beyond fisheries politics, when unelected bureaucrats

consistently make new, unpopular, draconian emergency rules, without clear checks and balances, then food security, and their proud commercial fleet suffers unjustly. Mr. Romano pointed out his bulleted observations that he believed deserved the attention of the committee. He said, the DMF has made it illegal to possess frozen striped mullet that were legally caught and purchased this year. He stated, this is unconstitutional and egregious, not to mention sinful as they are forcing us to dump legally caught seafood in a dumpster. Mr. Romano said they had the power of discretion but opted for knee-jerk emergency rules that had unintended consequences. He stated this new striped mullet proposal is incredibly biased against fishermen in the southern part of the state. Mr. Romano said, the fishermen in his area came to this committee earlier in the year and made the case, but it fell on deaf ears. He said fishermen have historically caught most of their roe mullet after the proposed closure. He stated, the DMF is supposed to rule fairly and equally across the state, and said, this is not it. Mr. Romano said like flounder before it, the striped mullet stock assessment is clearly flawed as it does not measure up to what fishermen are bringing to the dock. Mr. Romano said he believes that the focus on graphs, charts, algorithms, and extrapolation has blinded many of the DMF scientists to the boots on the ground reality of high fecundity species. He said when one fish can lay millions of eggs, it is not humans that control its success. He stated, warming waters and weather events are the leading cause of abundance, or scarcity, but yet we make it about commercial effort. Mr. Romano said the targeting of high fecundity species is different every year. He said fish don't operate on a human calendar. It takes dedicated and committed fishermen to chase them year after year, but draconian regulation could eliminate this ability, and choke up the best boots on the ground marine scientists, the commercial fisherman. He said overregulation of seafood is coming to a head now that we have two state agencies that have competing rules and narratives. Mr. Romano said, please bring some empathy for the whole seafood industry to your discussion and remember, more rules and draconian regulations is not the answer.

Tyler Barnes said he grew up in a commercial fishing household and it put food on the table growing up. There are a lot of gentlemen and women in the room that have spent years in commercial households. They are essentially doing agricultural farming of the water. He said they make as much as they can on every set, and there is no reason for this reduction; it affects our local area businesses, like those that sell cast nets and slip corks. This was a direct finger pointing to our commercial fishermen, but it is not just about them anymore. He said people come here year after year just to come fishing here. They frequent this area for the aquaculture and what is swimming in the waters. He said there are good years and bad years. But hundreds of thousands of dollars are spent on things like motors, nets, and hanging nets. He said no young person would start a net hanging business because everything keeps getting cut and seasons get shorter and shorter. He said he is thankful his dad has a secondary job, because he does not know what his parents would do otherwise. The striped mullet fishery is Thanksgiving and Christmas money for fishermen. He wants his one-year-old to be able to go fishing with him one day. He said he hopes the fishery is not closed just because people are tired of seeing a gill net and want someone to be able to rod and reel fish. He said there is nothing but a list of what we cannot do.

Zachary Willis said he has lived here his whole life, and taking striped mullet away from fishermen is an outrage. He said part of the problem is this commission. Mr. Willis asked how many of the commissioners are from North Carolina and how many have a background in commercial fisheries. He said unless you live here and know the facts and do not just read a piece of paper, you cannot have an accurate assessment of striped mullet, flounder, or shrimp. Mr. Willis said in the past two

years, between the shrimping, flounder gigging, and especially mullet fishing this year, that he has caught more mullets this year than in years past. Mr. Willis said he doesn't even fish but about a third of the net that marine fisheries allow you to fish, and he is still catching 5,000 – 8,000 lbs. of fish a set. He said he does not know what the MFC is going to do to fix this. He said it looks like the MFC is enjoying this as much as fishermen are; he said he does not see one smiling face. Mr. Willis said the problem lies with the MFC and too many out-of-state views that are not needed here and are not in our commercial industry's best interests. He said the commercial fisherman is small compared to recreational fishers, CCA and out-of-staters who get to come here and say what they want to say and make their own rules. He said he would love to see his kids grow up and participate in commercial fishing, whether it's shrimping, striking mullets, or catching a red drum in a net. Mr. Willis said another thing with this mullet thing, you've destroyed the red drum industry in the state of North Carolina by doing this with the mullets, because now we're not allowed to have our 50 lbs. or 100 lbs. of bycatch to catch our red drum.

Cayton Daniels spoke about reductions. He asked the commissioners to look behind him to see how many fishermen in the room have gray hair. He said he can count on two hands the number of commercial fishermen. He said striped mullet needs to be looked at again and redone. He said there have been more striped mullet in the last two years than he can remember in his lifetime. Mr. Daniels said one of the main buyers would not buy mullet this year for two weeks' worth of fish, so the MFC is affecting the market by shortening the season. He urged the MFC to look at striped mullet again and make changes.

Robert Salter, a commercial fisherman for 74 years, said striped mullet are not just in North Carolina. They travel from one place to the other. He said the MFC is stopping people that need the money from striped mullet. He asked commissioners how they would like to want to work for two weeks and then just have it stop. Mr. Salter said mullet are all over the world and they travel from one place to another. He said stopping fishermen from fishing impacts them from being able to pay bills and buy groceries and said it is not right. For shrimping he said it is the same: you cannot do this, cannot do that. He said it is not right to treat people this way. He said to do unto others as you would have them do unto you. He urged the MFC to think about it.

Anthony Mendoza, a commercial fisherman for over 45 years, said all these mullets are being cast netted. He said he understands why the MFC shut it down, because maybe other people, not natives from around here, bought up the land and do not like commercial fishermen and what commercial fishermen do, like gill netting. He said he just walked in the door from fishing; that is how he makes it through the wintertime: mullet fishing. He asked the MFC to open the season earlier than December 31 so commercial fishermen can still get more fish to help over the winter. He said he hates to see it go away from commercial fishermen like this in a short amount of time because it helps him get through the wintertime. That is his job.

End 6:23 p.m.

November 16, 2023

Chairman Bizzell convened the MFC business meeting at 9:00 a.m. on November 16, 2023, with the public comment period. The public comment session began at 9:00 a.m. and ended at 9:24 a.m. and the following comments were received:

Public Comment Period

Jerry Schill, Director of Government Affairs for NCFA, provided comments on the process and how to avoid litigation. He said as of February 2022 in the Southern Flounder FMP, the DMF has the ability to set trip limits for pound nets only after meeting the closure thresholds. He played a portion of two recordings from a previous presentation by DMF staff member Mike Loeffler regarding southern flounder management. Mr. Schill said the approved FMP does not have anything in adaptive management about reducing the days allowed; trip limits can only be used for reopening once thresholds have been met. He said this is stated in the FMP nine times. He said NCFA Executive Director Glenn Skinner sent an email to Director Rawls about this, but she proceeded with setting trip limits anyway. Mr. Schill said the MFC can and should discuss the blatant disregard of the provisions of the FMP by the DMF. He said that is what should be done and if not, one can look at the courts or other legislative review.

Stuart Creighton, Coastal Conservation Association North Carolina (CCANC) Fisheries Committee Chairman, said he sent an email to the DMF director about new pound nets in West Bay and suggested that rules be reviewed to provide authority for the director to deny a pound net for a particular species when the fish is in recovery. Next, Mr. Creighton said there is an increasingly significant role of aquaculture in the shellfish industry. It is truly sustainable, improves water quality, and helps oyster reefs to recover. He urged the MFC to make sure this state approves these leases correctly. He said they should be a small area for true small business enterprises, and large corporations should not be allowed to lease out large chunks of State waters. Mr. Creighton said make sure they are not to use the fast-growing Chinese oysters so as to avoid the introduction of another invasive species. He said to make sure they are cited properly so that important public fishing waters do get blocked. Mr. Creighton referenced what is happening in Stump Sound and the Topsail area as being a good example of what not to do. He said it is time to stop the mechanical harvest of native oyster reefs and clamming areas. Mr. Creighton said they are reduced to less than 10 percent of historical coverage and need to be rebuilt. For recreational harvest, an appropriate license fee or stamp should be added for those that want to pick, tong, or rake by hand providing a responsible limit for harvest so fishermen can enjoy the resource without harming a given area. For striped mullet management, Mr. Creighton said this will result in a derby fishery when the short roe fishery begins. He asked the MFC not to forget about striped mullet's role as a forage fish. He said cast netting should continue without limitations.

David Sneed, Executive Director with the Coastal Conservation Association North Carolina (CCANC), provided a handout to the MFC. He said what we all need to do is relax a little bit. Some of the things said at the public comment period last night probably rattled some people. Mr. Sneed said there were attacks on the MFC and on DMF staff. Mr. Sneed said such comments were made about "there's plenty of fish", "you just don't know what you're doing because you're not from around here". He went on to say, just because you live at the coast it doesn't mean the fish belong

to you. He said the North Carolina Constitution and the North Carolina court of appeals will back him up on that. Mr. Sneed said there were a lot of comments heard about fishermen not being able to feed their families and about the system being broken, to which he did agree too. He said we need to figure out how to fix it. He encouraged the MFC to not be intimidated by the "hell raising" and concentrate on what they can do to fix it. Next, he thanked Director Rawls and DMF staff member Jordan Byrum for the DMF's work on the Mouse Harbor artificial reef project, the second CCANC project in two years. He said they need to figure out how to do more enhancement projects next year. Regarding the CCANC lawsuit, he said the handout shows a schedule, and he encouraged the MFC to read it.

Matthew Wallin, a concerned recreational angler, thanked the MFC for what it does, but he said North Carolina's ability to manage the fisheries for the common good is broken. He said the MFC needs the trust of the public, accountability, and enforcement in written laws, all three of which are lacking in fisheries management in North Carolina. Mr. Wallin said the angling public and commercial fishermen lack trust in the DMF's ability for long term viability and true sustainability. He said there is a lack of accountability, standards, and deadlines in their very own FMPs, enforcement is minimal at best and there is a lack of accountability measures for both commercial and recreational fisheries for continuing to break the law; most fishermen pay the fine and go on with business as usual. He said he is frustrated with the rules and laws in place; they limit the ability to sustainably manage. He said for striped mullet harvest today, based on DMF data, 98% is commercial, so he does not see how it is necessary to close the recreational fishery for bait. He asked the MFC if a one-month recreational closure will really give the reductions needed. He said the roe fishery is the real problem; they are full of eggs and their harvest is leading to the decline. For oyster harvest, he asked why not implement a mandatory recreational permit like a deer tag, either free or with a charge where those funds could be used to create oyster reefs. Regarding speckled seatrout, Mr. Wallin said he hopes they have not forgotten, as it seems the DMF is slow walking the FMP, using a stock status from 2019. He asked how the MFC is going to allow two more harvest seasons before any management changes can be implemented. He said that will be six years ago and a lot can change in that time. He said this is a broken system and he hopes it can be fixed; until then, the future of fisheries will play out in court.

Joey Frost thanked the MFC for being here to help with what is going on with the mullet fishery. He said he thinks the whole state has heard about the 77,600 pounds of mullet he caught (in the stop net fishery). He said he has been involved with the mullet fishery since he was a toddler, and he has been in business at least 60 years. He remembers the biggest harvest he was part of in 1974 at about 92,000 pounds. He said this year was the second biggest harvest he has been involved with. He said he is part of the mullet fishery, and it is a bad time because it has been made a derby fishery with what the MFC has done. All the gill netters went fishing night and day. He is thankful the dealer he works with had the capability to handle the harvest. Mr. Frost said two weeks ago, he was baling fish but there was no capacity to handle it. He had 40,000 fish and if he let them go, two-thirds of them would die. The dealer forced himself to address this problem. He said we do not need a derby fishery. He said he was part of the FMP advisory committee for striped mullet. After this derby system, the MFC needs to direct the DMF director to do some more work on that. Mr. Frost said more people need to be involved on the committee, like adding fish house dealers. He said if the MFC does something here and the dealers cannot handle it, it does not make sense. He said this needs to go back to the committee and make sure they evaluate more ideas. He encouraged

the MFC to table this item, have more meetings, and bring this back to the DMF to bring it back for the MFC to pass.

Thomas Newman, a commercial fisherman and employee of the NCFA, spoke about changes in recreational data collection for southern flounder. He provided a handout that shows how recreational harvest changed for each updated made to the Southern Flounder FMP, and how it was measured each time. Mr. Newman explained in the original 2005 FMP, MRFSS was used to calculate hook and line estimates, a 2½-year DMF study was used to estimate recreational gig harvest, and a 2-year DMF survey was used to estimate Recreational Commercial Gear License landings to give the total recreational harvest. He said in Amendment 1, recreational hook and line harvest was again estimated by use of MRFSS, but the recreational gig harvest survey was recalculated and was set equal to the annual hook and line harvest throughout the time series. Mr. Newman said in Amendment 1 the Recreational Commercial Gear License data was deemed unreliable and was not used although it represented 97,000 lbs. of harvest annually in the original 2005 FMP. Mr. Newman said in Amendment 2 hook and line recreational harvest estimates were collected in and back calculated with MRIP estimates. He said recreational gig harvest in Amendment 2 went through yet a third estimation method change in which recreational gig harvest was calculated through a DMF mail survey. He explained a hind-casting approach was then used to recalculate gig harvest estimates prior to 2010. Mr. Newman said Recreational Commercial Gear License landings, past and present, were again disregarded and not considered for Amendment 2. He stated that none of the recreational catch estimate methods we have previously used have given us accurate results. Our current data collection method, MRIP, is not designed to monitor and track landings and pulse fisheries like our two-week flounder harvest season. Mr. Newman said it is well documented that MRIP is likely to produce highly variable estimates for short harvest seasons. He said he has been told that more changes are coming from MRIP, which will change their recreational harvest data once again. Mr. Newman said mandatory recreational harvest reporting has been passed by NC legislation. He said NCFA fully supports mandatory reporting because everyone can see that the past and current methods of collecting recreational data have failed to produce reliable estimates time and again. He stated that recreational harvest reporting has been successful in other states, and it can be successful in North Carolina as well with support from the DMF and this commission.

Glenn Skinner, NCFA Executive Director and commercial fisherman, spoke about the 2022 stock assessment for striped mullet and said no document ever produced by the DMF has been in such stark contrast with a fishery. He said he has never seen striped mullet like he has seen this year; the stock status from the assessment could not be true with the expansion occurring in the fishery. He said he is frustrated because what we are seeing does not match what is happening. This is the most visible species we see and there is very little effort needed for the DMF to verify it. He said if you sit on the beach in a beach chair you can see them; this is not flounder, it is nothing like that. Mr. Skinner said with the reproductive capability of striped mullet we are seeing expansion in the fishery. Pages 91-92 of the stock assessment report have charts that show how many fish were harvested by sector by number of fish. He said this shows that quite often the recreational fishery is harvesting more than the commercial fishery, but the data is not presented that way. He said the recreational and commercial fisheries are not having an impact on the stock because it is expanding. He is catching 10,000 – 15,000 pounds in a gill net; you cannot run the net over without catching that much. Mr. Skinner thanked Commissioner Bethea for sitting with fishermen last night after the

public comment session to see fishermen's videos of the fish. He said these are harsh actions for this fishery. He sat with Director Rawls, and she expressed her concerns about the stock assessment to us, but she has not shared those with the MFC.

Brent Fulcher, chairman of the North Carolina Fishery Association (NCFA), a commercial fisherman, and business owner provided a handout to the MFC. He said we all lost a huge resource when Jimmy Ruhle passed away in September. He kept accurate, real-time data for inshore surveys with the Virginia Institute of Marine Science. Mr. Fulcher said with his landings alone that last year he purchased 528,000 lbs. of mullet for the year. He said this year through the closure date he purchased 524,000 lbs. He said in addition to what he purchased last year, he purchased 101,000 lbs. past what is now the season closure date. He said the landings probably would have been the biggest this year if fishermen had been allowed to operate traditionally. He said buyers were forced to start earlier, and a lot of them could not handle the fish. The fish soured, so market conditions may show landings were down, but if so, it is the market, not the fishery. Mr. Fulcher said he could not take the risk of not handling the fish in a wholesome manner. If it had been one day either way, if it had been normal, look at the food source, look at the data, look at the landings last year and this year. Everyone he talked to said something must be wrong. Mr. Ruhle said no one should make more than a 10 percent change in one year because of social and economic reasons.

End 9:24 a.m.

Preliminary Matters

Chairman Bizzell called the business meeting to order. He began the meeting with a moment of silence, followed by the pledge of allegiance.

Chairman Bizzell reminded all commissioners of N.C. General Statute § 138A-15E, which mandates at the beginning of any meeting of a board, the Chair shall remind all members of their duties to avoid conflicts of interest under Chapter 138 and the Chair shall also inquire as to whether there is any known conflict of interest with respect to any matters coming before the board at that time. There were no stated conflicts of interest from any commissioner.

The following MFC members were in attendance: Rob Bizzell – Chairman, Ryan Bethea, Mike Blanton, Sammy Corbett, Sarah Gardner, Donald Huggins, Robert McNeill, Dr. Doug Rader, and Tom Roller. A quorum was achieved.

Chairman Bizzell noted several adjustments to be made to the agenda dealing with the rule making section, to be held day 3, November 17th, 2023. Chairman Bizzell stated they did not need to vote on the following at this time and these items could be removed and placed on the next meeting agenda:

- Vote on final approval to amend 15A NCAC 03K and 18A .0302.
- Vote on final approval to amend 15A NCAC 03I .0113, 03O .0101, .0109, .0112, .0301 for Data Collection and Harassment Prevention for the Conservation of Marine and Estuarine Resources.
- Vote on final approval to amend 15A NCAC 03R .0117 for Oyster Sanctuary Changes.

- Vote on final approval to amend or repeal 15A NCAC 03I .0101, 03K .0101, .0104, .0301, .0401, .0403, .0405, 03O .0201, .0501, .0503, 18A .0901, .0906 for Conforming Changes for Shellfish Relay Program and Shellfish Leases and Franchises.

Motion by Commissioner Roller to approve the meeting agenda, as modified for rulemaking actions.

Second by Commissioner Huggins.

Motion passed without dissention. (Removed 15A NCAC 03K .0110, 18A .0302 from the first subject, and removed the second, third, and fourth listed subjects.)

Chairman Bizzell asked for any corrections, additions, or deletions that need to be made to the August 2023 MFC Quarterly Business Meeting minutes. Hearing none, he called for a motion to approve the minutes.

Motion by Commissioner Roller to approve the minutes of the August 2023 business meeting.

Second by Commissioner McNeil.

Motion passed without dissention.

Chairman's Report

Letters and Online Comments
Chairman Bizzell referred commissioners to letters and comments provided in the briefing materials.

Ethics Training and Statement of Economic Interest Reminder
Chairman Bizzell reminded commissioners to stay up to date on their ethics training and Statement of Economic Interest.

2024 Meeting Schedule
Chairman Bizzell referred commissioners to the 2024 proposed meeting schedule provided in the briefing materials.

Commission Committee Assignments
In provided material

MFC Workplan
In provided material

Committee Reports

Nominating Committee
Commissioner Tom Roller recused himself.

Chris Batsavage presented information on the four nominees for the at-large seat for the South Atlantic Fishery Management Council (Thomas N. Roller, Christopher G. Kimrey, Michael R. Oppegaard, and E. Jot Owens), and the three nominees for the at-large seat for the Mid-Atlantic Fishery Management Council (Anna Barrios Beckwith, Stuart Creighton, and William Gorham) that were recommended to the full MFC for approval by the MFC Nominating Committee at their October meeting. Chris Batsavage stated Sara Winslow is the current at-large member from North Carolina on the Mid-Atlantic Fishery Management Council and she is completing her third consecutive term and will not be eligible for reappointment.

Motion by Commissioner McNeill to approve the slate of nominees for the at-large seat for the South Atlantic Fishery Management Council and the at-large seat for the Mid-Atlantic Fishery Management Council.

Second by Commissioner Corbett.

	ROLL CALL VOTE				
Member	**Aye**	**Nay**	**Abstain**	**Recuse**	**Absent**
Bethea	☒	☐	☐	☐	☐
Blanton	☒	☐	☐	☐	☐
Corbett	☒	☐	☐	☐	☐
Gardner	☒	☐	☐	☐	☐
Huggins	☒	☐	☐	☐	☐
McNeill	☒	☐	☐	☐	☐
Rader	☒	☐	☐	☐	☐
Roller	☐	☐	☐	☒	☐
Bizzell	☒	☐	☐	☐	☐

Motion passed without dissention, with one recusal.

Director's Report

Director Kathy Rawls provided an update to the MFC on recent legislative items from House Bill 600, which has impacts for many of the Department of Environmental Quality divisions, including the DMF. One of these items is the phased-in mandatory commercial reporting of harvest of all species, and recreational reporting of harvest of flounder, red drum, spotted seatrout, striped bass, and weakfish. She said the MFC is tasked with temporary and permanent rulemaking to implement the requirements beginning December 1, 2024. The rules must specify how and when all commercial fishermen will report their harvest, regardless of sale, when engaged in a commercial fishing operation, and how and when all recreational fishermen will report the harvest of the five aforementioned species. She said non-recurring funds of five-million dollars were allocated for developing a reporting application. Director Rawls discussed concerns with the time frame, as well as other challenges with the task, and the need for setting expectations.

Director Rawls highlighted key items from the budget bill from the 2023 session. State employees received a 4% increase for the 2023-2024 fiscal year and an additional 3% increase for the 2024-2025 fiscal year. There were also marine patrol increases to better align their salaries with other law enforcement agencies. The pay increases are only funded for full-time appropriated positions, which for the DEQ means about 30% of positions are covered. Funding comes from other sources for the increases for the non-appropriated positions, which comes out of operating budgets for those positions.

Director Rawls provided an update on the CCANC lawsuit. She said it has taken an extensive amount of time for staff to fulfill the requirements of the process. Information continues to be exchanged in the discovery process and the judge has set a schedule for certain steps that will occur this year.

Director Rawls touched on public comments the MFC received the night before the business meeting regarding how great flounder fishing was in South Carolina. She offered a reminder that flounder are also overfished with overfishing occurring in South Carolina because it is a multi-state stock. North Carolina is taking appropriate actions, but this is not just a North Carolina responsibility. Director Rawls said there has been significant public confusion across the state regarding the separate flounder seasons in North Carolina and where those regulations applied. The Wildlife Recourses Commission rules continue to fall out of sync with MFC rules and DMF proclamations, as well as interstate and federal management for marine and estuarine species.

Director Rawls expressed appreciation on tips and reports of fishing activity that have been received. She said the DMF only has 56 officers who are responsible for 4,000 miles of coastline and 2.5 million acres of water. Tips and reports are appreciated and investigations into illegal activity are conducted. Director Rawls said to keep in mind that something that looks illegal is not necessarily illegal, and it takes time to investigate.

Director Rawls said her report will continue to highlight section updates, not just fishery management plan items, so the MFC will hear updates from several section chiefs and senior staff.

Division of Marine Fisheries Operations Update – Deputy Director Mike Loeffler gave a Power Point presentation with an overview of DMF operations over the last year and details on the annual budget.

To view the presentation, go to: https://www.deq.nc.gov/marine-fisheries/mfc/mfc-meetings/dmf-overview-nov-2023-mfc/open.

Atlantic States Marine Fisheries Commission Update
Mid-Atlantic Fishery Management Council Update – Special Assistant for Councils Chris Batsavage gave updates from the August 2023 meetings of the Atlantic States Marine Fisheries Commission and the Mid-Atlantic Fishery Management Council.

South Atlantic Fishery Management Council Update – Executive Assistant for Councils Trish Murphey gave an update from the September 2023 meeting of the South-Atlantic Fishery Management Council.

Habitat and Enhancement Section Update – Habitat and Enhancement Section Chief Jacob Boyd gave an update regarding activities of the Habitat and Enhancement Section covering enhancement, habitat, and aquaculture.

Shellfish Sanitation and Recreational Water Quality Section Update – Environmental Program Supervisor Andy Haines gave an update regarding activities of the Shellfish Sanitation and Recreational Water Quality Section, including information about the opening of a new northern lab, the 2023 Interstate Seafood Seminar & Gulf and South Atlantic States Shellfish Conference held in Wilmington, NC in November 2023, and the enhancement of capabilities for monitoring coastal waters for potentially harmful phytoplankton and biotoxins.

Fisheries Management Section Update – Fisheries Management Section Chief Steve Poland gave an update regarding activities of the Fisheries Management Section, including the stock assessment program, encouraging donations of carcasses for aging, and the multispecies tagging program.

Marine Patrol Section Update – Col. Carter Witten gave an update regarding activities of the Marine Patrol Section, including the active 2023 flounder season, the filling of staff vacancies, and patrol calls.

License and Statistics Section Update – License and Statistics Section Chief Brandi Salmon gave an update regarding activities of the License and Statistics Section. She provided the MFC with the License and Statistics Annual Report (AKA "The Big Book") that provides summaries of commercial and recreational harvest and landings data along with commercial and for-hire license and permit sales statistics for the State of North Carolina.

Informational Materials

Director Rawls referred commissioners to the informational materials in their briefing documents, including the Protected Resources Update Memo.

Fishery Management Plans

Status of Ongoing Plans
FMP Coordinator Corrin Flora gave a presentation on the status of ongoing fishery management plans.

To view the presentation, go to: https://www.deq.nc.gov/marine-fisheries/mfc/mfc-meetings/status-ongoing-plans-nov-2023-mfc/open.

Estuarine Striped Bass FMP Amendment 2 Adaptive Management Update
DMF striped bass leads Nathaniel Hancock and Charlton Godwin gave a presentation with an update on adaptive management measures under Amendment 2, 2023 data and stocking results, and steps moving forward for striped bass in the Albemarle Sound and Roanoke River. Support for a moratorium, continued concern for the health of the stock, and the need for increased natural recruitment were briefly discussed.

To view the presentation, go to: https://www.deq.nc.gov/marine-fisheries/mfc/mfc-meetings/estuarine-striped-bass-fmp-amendment-2-adaptive-management-update-nov-2023-mfc/open.

Hard Clam FMP Amendment 3 and Eastern Oyster FMP Amendment 5
DMF hard clam and oyster leads Lorena de la Garza, Jeff Dobbs, Bennett Paradis, and Joe Facendola gave a presentation on the development of Amendment 3 to the Hard Clam FMP and Amendment 5 to the Oyster FMP, including the goal and objectives and potential management strategies for each FMP. The staff summarized the results of the Sept. 11-22, 2023, public scoping period and additional public outreach efforts underway, including for the mechanical harvest fisheries. Staff are continuing to draft the first version of the amendments and will hold an FMP workshop later this year to further develop the amendments with the FMP advisory committee. Longer-term planning and outcomes for oyster reefs in Pamlico Sound, and SAV protections were briefly discussed.

To view the presentation, go to: https://www.deq.nc.gov/hard-clam-fmp-amendment-3-and-eastern-oyster-fmp-amendment-5-nov-2023-mfc/open

Motion by Commissioner Roller to approve the goal and objectives for the Eastern Oyster Fishery Management Plan Amendment 5 as presented by staff, except the goal is changed from "maintain" oyster populations to "enhance" oyster populations.

Second by Commissioner McNeill.

	ROLL CALL VOTE				
Member	**Aye**	**Nay**	**Abstain**	**Recuse**	**Absent**
Bethea	☒	☐	☐	☐	☐
Blanton	☒	☐	☐	☐	☐
Corbett	☒	☐	☐	☐	☐
Gardner	☒	☐	☐	☐	☐
Huggins	☒	☐	☐	☐	☐
McNeill	☒	☐	☐	☐	☐
Rader	☒	☐	☐	☐	☐
Roller	☒	☐	☐	☐	☐
Bizzell	☒	☐	☐	☐	☐

Motion passed unanimously.

Motion by Commissioner Rader to approve the goal and objectives for the Hard Clam Fishery Management Plan Amendment 3 as presented.

Second by Commissioner Roller.

	ROLL CALL VOTE				
Member	**Aye**	**Nay**	**Abstain**	**Recuse**	**Absent**
Bethea	☒	☐	☐	☐	☐
Blanton	☒	☐	☐	☐	☐
Corbett	☒	☐	☐	☐	☐
Gardner	☒	☐	☐	☐	☐
Huggins	☒	☐	☐	☐	☐
McNeill	☒	☐	☐	☐	☐
Rader	☒	☐	☐	☐	☐
Roller	☒	☐	☐	☐	☐
Bizzell	☒	☐	☐	☐	☐

Motion passed unanimously.

Striped Mullet FMP Amendment 2 (Draft)

DMF striped mullet leads Willow Patten and Jeff Dobbs gave a presentation that reviewed the draft amendment, including the goal and objectives, management unit, striped mullet fisheries in North Carolina, 2022 stock assessment results, the two issue papers and information paper

included in Amendment 2, and the timeline for implementation of the amendment. Potential use of drone technology for future evaluation of striped mullet as they congregate and school was briefly discussed but would be for an amendment in the future contingent on funding and staffing.

To view the presentation, go to: https://www.deq.nc.gov/marine-fisheries/mfc/striped-mullet-fmp-amendment-2-draft-nov-2023-mfc/open.

Motion by Commissioner Roller to approve the draft Striped Mullet Fishery Management Plan Amendment 2 for public and MFC advisory committee review.

Second by Commissioner McNeill.

	ROLL CALL VOTE				
Member	**Aye**	**Nay**	**Abstain**	**Recuse**	**Absent**
Bethea	☒	☐	☐	☐	☐
Blanton	☒	☐	☐	☐	☐
Corbett	☒	☐	☐	☐	☐
Gardner	☒	☐	☐	☐	☐
Huggins	☒	☐	☐	☐	☐
McNeill	☒	☐	☐	☐	☐
Rader	☒	☐	☐	☐	☐
Roller	☒	☐	☐	☐	☐
Bizzell	☒	☐	☐	☐	☐

Motion passed unanimously.

Rulemaking

Rulemaking Issues Update
MFC Counsel Phillip Reynolds briefed the MFC on two items that relate to the MFC's rulemaking actions at its August 2023 business meeting.

15A NCAC 03M .0101, MUTILATED FINFISH
At its August 2023 business meeting, the MFC discussed objections raised by the Wildlife Resources Commission (WRC) to proposed amendments to the MFC's mutilated finfish rule. At that time, Reynolds informed the MFC he would provide proposed rule amendments to satisfy the objection at the MFC's November 2023 business meeting. Reynolds advised the MFC that since then, things have changed. Specifically, when the budget became law there were provisions about the rulemaking process and the return of rules to an agency. Previously, when the Rules Review Commission (RRC) objected to a rule, the rule stayed under review until the agency requested return of the rule, at which point the rulemaking process could begin again. However, when the budget became law, it required the RRC to return rules to agencies if the rules had not been

submitted. The MFC's mutilated finfish rule was returned as a result of that legislative change. Reynolds said the proposed amendments to the mutilated finfish rule did not become effective, but the existing rule remains intact in the N.C. Administrative Code. Reynolds said he intends to bring proposed language to the MFC at its February 2024 business meeting so the desired outcome can be reached.

15A NCAC 03Q .0106, APPLICABILITY OF RULES: JOINT FISHING WATERS

Reynolds spoke about the authority to manage fisheries resources in joint fishing waters and the continuing assertion by the WRC that it has exclusive authority over hook and line fishing in joint fishing waters. Reynolds said the WRC's assertion is inconsistent with an advisory opinion by the Attorney General's office regarding the rule. In August, Reynolds recommended striking out a portion of the rule, but also to consider other amendments. Reynolds said, a further look revealed that the revision discussed in August would not be sufficient to resolve the confusion over hook and line fishing in joint fishing waters. Reynolds presented proposed amendments to 15A NCAC 03Q .0106 that would replace the existing text of the rule and said a draft regulatory impact analysis of the proposed amendments is being developed. Reynolds recommended authorizing staff to move forward with publishing the notice of text, pending OSBM approval of the regulatory impact analysis. Reynolds said he does not see any fiscal impact or required changes for operating under the revised rule because it is not impacting anything other than providing clearer conflict resolution. Reynolds said for the proposed amendments to become effective, the rule would either have to be agreed to by the WRC or resolved via the Governor's office per G.S. 113-132(d).

Motion by Commissioner Corbett to approve Notice of Text for Rulemaking to amend 15A NCAC 03Q .0106, pending OSBM approval of the Regulatory Impact Analysis.

Second by Commissioner Rader.

	ROLL CALL VOTE				
Member	**Aye**	**Nay**	**Abstain**	**Recuse**	**Absent**
Bethea	☒	☐	☐	☐	☐
Blanton	☒	☐	☐	☐	☐
Corbett	☒	☐	☐	☐	☐
Gardner	☒	☐	☐	☐	☐
Huggins	☒	☐	☐	☐	☐
McNeill	☒	☐	☐	☐	☐
Rader	☒	☐	☐	☐	☐
Roller	☒	☐	☐	☐	☐
Bizzell	☒	☐	☐	☐	☐

Motion passed unanimously.

Rule Suspensions Update Memo

Fisheries Management Section Chief Steve Poland gave a brief verbal update regarding recent rule suspensions and requested the MFC approve additional suspensions.

Motion by Commissioner Roller to suspend section (a) of NCMFC Rule 15A NCAC 03M .0502 MULLET and section (1) of NCMFC Rule 15A NCAC 03M .0101 MUTILATED FINFISH for an indefinite period.

Second by Commissioner Corbett.

	ROLL CALL VOTE				
Member	**Aye**	**Nay**	**Abstain**	**Recuse**	**Absent**
Bethea	☒	☐	☐	☐	☐
Blanton	☒	☐	☐	☐	☐
Corbett	☒	☐	☐	☐	☐
Gardner	☒	☐	☐	☐	☐
Huggins	☒	☐	☐	☐	☐
McNeill	☒	☐	☐	☐	☐
Rader	☒	☐	☐	☐	☐
Roller	☒	☐	☐	☐	☐
Bizzell	☒	☐	☐	☐	☐

Motion passed unanimously.

Rulemaking Update

The DMF's Rulemaking Coordinator Catherine Blum provided updates on two rulemaking cycles, including public comments received in support of the 2023-2024 rulemaking cycle. She also provided a preview of upcoming items for the 2024-2025 rulemaking cycle.

Motion by Commissioner Rader to give final approval to readopt per G.S. 150B-21.3A and repeal and adopt 15A NCAC 18A .0301, .0305, .0401-.0424, .0426-.0430, .0432-.0439, .0501-.0504, .0601-.0621, .0701- .0713, .0801-.0806 (excluding 15A NCAC 03K .0110 and 18A .0302).

Second by Commissioner Huggins.

	ROLL CALL VOTE				
Member	**Aye**	**Nay**	**Abstain**	**Recuse**	**Absent**
Bethea	☒	☐	☐	☐	☐
Blanton	☒	☐	☐	☐	☐
Corbett	☒	☐	☐	☐	☐
Gardner	☒	☐	☐	☐	☐
Huggins	☒	☐	☐	☐	☐
McNeill	☒	☐	☐	☐	☐
Rader	☒	☐	☐	☐	☐
Roller	☒	☐	☐	☐	☐
Bizzell	☒	☐	☐	☐	☐

Motion passed unanimously.

Issues from Commissioners

Commissioner McNeill – reexamine potential waste of striped mullet during the closed season due to no possession allowed, balanced with enforcement concerns, if anticipating 2024 season closure

Chairman Bizzell – inquired about being removed from the DEQ email distribution list due to the volume of routine distributions

Review of MFC Workplan, Meeting Assignments, and Preview of Agenda Items for Next Meeting

Lara Klibansky reviewed meeting assignments and provided an overview of the February 2024 meeting items.

Having no further business to conduct, Chairman Bizzell adjourned the meeting at 3:23 p.m.

(The MFC Business Meeting for November 2023 was concluded in full on November 16, 2023.)

NC Marine Fisheries Commission

Chairman's Report

February 2024 Business Meeting

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.

Marine Fisheries Commission 2024 Calendar

Dates are subject to change.

January

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

February

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		

March

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		30
31						

April

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				

May

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		28	29	30	31	

June

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						

July

Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3		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			

August

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	

September

Su	Mo	Tu	We	Th	Fr	Sa
1		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					

October

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		

November

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

2024 MFC Meeting Dates

MFC Business Meetings	Northern Regional AC	Southern Regional AC
February 21-23	January 9	January 10
May 22-24	April 9	April 10
August 21-23	July 9	July 10
November 20-22	October 8	October 9

Shellfish/Crustacean Standing AC	Finfish Standing AC	Habitat and Water Quality Standing AC
January 11	January 16	January 17
April 11	April 16	April 17
July 11	July 16	July 17
October 10	October 15	October 16

Calendar Key

- MFC
- ASMFC
- SAFMC
- MAFMC
- State Holiday
- Northern Regional AC
- Southern Regional AC
- Shellfish/Crustacean Standing AC
- Finfish Standing AC
- Habitat and Water Quality Standing AC

2023 Committee Assignments for Marine Fisheries Commissioners

08/31/2023

FINFISH ADVISORY COMMITTEE

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

Commissioners: Tom Roller – co-chair, Mike Blanton – vice chair
DMF Staff Lead: Lee Paramore - lee.paramore@deq.nc.gov
Meeting Frequency: Can meet quarterly, depending on assignments from MFC

HABITAT AND WATER QUALITY ADVISORY 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: Doug Rader – chair, Sarah Gardner– vice chair
DMF Staff Lead: Anne Deaton - anne.deaton@deq.nc.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: Mike Blanton – chair, Ryan Bethea – co-chair
DMF Staff Lead: Tina Moore - tina.moore@deq.nc.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: Doug Rader - chair, and Robert McNeill
DMF Staff Lead: Steve Poland – steve.poland@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, Donald Huggins – co-chair
DMF Staff Lead: Col. Carter Witten – carter.witten@deq.nc.gov
Meeting Frequency: Meets as needed

COASTAL RECREATIONAL FISHING LICENSE TRUST 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: Robert McNeill– chair, Rob Bizzell, Tom Roller, and Doug Rader
DMF Staff Lead: Paula Farnell – paula.farnell@deq.nc.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, Tom Roller – vice chair, Donald Huggins, Sammy Corbett
DMF Staff Lead: Chris Batsavage - chris.batsavage@deq.nc.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@deq.nc.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: Sammy Corbett - chair, Mike Blanton - vice chair, Ryan Bethea
DMF Staff Lead: William Brantley – william.brantley@deq.nc.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, Donald Huggins, Sarah Gardner
DMF Staff Lead: Anne Deaton - anne.deaton@deq.nc.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:
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: Doug Rader, Donald Huggins
DMF Staff Lead: Anne Deaton – anne.deaton@deq.nc.gov
Meeting Frequency: Meets as needed

Marine Fisheries Commission 2023-2025 WORKPLAN

INCORPORATING ACTIVITY UNDERWAY AND UPCOMING ASSESSMENTS

General Timelines and Abbreviations (See "General Timelines" worksheet for details, Colored blocks below indicate MFC Action Point)

Fishery Management Plans	(SA)	SAR	GO	(PD)	AC/Pub	PMO	A
	Stock Assessment In Progress	Stock Assessment Report Presented to MFC	Vote to Approve Goal and Objectives	Initial Plan Development by DMF/FMP AC	Advisory Committee and Public Review	Select Preferred Management Options	Vote on Final Approval
Non-FMP Rule Development	R	IP	PR	RLO	PRL		
	Request Issue Development	Information Paper In-Progress	Decision to pursue rulemaking	Issue paper with rule language options In-Progress	Select Preferred Rule Language		
Rulemaking	FA	NOT	NCR/PH/PC	A			
	Fiscal Analysis In-Progress	Approve Notice of Text	Publish in NC Register/Hold Public Hearing&Comment Period	MFC Review Public Comment & Vote on Approval			
MFC Committee Activity	APR	JUL					
	Meeting confirmed and scheduled	Meeting anticipated					

Topic	DMF Staff Lead(s)	Quarterly Business Meeting: Nov - 23	Feb - 24	May - 24	Aug - 24	Nov - 24	Feb - 25	May - 25	Aug - 25
Stock Assessments									
Southern Flounder Stock Assessment Update	Schlick	(SA)	(SA)	SAR					
Blue Crab Stock Assessment Update	Schlick	(SA)	(SA)						
Active Management Plans									
Striped Mullet FMP Amendment 2	Zapf/Dobbs	AC/Pub	PMO	A					
Spotted Seatrout FMP Amendment 1	Behringer/Pensinger	(PD)		AC/Pub	PMO	A			
Hard Clam/Oyster	Dobbs/Facendola	G/O	(PD)		AC/Pub	PMO	A		
Status of Commission Requests									
Update False Albacore Issue Paper	Seward/Markwith	RLO	PRL						
Pot Marking Requirements Issue Paper	Blum	RLO	PRL						
Federal Permits - Review Feasibility of State Requirements	Murphey/Batsavage/Witten/Poland/Klibansky				IP	PR			
Rulemaking									
18A Rule Readoption - Shellfish Sanitation (85 rules)	Blum/Walsh/Subject Matter Experts	A							
Data Collection and Harassment Prevention for the Conservation of Marine and Estruarine Resources (5 rules)	Blum/Walsh/Subject Matter Experts			A					
Oyster Sanctuary Rule Changes (1 rule)	Blum/Walsh/Subject Matter Experts			A					
Conforming Rule Changes for Shellfish Relay Program and Shellfish Leases and Franchises (12 rules)	Blum/Walsh/Subject Matter Experts			A					
MFC Committees Meetings	(Meeting date(s) in cell)								
Nominating Committee	Batsavage/Blum	11-Oct				October			
Shellfish Cultivation Lease Review Committee	Reynolds								
CHPP Steering Committee	Rader/Blanton/Huggins								
Advisory Committees Activity Overview	(Meeting date(s) in cell)		In-Person	In-Person	In-person	In-Person	In-Person	In-Person	In-person
Northern Regional Advisory	Godwin/Paramore		JAN	APR	JUL	OCT	JAN	APR	JUL
Southern Regional Advisory	Moore/Stewart		JAN	APR	JUL	OCT	JAN	APR	JUL
Finfish Standing Advisory	Paramore/Rock	No meetings	JAN	APR	JUL	OCT	JAN	APR	JUL
Shellfish/Crustacean Standing Advisory	Moore/Deaton		JAN	APR	JUL	OCT	JAN	APR	JUL
Habitat and Water Quality Standing Advisory	Deaton/Harrison		JAN	APR	JUL	OCT	JAN	APR	JUL

ROY COOPER
Governor

ELIZABETH S. BISER
Secretary

KATHY B. RAWLS
Director

February 2, 2024

MEMORANDUM

TO: Marine Fisheries Commission
Northern Regional Advisory Committee

FROM: Charlton Godwin, Biologist Supervisor
Lee Paramore, Northern District Manager
Fisheries Management Section

SUBJECT: Meeting of the Marine Fisheries Commission's Northern Regional Advisory Committee to provide recommendations for management options for Marine Fisheries Commission Consideration on draft Amendment 2 to the Striped Mullet Fishery Management Plan

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The Marine Fisheries Commission's (MFC) Northern Regional Advisory Committee (AC) held a hybrid meeting on Jan. 18, 2024, at the Dare County Administration Building in Manteo. The meeting was also live streamed on YouTube. Advisory Committee members could attend in person or on WebEx and could communicate with other committee members.

The following AC members were in attendance in person: Melissa Clark, Herman Dunbar, Carl Hacker, Thomas Newman, Jonathan Worthington. The following AC members were in attendance on WebEx: Everett Blake, Roger Rulifson. The following AC members were absent: Keith Bruno, Jamie Lane, Allan Martin, Sara Winslow.

The following Division of Marine Fisheries (DMF) staff were in attendance: Kathy Rawls, Carter Witten, Edward Mann, Chris Lee, Steve Poland, Lee Paramore, Charlton Godwin, Corrin Flora, Hope Wade, Debbie Manley, Dan Zapf, Jeff Dobbs, Willow Patten, Rick Crawshaw, Haley Clinton.

Public: Twenty-seven members of the public attended in person and 17 viewers watched on YouTube. Nine members of the public provided public comment.

The Northern Regional AC had seven members in attendance and a quorum was met.

Northern Regional AC Vice-Chair Everette Blake called the meeting to order at 6:01 p.m.

APPROVAL OF THE AGENDA AND APPROVAL OF APRIL 12, 2023 MEETING MINUTES

A motion was made by Thomas Newman to approve the agenda for the meeting with a change in order of business to have Public Comment moved to after the staff presentation and before the AC deliberation and vote on Management Options. Second by Melissa Clark. The motion passed by unanimous consent.

A motion was made by Jonathan Worthington to approve the minutes from the Northern Regional AC meeting held on April 12, 2023, with the correction that Carl Hacker attended virtually only. Second by Thomas Newman. The motion passed by unanimous consent.

MARINE FISHERIES COMMISSION UPDATE

A memo was provided in the AC's briefing materials updating them on the actions taken during the MFC's November 2023 business meeting.

REVIEW STRIPED MULLET FMP DRAFT AMENDMENT 2 AND AC DISCUSSION

Division staff Jeff Dobbs and Willow Patten provided a review of the Striped Mullet Decision Document. The Decision Document outlines the Goals and Objectives of the FMP and lays out the Sustainable Harvest Options for the commercial fishery that will end overfishing and rebuild the striped mullet spawning stock biomass to a sustainable level. The data used to quantify harvest reductions are collected from commercial fishermen through the trip ticket and the Division's fish house sampling programs. Because they are quantifiable, commercial harvest reductions are used to meet the legal requirements of the Fisheries Reform Act to address overfishing and rebuild overfished stocks. Because harvest reductions from the recreational fishery are not quantifiable, sustainable harvest options are specific to the commercial fishery, where most striped mullet harvest occurs. A 21.3 to 35.4% reduction in commercial harvest relative to commercial landings in 2019 is needed to rebuild the striped mullet spawning stock biomass to a sustainable level.

Commercial Fishery Options

The management options to meet reductions in the commercial fishery relative to landings in 2019 included: Option 1: Size Limit Options; Option 2: Season Closure Options; Option 3: Trip Limits; Option 4: Day of Week Closures; Option 5: Combinations of Season and Day of Week Closures; Option 6: Stop Net Fishery Management; Option 7: Seasonal Catch Limits; Option 8: Area Closures; Option 9: Limited Entry; and Option 10: Adaptive Management.

Recreational Fishery Options

The intent of these management options is to allow traditional use of striped mullet in the recreational fishery while supporting sustainability objectives. Due to recreational fishery data collection methods and recreational fishery practices, it is not possible to calculate harvest reductions from the proposed management options. While recreational harvest currently accounts for only a small percentage of the striped mullet harvest, there is concern that the reduced availability of commercially harvested bait could lead to a significant shift in directed recreational harvest. The proposed options will reduce the potential for that type of shift and therefore support meeting the sustainability objectives successfully.

The Management Options for the recreational fishery included: Option 1: Recreational Bag Limit; and Option 2: For Hire Vessel and Bag Limit.

AC Discussion

AC member Jon Worthington asked if there had been any more sampling for mullet north of Harkers Island? In Albemarle Sound? Staff indicated yes. Jon asked if there was an economic analysis completed on the recreational use of mullet and the impact of closures and reductions? Staff indicated the data was not sufficient to complete an economic analysis on just the recreational harvest and use as bait. Staff explained the data gaps associated with estimates of recreational use either from bait landed commercially or from recreational cast net harvest. Staff indicated the recreational use of mullet for bait was a very small percentage of total mullet landings.

PUBLIC COMMENT

Nine members of the public spoke.

Steve House-Dare County Commissioner. Commented that the economic impact presented in the FMP is inadequate and does not meet the requirements of the Fisheries Reform Act. We have had several done for the county and each one has a final number of the actual impacts to income and also how many people are impacted. Also, the stock assessment the final year is 2019. There is no way we can work off data that is four years old. You need to have more recent data than that.

Chris Greene-Wanted to know how many recreational anglers received citations that were issued for illegal possession during the recreational closure? He feels the way the regulation was rolled out didn't inform the public about the changes. Thinks the Division could have done better at informing the public of the change. We should not have been writing citations for this regulation change.

Tracy Shisler-I don't understand how you get recreational fisherman's data. Fish houses have to turn in a trip ticket weekly, so I don't understand how we don't have the data we need from this sector. Staff indicated that we presume that bait shops that buy mullet directly from commercial fishermen are using all of those mullet for bait. Staff responded that the fish houses are the ones that may not fill out the trip ticket to indicate if the landings were used as bait or otherwise. That is where the data gap is. Tracy asked about the habitat discussions in the FMP. Asked if we were working with other agencies about the destruction of critical habitat, such as rampant building on the coast that may degrade spawning habitat and nursery habitat. Staff indicated this is where the FMPs link up with our Coastal Habitat Protection Plan and in that plan we outline how we work with other agencies to try and protect and restore critical habitat. Tracy asked if we could determine the exact level that habitat destruction impacts the mullet stock relative to fishing? Staff indicated we do not have data to determine what that level.

Mike Langowski-Frisco mullet fishing for 60 years. Third rodeo and recalled 1986 and 1991. In 1986 this was started to the tackle shop owners for years I sold to tackle shops. Yes, they must have trip tickets filled out. This isn't being done? Staff indicated that yes, we get that data but that is only a segment of the commercial harvest that may go for recreational fishing. You are shutting down my fishery for bait to the tackle shops. I've gone back and looked back at data to 1917 and 1945. Needed food to feed the troops in Europe. After all was said and done, they did a study that indicated no harm was done with all that harvest. In all my years of fishing since 1966 until the 1980s there was more mullet caught in Dare County and Harkers Island. I would go down at Christmas to Wilmington and haul seine off the beach and catch more mullet in a week than you say we can have now. Taken red drum away and talking about taking away speckled trout. More mullet now than there has been in 50 years.

Tami Gray-I'm trying to get an idea of where your data comes from too? Raise your hand if any of you guys go out on boats to fish for mullet? And where do you guys at DMF go? Staff indicated we have staff go out all over the state to collect our data. We have crews in all coastal counties that go out four days a week. Tami asked about how many yards of net we set and how we set nets. Staff indicated that specifics are available on all our studies and we can discuss that separately but it will take more than three minutes. Staff indicated this information is also available in our annual FMP updates. Staff indicated we would be glad to discuss all of our independent sampling. Staff indicated we would also be glad to actually take people out to see our sampling if they would like. We have actually taken out commission members to see our sampling.

David Warren-I mullet fished since mid 1990s. Not only fished NC but also fished Florida. What's interesting is in Florida with all the fishermen there they did away with the weekend closures and the 10-day closure they had in the wintertime. But there is more mullet now than it was in 1990s. It was harder to catch mullet then than now. There are less fishermen, the market is taking care of it. The Asian roe market had declined. If you're using 2019 data, you're using the wrong data. Because the market is not as lucrative as it used to be, I don't go mullet fishing as much anymore. Here to support my friends.

Reese Stecher-Can I ask a few quick questions before my three minutes starts, used to be five minutes. Have the surrounding states, Virginia and South Carolina, closed their mullet fishery? Staff responded no, not that they were aware. Next question is it true that there was a record catch this year for poundage for a single set down south? Staff asked if he is talking about the stop net fishery? Yes, there was a single catch of 76,000 pounds, but not sure if it is a record. Reese thanked the commercial fisherman that supply recreational fishery with mullet. We have only two or three fish left that are not overfished. All others are overfished. We need to see how much grant money you guys get for having fish on the overfished list. I know once you put a fish on the overfished list there has to be a group set up to recover the fish and have a time period for recovery. Is there is Federal Grant money coming to N.C. for overfished species? Staff corrected that statement; the Division does get Federal Grant money to help manage fisheries, but that money has nothing to do with whether the fish is listed as overfished or not. Reese-you guys are putting these folks out of business. There's more mullet out there than I've ever seen. It's so frustrating.

John Machie-In 2019 landings were down, people were doing other things. Still uses 2019 data on a fish that matures in two years. Got your foot in the door and are trying to take mullet from us. Never give us anything back. Staff explained there was a lack of sampling during Covid and there are data streams missing in 2020 and 2021.

Cara Eakes-I own a tackle shop, lot of these fishermen are my friends. They are making bills, house payments, plans for the future. If I don't have fresh bait, I don't sell anything else in the shop. I think reasonability has gone out the window. Need to look at how this economy is treating every one of us.

6:43 public comment was closed as no one else wished to speak.

VOTE TO RECOMMEND MANAGEMENT OPTIONS FOR MFC CONSIDERATION

Staff started presenting the commercial options from the Sustainable Harvest Issue Paper. Staff noted the DMF recommendation was 5.n, the Southern AC's recommendation was 5.n, and the Finfish AC's recommendation was 5.a. Staff pointed out these selections for this are also tied to the stop net portion. Staff also noted the Adaptive Management Framework at the end needed to be reviewed. Both the Southern and Finfish ACs supported the Adaptive Management framework in Option 10. Thomas Newman noted that he was on the Striped Mullet FMP AC Workshop, and pointed out the stop net reduction was only discussed if there was a commercial quota. They were not looking at a quota for the stop net fishery only.

Sustainable Harvest Commercial Fishery

Thomas Newman made a motion to support 5.a and 6.a. Motion seconded by Wayne Dunbar.

Everette Blake asked for clarification from a tackle shop owner on how long fresh mullet would last. Would it last through a weekend closure? Just wanted to make sure about that question before voting. There was no more discussion. A tackle owner stated mullet would last over a weekend closure.

Motion passes 6-1.

The Vice-Chair asked the AC members if they wanted to discuss the Adaptive Management. There was no discussion so the AC moved to discussing the recreational fishery management measures. The AC did not make a recommendation for Adaptive management.

Recreational Fishery Management Options

After hearing no recommendations from the AC, the Vice-Chair asked if since we are not hearing a request for any specific management offer would we simply default to status quo which would be Option

1 or take this as a no vote for any option. After hearing no discussion, the Northern AC did not make a recommendation for the recreational fishery options for the Striped Mullet FMP. The Vice-Chair recognized the Northern AC is not taking a vote for the recreational management Options. Jon Worthington added to state 'as presented".

AC member Jon Worthington stated that he feels they cannot vote due to the process not being followed. There was no economic analysis. We have heard a lot of concern from tackle shop owners. We are using data from 2019 and it's not our fault that we could not sample in 2020 and 2021 and have no data. They have given us a statute that Marine Patrol cannot enforce.

The Vice-Chair clarified that the Northern AC chooses not to support any of the recreational recommendations and will not be voting on this particular issue. The Vice-Chair noted that they were close to concluding their work for this meeting and asked if there is anything else members wanted to talk about relative to coastal habitat or future scientific studies regarding the FMP that could be addressed before closing out discussion?

The Director was recognized and asked that the Vice-Chair may want to further consider the Adaptive management Framework with the AC to make sure they are aware of what is contained in the Adaptive Management as proposed. Staff explained that Adaptive Management simply allows the Division to react more quickly to new information that may come about relative to mullet stock status. If we do not have the Adaptive Management framework, once we get a stock assessment update for example, we would have to reopen the plan, rather than acting more quickly using Adaptive Management if it were passed as part of the plan. The stock assessment is scheduled to be updated at least once between amendments. It is possible the upcoming assessment will have a terminal year of 2024 with the assessment completed in 2025. Whatever the outcome of the assessment, whether the stock has improved or declined, if Adaptive Management were adopted, the Division could react more quickly to the assessment update without having to reopen the plan which would take much longer.

Everette Blake asked looking at the way this is written, I would almost prefer to see some different targets laid out. I'm a sales guy and get asked every day if I go from 500 to 400 or 500 to 600 employees what do you charge me then. I would like to see this because I see mullet everywhere. How quickly could we see one or two years of a recovering fishery and then take the Saturday-Sunday closure away? What would that take for us to see? Staff indicated that would require a stock assessment update. Staff also added that all the projections indicated the stock could recover very quickly. That is why we want the Adaptive Management in place so if we do see the stock recover, we could convene the industry workgroup and have discussions to relax regulations. We want to be able to have those conversations with the industry on how to manage a recovered stock. Staff indicated if they must reopen the plan to change management it takes around two years instead of much more quickly through Adaptive Management.

Thomas Newman stated that Adaptive Management is a good thing, but we are not using it now. We have lots of evidence from the Division data and landings that the stock has increased since 2019, and yet the DMF is still recommending that we take the most severe reduction. We are not using that information now, so why would we expect the Division to use it in the future.

Jon Worthington stated that we need to take some of these CRFL funds and funnel them off to some of our universities to help with studies for mullet. There were additional discussions about using 2019 data and not having more recent data. We have to do something to promote the public to believe what you are saying. We need more transparency between the Division and the public. Staff did mention that the stock assessment was peer reviewed by an outside panel of experts in stock assessment modeling and biology and life history of striped mullet in a public forum. The reviewers were from other agencies and universities outside the Division. They thoroughly reviewed and asked questions about all the data that goes into the model. The experts at the peer review workshop also worked with Division staff to come up with the best model to represent the mullet stock in North Carolina. All those workshops were open to the

public and we got very little participation from the public. Staff also mentioned we would be glad to take people out on the water with us when we conduct our sampling, so every step is transparent throughout the process.

No additional motion or discussion was provided from the AC.

Updates from DMF Staff

Lee Paramore pointed out that in the AC's packet they were given a written update on the MFC November business meeting and what was going on with all the FMPs. It was highlighted that coming up in March we are having a flounder symposium. This is the first one of these we've done. University researchers and agency staff will be there to provide an update on studies being conducted in North Carolina on southern flounder. We will be providing the public more information as it gets closer. The symposium will be in New Bern on March 20. The next Northern AC meeting is in April and the agenda will be determined based on what the MFC does at its February business meeting. The Vice-Chair asked if there was a location for the April AC meeting yet? Staff indicated that we were thinking it would be between Manteo or Washington. The location of the meeting may be informed by the agenda for the meeting.

ISSUES FROM AC MEMBERS

Thomas Newman pointed out that we need to have the MFC resume having meetings in Dare County. We have not had an MFC meeting here in years. Dare county is the powerhouse for both commercial and recreational fisheries. I don't know who sets the meeting locations, but I think it may be the chair. We would have a lot of public come to these meetings if they were closer to the northern part of the state. I want to put it on public record that we need to resume having meetings in Dare County. Staff indicated we would make a point of this in the minutes.

Thomas Newman proceeded to make a motion that the Marine Fisheries Commission start having meetings in Dare County again. Second by Jon Worthington. The motion passed by unanimous consent.

APPROVAL TO ADJOURN
The meeting was adjourned at 7:21.

ROY COOPER
Governor
ELIZABETH S. BISER
Secretary
KATHY B. RAWLS
Director

January 29, 2024

MEMORANDUM

TO: Marine Fisheries Commission
Southern Regional Advisory Committee

FROM: Chris Stewart, Biologist Supervisor
Tina Moore, Southern District Manager
Fisheries Management Section

SUBJECT: Meeting of the Marine Fisheries Commission's Southern Regional Advisory Committee, Jan. 10, 2024 to provide recommendations for management options for Marine Fisheries Commission Consideration on draft Amendment 2 to the Striped Mullet Fishery Management Plan

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The Marine Fisheries Commission's (MFC) Southern Regional Advisory Committee (AC) held a meeting on Jan. 10, 2024, at the Department of Environmental Quality Wilmington Regional Office, Wilmington, North Carolina and via webinar. Advisory Committee members could attend in either setting and communicate with other committee members.

The following Advisory Committee members were in attendance: Fred Scharf, Tom Smith, Samuel (Sam) Boyce, Jason Fowler (online), Jeff Harrel (online), Jeremy Skinner, Truby Proctor, Pam Morris (online), Kenneth Siegler, Michael Yates (Absent – Tim Wilson).

Division of Marine Fisheries (DMF) Staff: Chris Stewart, Tina Moore, Kathy Rawls, Jeff Dobbs, Willow Patten, Dan Zapf, Brandi Salmon, Corrin Flora, Hope Wade, Garland Yopp, Ashley Bishop, Carter Witten, Debbie Manley, Anne Deaton, Jesse Bissette, Alexander Batchelder, Genny Ivec, Savannah Starling. Kim, Hardison

Public: Glenn Skinner, Lee Parsons, Joe Romano, Taylor Barefoot, Adam Child, Bob Parish, Luke Ingraham, Jack Spruill, Andy Wood, Sheel Patel, Bonnie Monleone. Thirty-nine viewers watched on YouTube.

The Southern Regional AC had ten members present at the start of the meeting and a quorum was met.

Southern Regional AC Chair Fred Scharf called the meeting to order at 6:05 p.m. The Chair opened the floor for the AC members and DMF staff to provide introductions.

APPROVAL OF THE AGENDA AND APPROVAL OF THE MINUTES

Fred Scharf asked the AC members if they approved of moving public comment after the Striped Mullet FMP draft Amendment 2 discussion but before the Southern AC votes on recommendations.

A motion was made to approve the modified agenda by Tom Smith. Second by Sam Boyce. The motion passed without objection.

A motion was made to approve the minutes from the Southern Regional AC meeting held on Apr. 12, 2023. Motion by Jason Fowler to approve the minutes. Second by Sam Boyce. The motion passed without objection.

STRIPED MULLET FMP DRAFT AMENDMENT 2

Discussion of Draft Amendment 2

Jeff Dobbs noted a full presentation on the management options is available online and today would be a verbal discussion following the Decision Document as part of the digital materials sent to the group and posted online. Dobbs said today's action item is to provide a recommendation to the MFC for Striped Mullet FMP Amendment 2 to achieve sustainable harvest. A 21.3 to 35.4% reduction in commercial harvest relative to commercial landings in 2019 is needed to rebuild the stock and end overfishing. Management options include season closures, size limit, trip limits, day of week options as well as combinations of various options. The DMF recommendation is for a day of the week trip limits (Option 5.n. – Jan. 1-31 and Nov. 16 – Dec. 31 50 lb., Sat-Sun 50 lb, Feb. 1 – Oct. 15 500 lb.) with as stop net catch cap (Option 6.b. – 30,000 lb. annual catch cap). Scharf asked about the measures put in place for 2023 as part of the supplement. Dobbs noted that an immediate reduction was needed; the division opted for regional season closures. However, fishermen indicated the 2023 season closures were difficult, particularly in the southern region. Therefore, for Amendment 2 DMF recommended a combination of management measures to achieve sustainable harvest while still allowing harvest to occur and reduced discards. Seigler noted there would be an abundance of discards with a 500-pound trip limit. Dobbs said trip limits would not occur during the roe fishery and would limit discards. Typically, the fish houses are not asking for high volume during this time. The meat and bait market demands are also lower during this time. Hopefully people will not change their gear configuration and fishing practices. Trip limits would only occur on Saturday and Sunday.

Smith indicated that has sat on three striped mullet FMPs now and each time we have done the bare minimum, basically catching the last fish that could be caught. We keep spinning our wheels and more needs to be done to increase escapement and rebuild the population. Several AC members agreed simpler is better and easier to enforce. Dobbs indicated at the options being presented came out of the workshop and that stakeholder indicated they didn't want complete season closures. The division wanted to do everything we could to reduce the impact to the roe fishery; however, we wanted to take an extremely conservative approach. Seigler said he would feel more comfortable with a minimum mesh size limit and felt that any reductions gained on Saturday and Sunday would be recouped the following week. Seigler further noted that if you went to a 1 3/8-inch bar mesh in a gill net it would allow escapement and those fish would contribute to the spawning stock for the next two years. Dobbs indicated gear restrictions are on the table. Scharf asked what was discussed regarding gear restrictions at the mullet workshop. Dobbs noted that the Striped Mullet AC was concerned mesh restrictions would impact other fisheries such as the white perch and sea mullet fisheries. More information can be found gill net issue paper.

Boyce asked about adaptive management, specifically how it would be applied between plans. He further noted that in year four it didn't make sense to implement it. Dobbs noted that if stock conditions change, we can make changes without reopening the plan. Flora noted the same language has been used in multiple plans. It's less prescriptive, we could do it twice if need be. We have a limited number of assessment biologists and the more prescriptive we get, the more our hands are tied. If the indices say we are doing good based on the annual FMP update, then we wouldn't need to do anything. Boyce said the wording made it sound like the stock would be assessed multiple times between reviews. Staff further noted that a

benchmark assessment occurs when more surveys are added to the assessment or other major changes occur; however, updates occur only when new data is added to the already existing data streams in the last assessment. Updates can shorten the time it takes to assess a stock. Dobbs went on to add that if the stock is recovered within two years, management would be loosened. Flora added the FMP update could be used to assess the stock as many of the indices used in the assessment are updated on an annual basis to monitor the stock. Dobbs further noted that if the target is not met, adaptive management gives us the ability to make changes during the 5-year cycle.

Boyce expressed his concern that when most recreational fishermen run out of bait, their 50 fish, they would only go out and get 50 more and it would be very difficult for Marine Patrol to enforce this measure. Therefore, he recommended that the division should conduct more messaging to explain why this is in place, so the public understands. Flora noted one of the objectives of the plan is public outreach and division would post best fishing practices to reduce discard mortality for the recreational fishery. Seigler asked how the fish limit was determined. Patten said the MRIP data showed that recreational fishermen landed less than 50 mullet. Seigler indicated that he would like to see the limit lower. Smith said fishermen use mullet for a lot of different things and that live bait is also a big part of fishery.

PUBLIC COMMENT

Glenn Skinner - Executive Director of the North Carolina Fisheries Association, and commercial fisherman – I have fished the roe mullet fishery for 30 years. Commercial landings have increased dramatically since the stock assessment has been completed. The 2022 fishing year had the fifth highest landings on record. Not only are our landings increasing, but the division's surveys are also increasing. The electrofishing data was not used in the stock assessment it is seeing large amounts of fish. The stock is rapidly expanding, and we are seeing larger fish. Some fish are as old as 3 years, indicating the stock is expanding. We saw much larger fish this year. We are currently not fishing at a very high rate and when the environmental conditions are right you see increases like this. Last year we had several 10,000 pounds sets. Which is all our nets would hold. We need to keep this simple and be equitable for everyone. Let's do a weekend closure, it meets the reduction needed and treats everyone the same no matter what fishery you are in. This stock is rapidly expanding based on the data I've seen; it is not overfished. Regarding the spawning stock biomass, we caught more fish last year than the stock assessment says exists. We need more data.

Taylor Barefoot – Commercial fishermen from Wilmington – I agree with Glenn, it needs to be cut and dry, no 500 pounds one day and 50 pounds another. The 500-pound trip limit doesn't work for Spanish, you can't control what hits the net. We need to go to the weekend closure. We can't divide the state into two different halves, it's not fair. We as fishermen need to work together to find a solution that works for everyone. Commercial fishermen need to make a living and provide for our families.

Lee Parsons – Charter boat captain for hire, recreational fisherman, has a major in marine technology and a minor in marine biology – I also have been a commercial fisherman in the strike net mullet fishery for roe. As a biologist, I have a problem with the roe fishery, you can't build the population back up if you keep taking the babies. I can live with 50 fish per trip, I can get other things to use as bait. It takes me 100 baits to run a trip on a good day. However, the drum fishery is going down, particularly in the southern region of the state. You need to work with other states. Is it fair to constrain fishermen in NC when you can go to other states and catch all you want. How can it work. When it comes to red drum you need to do research on caged oyster leases. Bottom leases work great. The fish don't like the caged oysters. Red drum and speckled trout don't like it due to the noise. You need to put a moratorium on caged oyster leases until a study can be done.

Jake Spruill – Defer to speak later, comments are not related to striped mullet. Left before giving comment.

Andy Wood – deferred to speak later in the meeting, comments are not related to striped mullet. Comments are provided closer to the end of the meeting.

Sheel Patel - Defer to speak later, comments are not related to striped mullet. Left before giving comment.

Joe Romano – Commercial fisherman and owner of Sea View Crab Co. – I back what Glenn said. Putting another derby fishery in place messes up everything; the price, floods the markets, deters buyers, etc. The Saturday and Sunday closure is equitable. The division is not hearing what the fishermen are saying. We need collaborative undertaking to tackle these issues. I believe if we have a problem, which I don't think we do, then why would we allow people to catch fish in cast nets before they are old enough to spawn. Data collection is the problem. The mullet fishermen can't be wrong, there are more fish than ever. This is not just for fun, it is food, substance, it's our heritage, it's our livelihoods. We are on the hills of losing many of our fisheries. If you shut us down on November 16th, you are cutting us out. Mullet don't operate on a calendar. Please support us with a Saturday and Sunday closure.

Bonnie Monleone – Defer to speak later, comments are not related to striped mullet. Left before giving comment.

Vote to Recommend Management Options for MFC Consideration

Smith said while simpler is best, just doing weekend closures only gets us to the number. It's likely that fishermen will continue to catch the same amount no matter what days are cut. Skinner indicated that once the fish make it to the ocean, they are no longer available; therefore, there will be reductions. Smith noted they are not entirely lost as the stop netters would still catch them. Skinner agreed, adding that they had a better shot than the estuarine gill netters. Boyce noted that the 30,000-pound stop net limit should address those concerns. Seigler expressed his concern the stop net limit would result in a large number of discards. The question was asked whether the limit was a daily cap or a season cap. Staff indicated once the limit was met the stop net fishery would close. Staff said you could approach it with payback if needed. Dobbs further noted the fishery rarely catches 30,000 pounds annually. Smith questioned how Marine Patrol would enforce the proposed management measures. Colonel Carter Witten, Larine Patrol noted the flat closures are the easiest to enforce and they currently enforce trip limits for several fisheries. It comes down to how the proclamation is written. Scharf said the challenge was enforcing the 500-pound trip limit. Witten further noted that most fishermen know what they have caught by sight alone. If an officer suspects that someone is over the limit, and they require fishermen to go back to the dock and weight their catch.

Scharf asked if Option 7, the seasonal catch limit, was essentially an annual quota. He noted for flounder the division tracks the landings on a daily basis. Would the division use the same infrastructure? There are always concerns with temporal closures that effort will get reallocated due to changes in fleet behavior. It's hard to know how it plays out until you do it. Typically, most states do not manage with annual catch quotas; however, NOAA commonly uses them. I know DMF tries to anticipate the shifts in effort and build it in, but it's hard to know. Annual catch limits work, because when the quota is met, fishing ends and escapement occurs. Dobbs said we know there will be recoupment if we are leaning towards the target. This is an extremely diverse fishery. People depend on the fishery throughout the year. By putting a catch limit in without other measures, you are going to disproportionally affect the roe fishery. Without having a hard end date, the reduction is shared across the fisheries. With a catch cap you are limited to the 2019 landings. Scharf added that the fishing year could start earlier in the year, say October 1. It could still disproportionately impact another part of the fishery. For example, you may not have a summer fishery. Dobbs noted that staff discussed a roe and non-roe season; however, you could have a period of time with no harvest. The catch cap is when you have exhausted all measures. Using a combination of options would be better for fishermen. Smith expressed the need to have a robust biomass first and need to aim for the high end of the reduction so we don't find ourselves back in the same situation. Scharf asked about the

reductions that were implemented with the other plans. Staff noted that the other plans haven't limited harvest and the 200 recreational limit was more an enforcement issue. Scharf noted that the stock was not in an overfished state at the time. Seigler said the biggest difference between plans was that the target changed since Amendment 1; and that is why reductions are now needed. Staff noted that while the target did change from 30% to 35%, it's the threshold that determines the overfished status and it has not changed. Scharf noted targets can change in an assessment due to fleet behavior. It's not driven by the status of the stock. Staff further noted the target was raised from 30% to 35% due to striped mullet's ecological role as a forage species, a better understanding of their life history, and the desire to create a buffer. It's a more conservative point so it could be more sustainable. We didn't account for it before, but we wanted to address it. Seigler questioned the model, adding if the old model was used, we wouldn't need management. Staff indicated that the peer reviewers identified several changes that could be made to the model to improve it; and they were incorporated in the 2022 model. This model found that the stock was overfished and overfishing was occurring. Scharf added the assessment has been approved for management and this is the best model that we have; however, the data ends in 2019, so anything you are seeing in recent years can't be accounted for. Our role is to provide input on the best options to go with. The challenge is due the complexity of the fishery, due to gears, user groups, seasonality. We try to spread the reductions across users to create fair and equitable reductions. Be aware that simple measures usually lead to one or two user groups taking a big hit.

Smith noted that when you put in monthly trip limits, it seems like you need an annual stopping point once "X" amount is caught. You have no season, you need escapement. Scharf asked about DMF recommendation and the commercial trip limits (Option 5.n.). Dobbs added the 50 lb. trip limit would stop the targeted and still allow incidental catch and allow some users to keep fish. Scharf asked about why the landings differed when the stop net cap was added. Staff indicated that for some years it could be an increase for the stop net fishery as they rarely land 30,000 pounds. We understand the cultural aspect of the fishery to NC. The 30,000-pound cap came from the workshop. Right now, there are only about four participants and it's not an emerging industry. Pam Morris noted she had the same concerns as Seigler with the division's recommendation. Further noting that there are a lot of fish out there right now, and we are only regulating people. Morris said she didn't support trip limits and didn't want to see any further regulations on the stop net fishery.

Sustainable Harvest – Commercial Fishery

Motion by Tom Smith to approve DMF recommendation 5.n., 6.b. and 10 for the commercial fishery.

Skinner noted he didn't agree with the motion as it was too complex. Smith said while he too believes that simpler is better, he merely just wanted to get the discussion going. While he feels a quota or a total allowable catch would be ideal, these options still allow fishing to occur while getting the needed reductions. Skinner disagreed and said he supported option 5.a. Scharf added that weekend closures would achieve the needed reduction if there were no shift in behavior. Seigler added the motion would cut out fishermen in the southern part of the state as the fish don't show up until Thanksgiving. Staff indicated that this would actually extend the season as compared to 2022. It was asked if the division examined different opening dates for north and south, more or less creating two roe mullet seasons. Dobbs indicated that it could be an option and part of the AC recommendation, but staff would need additional time to calculate the reductions. Dobbs noted when it was discussed at the workshop, fishermen were opposed to it. A friendly amendment was offered and accepted to modify the motion to include a north/south season for an equitable reduction using the Highway 58 Bridge at Emerald Isle. Dobbs noted that at the mullet workshop it was calculated and there was only a three-day difference using the landing from the last 5 years. Staff added it was not favored by fishermen. Dobbs noted that the line could be drawn at the 58 Bridge. Scharf called the motion to a vote.

The motion adjusted with the friendly amendment reads: Motion by Tom Smith to approve DMF recommendation 5.n., 6.b. and 10 for the commercial fishery. With staff looking to adjust the roe season north and south for equitable reduction. Seconded by Truby Proctor.

The motion passed 7-3.

Motion by Ken Seigler for Option 5.a. and the requirement of a minimum 1 3/8-inch bar mesh in gill nets from January 1 - March 31.

Seigler said he felt the motion would get an additional 35% reduction. Dobbs noted any reductions from reducing the minimum mesh size could not be quantifiable. We can calculate a reduction based on minimum fish size. Flora noted that since Option 5.a. meets the reduction, there would be no need to calculate this.

The motion failed due to lack of a second.

Motion by Ken Seigler for Option 5.a. and Option 10. Second by Jeremy Skinner.

Scharf asked if we could put forth both motions. Staff indicated yes, but it would be subject to the MFC interpretation. Both motions meet the reductions needed; however, one is more conservative. Seigler agrees there will be some recoupment with Option 5.a. However, it is simpler. The weekend only closure is fair to everyone. Skinner noted that he would agree with option 5.n if there was a problem with the stock. The numbers we are seeing indicate things are getting better, thus more extreme measures are not needed. Smith again, just doing the minimum has not worked and we will never fully realize the reduction if we don't go with the other motion. Skinner and Seigler disagreed. Scharf noted that if the stock is expanding and it supports your notion the division can use adaptive management (Option 10) if the stock rebounds faster than expected. Discussion circled back around to the stop net fishery cap and its contribution. Staff indicated that it made up such a small percentage of the harvest it changed the numbers only slightly. The stop net fishery would not be bound to anything, but the 30,000 cap. Option 10 was added as a friendly amendment to the motion.

Skinner asked if the amendment started in 2023. Staff indicated yes.

Motion fails 3-5 with two abstentions.

<u>Sustainable Harvest – Recreational Fishery</u>

Motion by Sam Boyce for Options 1.b. and 2.b. for the recreational fishery. Second by Jason Fowler.

Staff clarified the for-hire option allows the captain to have the fish on the boat prior to the clients getting on the boat; the limit would still be 50 fish per person. Seigler took issue with the commercial harvest being restricted on the weekends while letting recreational fishermen have 50 fish. Scharf said the recreational sector makes up less than 2% of the harvest. Seigler noted 50 juvenile mullet allowed per day for recreational use is not equitable when the commercial fishermen are limited to 50 pounds a day on the weekend, which equates to only 25 fish allowed commercially on those days.

Ken noted that in roe mullet terms that's 50 juvenile mullet equates out to 50 bait fish, which is not equitable if the commercial fishermen are limited to only 50 pounds on the weekends.

Motion passes 8-0 with two abstentions.

ISSUES FROM AC MEMBERS

Scharf encouraged the AC to provide staff as well as he and Tom Smith with topics to be discussed at future meetings.

Andy Wood, a member of the public who wished to defer comments until later after public comment in the meeting spoke briefly and provided staff with a letter from the Coastal Plain Conservation Group. Andy Wood – I would like to speak about eels, shad, sturgeon, and striped bass. We need holistic management. Beyond the saltwater and freshwater environments, management should look to how land use impacts fisheries. Please consider coastal forest destruction related to the wood pellet industry. It feeds an industry that is in economic crisis. Their whole plan of cutting and sending trees to England to burn is flawed and it would be better if we just exported coal. What's going on the land impacts the seas. Please see my handout for more details. The handout was saved with meeting materials and available upon request.

Scharf reminded the AC members that the Marine Fisheries Commission Update from 2023 was included in the digital package of materials that was sent out. Staff indicated that paper handouts are no longer mailed to the AC member and can be available at the meetings upon request. Staff noted the division will hold a Flounder Symposium in New Bern at the Riverfront Convention Center on March 20, 2024. The symposium is open to the public and is an opportunity for stakeholders, researchers and DMF staff to discuss research related to Southern Flounder in North Carolina. The details of the flounder symposium can be found on the division's website.

Jeremy Skinner motioned to adjourn, seconded by Tom Smith. The meeting ended at 8:52 p.m.

February 2, 2024

MEMORANDUM

TO: Marine Fisheries Commission
Finfish Advisory Committee

FROM: Jason Rock, Biologist Supervisor
Lee Paramore, Northern District Manager
Fisheries Management Section

SUBJECT: Meeting of the Marine Fisheries Commission's Finfish Advisory Committee, Jan. 16, 2024 to provide recommendations for management options for Marine Fisheries Commission Consideration on draft Amendment 2 to the Striped Mullet Fishery Management Plan

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The Marine Fisheries Commission's (MFC) Finfish Advisory Committee (AC) held a meeting on Jan. 16, 2024, at the Division of Marine Fisheries' Central District Office, Morehead City, North Carolina and via webinar. Advisory Committee members could attend in either setting and communicate with other committee members.

The following Advisory Committee members were in attendance: Tom Roller (online), Mike Blanton (online), Jeff Buckel, Brent Fulcher, Chris Hickman (online), Dave Mense (online), Allyn Powell, Randy Proctor, and Bill Tarplee (Absent – Lewis Dunn, Larry Lord, Scott Whitley).

Division of Marine Fisheries (DMF) Staff: Jason Rock, Lee Paramore, Kathy Rawls, Steve Poland, Jeff Dobbs, Willow Patten, Dan Zapf, Brandi Salmon, Corrin Flora, Hope Wade, Justin Lott, Carter Witten, Debbie Manley, Casey Knight, Tina Moore, Lucas Pensinger, Jesse Bissette, and Rick Crawshaw.

Public: Ken Seigler, Glenn Skinner, Joey Frost, Jeremy Skinner, Marvin Newman, Jamie Frost, Romie Salter, Brian Peele, Neal Smith, Alyson Belvin, Jeremy Asdenti, Connor Salter, and David Willis. Thirty-two viewers watched on YouTube.

The Finfish AC had nine members present at the start of the meeting and a quorum was met.

Finfish AC Chair Tom Roller called the meeting to order at 6:08 p.m.

APPROVAL OF THE AGENDA AND APPROVAL OF THE MINUTES

Tom Roller asked the AC members if they approved of moving public comment after the Striped Mullet FMP draft Amendment 2 discussion but before the Finfish AC votes on recommendations.

A motion was made to approve the modified agenda by Brent Fulcher. Second by Randy Proctor. The motion passed without objection.

A motion was made to approve the minutes from the Finfish AC meeting held on Apr. 13, 2023. Motion by Jeff Buckel to approve the minutes. Second by Dave Mense. The motion passed without objection.

STRIPED MULLET FMP DRAFT AMENDMENT 2

Discussion of Draft Amendment 2

Willow Patten noted a full presentation on the management options is available online and today would be a verbal discussion following the Decision Document as part of the digital materials sent to the group and posted online. Patten said today's action item is to provide a recommendation to the MFC for Striped Mullet FMP Amendment 2 to achieve sustainable harvest. A 21.3 to 35.4% reduction in commercial harvest relative to commercial landings in 2019 is needed to rebuild the stock and end overfishing. Management options include season closures, size limit, trip limits, day of week options as well as combinations of various options. The DMF recommendation is for a combination option that includes day of the week trip limits (Option 5.n. – Jan. 1-31 and Nov. 16 – Dec. 31 50 lb., Sat-Sun 50 lb, Feb. 1 – Oct. 15 500 lb.) with a stop net catch cap (Option 6.b. – 30,000 lb. annual catch cap).

Jeff Buckel asked about the division recommending a higher reduction due to low recruitment in recent years and wanted to know if the recruitment is based on the stock assessment or a survey with more recent data. Patten indicated it is from the terminal year of the stock assessment. Brent Fulcher discussed the landings in 2017, 2018, and 2019 and that in two of those three years, red roe landings were higher than the spawning stock biomass (SSB) estimates in the stock assessment. Why is the division pushing for a 35% reduction in harvest when we know there is no way the fishery harvested for three consecutive years more roe mullet than the assessment shows were there. Leniency should be allowed since we know there is something wrong. Models are great but only as good as the data, if the data isn't correct then we come out with the wrong result. It needs to be conveyed by the division that there are some flaws in this. Dobbs acknowledged the magnitude of SSB could be off but the trend is what is important and has been decreasing. The point is not exactly how many fish there are but what is the trend in the data. Fulcher stated the landings from his facility are within 3,500 pounds during the same period last year. Management under the supplement established a derby fishery and he had to turn away fishermen. Would have had the biggest season last year if it didn't close. Note that last year was the biggest year class we have had in this state. Beach crew had their biggest catch last year in one swipe (~76,000 pounds). Management should be on the lower side.

Bill Tarplee was also concerned like Fulcher after going through the data. Understand we need to look at the downward trend but there is a discrepancy between the number of fish being harvested and the stock assessment. We need to look real hard at the stock assessment while making recommendations for reductions. Dobbs indicated we have seen an uptick in Program 915 since the terminal year of the stock assessment but we don't know what that means for the stock condition until we update the stock assessment with data through 2024. We can't change the stock status without updating the stock assessment. Corrin Flora added that the adaptive management in the FMP will allow management to be updated based on the results of an updated stock assessment. Allyn Powell asked for an example of where adaptive management has modified management. Is there any evidence that this works? Flora indicated that the striped bass plan has adaptive management that has been used previously and in Amendment 2 for blue crab, adaptive management was based on the Traffic Light approach but that was changed to a stock assessment in Amendment 3. Powell asked if Program 915 is adequate for estimating the abundance of schooling fishes.

Dobbs responded yes. Powell asked how we estimated recruitment. Dan Zapf indicated it is estimated by the stock assessment based on the available data in the stock assessment.

Roller asked about the intent of reducing the recreational bag limit and how that affects captain and crew. Patten indicated that the captain and crew would be able to possess their limits on a for-hire trip. Roller asked if for-hire trips can possess the bag limit for 6 customers based on a 6-pack license even if they only have one customer? Flora indicated the intent was to allow for-hire guides to possess more than the individual limit prior to having customers onboard since they typically catch bait prior to customers arriving and Marine Patrol needed a way to enforce the limit.

Buckel asked if option 6, stop net catch cap of 30,000 lb., is based on a 35% reduction from the historical average. Dobbs responded it would not be a reduction from the terminal year of the stock assessment and is well above the 5-year average. The FMP AC agreed they wanted to allow the fishery to continue operating and based on discussions this seemed like a reasonable number and limits future expansion of the fishery.

PUBLIC COMMENT

Ken Seigler – commercial fisherman – expressed concern about recommendation 5.n., had concern with a hard closure date in November, that will put 100% of the reduction on the fishermen in the southern part of the state. The FMP says although spawning may occur into March, females re-absorb eggs after November, so it is unlikely those fish will spawn, so what return on investment is there in saving those fish? He asked if we are double counting SSB by adding fish after the closure to SSB then that is a problem, 5.n. should be removed. Options 5.a., 5.d., and 5.f., difference between options is a small percentage, prefers option with a 50 lb allowance during closures to allow harvest for bait that would otherwise have to be thrown away.

Glenn Skinner – Executive Director of the North Carolina Fisheries Association and commercial fisherman – when looking at the last three years of the stock assessment and then looking at what we harvested in those years, we harvested more fish than the stock assessment says was present. The question is how much higher is SSB than what is in the assessment? We are seeing an uptick in commercial landings and DMF survey data. This tells me SSB is much much higher than we think. You can't catch what fishermen have the past few years without a lot of fish in the water. The weekend closure gives you a 25% reduction, there is no reason to shoot for the moon.

Joey Frost – commercial fishermen – he was on striped mullet advisory committee and was asked in a meeting what is bottom line number for stop net fishery. He has to pay fishermen hauling fish, 33% is kept for the operation, and the rest is divided among 21 men. Each person would make $365 if the catch was limited to 30,000 pounds. He also has to maintain tractors and a boat. He wants to go with the weekend closure option without a cap on the stop net fishery.

Jeremy Skinner – commercial fisherman – on page 89, he recommends option 5.a. with option 10. This will get a 25.7% reduction and should be enough with trends we are seeing in the fishery and knowing it will be reevaluated in a couple years. The biggest issue we have is handling the amount of fish we are catching. Fishermen are using larger mesh sizes because fish were bigger. Need to consider the upward trend we are seeing in the fishery.

Vote to Recommend Management Options for MFC Consideration

Fulcher said a lot of different scenarios have been put together, were specific dates looked at for stop net fishery? Like shortening the open season so it could operate similar to how it has evolved. They never know how many fish are there when they strike the net, my fish house landed 143,000 pounds of mullet

in 2 days, 76,000 pounds of which were theirs (stop net). Fishing practices changed this year and in the north they started fishing before buyers showed up and stored fish that soured and one of the large buyers pulled out of the state. If you can do something when you want you work at your own pace but when someone tells you that you can only go in this window then you go. Once they (stop net) catch those fish they are on the beach and discards will be an eyesore. I feel we already have too many unanswered questions so we can go toward lower end for reductions and see how the stock responds. This past year was not fair to fishermen south of Hwy 58, fishermen migrate with the fish so we have to think of how people operate and incorporate into decision document. Maybe go with 5.a. and figure out something for the stop net fishery. Dobbs noted that due to sporadic nature of the stop net fishery, trying to look at previous years and shifts in the fishery make it difficult to come up with an end date. He also noted that recommendations came from the AC workshop and industry was in favor of that approach but that seems to have changed. We are looking at other measures due to derby effect in fishery last year, and keep in mind the supplement was supposed to be a short-term measure. It sounds like catch cap in stop net fishery won't work but there are other ways to get reductions. Day of the week closures have recoupment issues because of behavior changes, but they can be effective so there is good reason to shoot a little higher. Fulcher stated he wants to get a reduction during roe season to help biomass. What will help us get to 25% with stop net fishery? Dobbs noted that a Saturday-Sunday, including the stop net fishery, will get a higher estimated reduction than if catch cap is implemented. Roller asked the AC if there is anything we don't want to see included or the MFC should not consider, like size limits? Powell suggested looking at options 5.a., 5.c., 5.f., and 5.n.

Sustainable Harvest – Commercial Fishery

Motion by Allyn Powell to only include options 5.a., 5.c., 5.f., and 5.n., without stop net cap. Seconded by Bill Tarplee.

Fulcher offered a friendly amendment that with the uncertainty in the assessment, option 5.a. should be the only one discussed by the committee and no changes recreationally. Chris Hickman said he would be willing to look at a 21.3% reduction and not do more until we figure out what model we are going with. Powell agreed with the friendly amendment. The seconder, Bill Tarplee, did not agree so the original motion remained.

Fulcher made a substitute motion that the Finfish AC recommend option 5.a. with the 25.7% reduction which is more than the 21% reduction by law **is used for management without a stop net cap. Seconded by Randy Proctor.**

Fulcher stated his rationale for the motion is based on the past two mullet seasons. It is pretty evident the stock is on the rebound and with the uncertainty in stock assessment and fishery, we can't make a decision to take more than what the law requires us to do. The 25.7% reduction is above the 21.3% minimum reduction and gives some buffer. Powell asked if 25% is closer to the target? Staff indicated that it is closer to the threshold. Fulcher stated option 5.a. has the lowest reduction that is presented and if we go picking things on our own they may not meet legal requirements. Dobbs noted that while the biomass estimates from the stock assessment may be questionable, the trend is what is important and the trend has been declining. Buckel stated that with stock assessments, if the biomass level changes then the reference points change too, the trend is what is important. There may be some evidence of an upward trend recently and asked if the uptick in P915 is higher than previous years. Dobbs and Zapf indicated we have seen better numbers recently, 2019 was a low year, 2021 was one of highest values, 2022 was one of the lowest years, and 2023 anecdotally has been higher.

The substitute motion Passed 4-3-2.

New main motion for the Finfish AC is to recommend option 5a with the 25.7% reduction which is more than the 21% reduction by law is used for management without a stop net cap.

The motion Passed 5-2-2.

Dobbs reminded the committee that option 10, adaptive management, still needs to be voted on by the committee. Roller asked if there were any other options to consider for the commercial fishery?

Motion by Brent Fulcher to approve the division recommendation for adaptive management for this fishery. Seconded by Randy Proctor.

The motion Passed 7-0-2.

Sustainable Harvest – Recreational Fishery

Tarplee wanted to know what number of baits a captain would like to have without any regulation? Roller said for me personally I think 50 is a good number, though I would add a lot of captains will go out before their trip to catch bait so not having the exemption would be detrimental. Patten noted that MRIP data shows that most anglers harvest less than 50 mullet per trip.

Motion by Brent Fulcher that for recreational and for hire vessel bag limit stay status quo. Seconded by Chris Hickman.

Proctor stated that recreational sector is insignificant so why do we need to do anything? Patten noted that part of the reason for limiting the recreational sector is to prevent effort shifting from the commercial fishery to the recreational fishery. Dobbs added that 200 seems too high for one person so we want to put some more reasonable guard rails on the fishery. Powell asked what percent the recreational harvest make of the overall fishery. Zapf noted that recreational harvest averages 1-2 percent of the fishery. Fulcher stated that lowering the possession limit is putting more stress on Marine Patrol. Zapf clarified the recreational fishery already has 200 fish limit, status quo option, that MP is enforcing. Buckel asked if there is concern later, can trip limit be changed with adaptive management? Zapf indicated it could be changed with adaptive management. Fulcher said he thinks the biggest species targeted with RCGL is shrimp not mullet. Zapf noted that if bait for purchase is limited then recreational effort may increase to compensate. Buckel asked if an option was endorsed by FMP AC? Zapf said he thought they suggested a 100 fish limit.

The motion passed 6-0-3.

Fulcher said I think you heard discussion here from all aspects/sides, and everyone is very concerned about the data in the assessment being used to make management decisions. We understand the need to protect the resource but don't want to use something with this much uncertainty. Buckel thanked staff for having answers on hand, it was very helpful for the discussion.

Paramore reminded the AC members that the Marine Fisheries Commission Update from 2023 was included in the digital package of materials that was sent out. Paramore noted the division will hold a Flounder Symposium in New Bern at the Riverfront Convention Center on March 20, 2024. The symposium is open to the public and is an opportunity for stakeholders, researchers and DMF staff to discuss research related to Southern Flounder in North Carolina. The details of the flounder symposium can be found on the division's website.

The meeting adjourned at 7:54 pm.

ROY COOPER
Governor
ELIZABETH S. BISER
Secretary
KATHY B. RAWLS
Director

January 30, 2024

MEMORANDUM

TO: Marine Fisheries Commission
Shellfish/Crustacean Advisory Committee

FROM: Anne Deaton, Habitat Program Manager, Habitat and Enhancement Section
Tina Moore, Southern District Manager, Fisheries Management Section

SUBJECT: Meeting of the Marine Fisheries Commission's Shellfish Crustacean Advisory Committee, January 11, 2024. For discussion on items to develop in the Eastern Oyster FMP Amendment 5 and Hard Clam FMP Amendment 3.

The Marine Fisheries Commission's Shellfish/Crustacean Advisory Committee (AC) held an in-person meeting on January 11, 2024, at the Division of Marine Fisheries, Central District Office, Morehead City, NC. There was also a virtual option for those that could not attend in person.

The following AC members were in attendance: Lauren Burch, Jim Hardin, Tim Willis, Michael Hardison, Mike Marshall, and Ted Wilgis. Online: Ryan Bethea, Mike Blanton, Mary Sue Hamann, and Brian Shepard. Absent: Bruce Morris

Division of Marine Fisheries (DMF) Staff: Hope Wade, Debbie Manley, Jeff Dobbs, Joe Facendola, Corrin Flora, Tina Moore, Anne Deaton, Carter Witten, Lorena de la Garza, Casey Knight, Charlie Deaton, Steve Poland, Alan Bianchi

Public: There were 13 viewers on YouTube.

Shellfish/Crustacean AC Chair Mike Blanton called the meeting to order at 6:05 p.m.

Chair Blanton provided some introductory remarks and let AC members introduce themselves. The Shellfish/Crustacean AC had a quorum.

APPROVAL OF AGENDA AND APPROVAL OF THE MINUTES

A motion was made by Tim Willis to approve the agenda. Second by Lauren Burch. The motion passed without objection.

A motion was made by Mike Marshall to approve the minutes from the Shellfish Crustacean AC meeting held on April 18, 2023. Second by Tim Willis. The motion passed without objection.

The AC members introduced themselves. This was the first AC meeting for Michael Hardison and Ryan Bethea.

EASTERN OYSTER FMP AMENDMENT 5 AND HARD CLAM FMP AMENDMENT 3

Jeff Dobbs began by informing the AC the goal and objectives for both plans were approved during the November MFC business meeting. Both plans are looking only at the wild harvest through their development. Staff are beginning to develop issue papers to address potential management and would like early input from the committee. One joint issue for the oyster and clam FMP is the need for a recreational shellfish harvest permit. Because there is currently not a requirement for any type of license or permit for recreational shellfish harvest, data is not available to estimate the number of recreational shellfishers. Staff would like to consider requiring a low cost or free permit. This would provide a means to gain understanding of the total number of people participating.

Tim Willis asked if DMF could sample somehow to get an idea of effort, rather than a permit or license. Dobbs explained that the nature of the fishery with people walking in from shore and private docks year-round makes it difficult for creel clerks to encounter fishers to get an estimate. Lauren Burch noted this is probably the last fishery that does not need a permit or license. Joe Facendola explained that it would require legislative action if the change was incorporated into the CRFL license requirements. Facendola noted that initially shellfish was included in CRFL license rules but was taken out at some point. Mike Marshall explained it was partially because it was considered a subsistence fishery - critical food resource for low-income residents. Steve Poland said the staff is considering incorporating the benefits of having a permit in the plan. If the MFC decides it is worth doing and approve including this as a recommendation in the FMP, it will provide more justification for implementation. Mary Sue Hamann questioned if it would require significant reporting on part of the holder. To address this and other committee comments, Dobbs explained that DMF uses surveys to get information on catch from recreational license holders, but since a license is not required, there is no pool of contacts to reach out to. If they did have a license or permit, DMF could survey and subsample to get an estimate on recreational effort and catch. This information is the first step to determine if recreational landings are significant relevant to commercial landings. Brian Shepard noted that there are no strictly recreational clammers. Rather, they tend to casually collect some shellfish while doing other activities on the water. Michael Hardison said that people must get permits for all types of hunting and we need to have a gauge on recreational effort. Marshall agreed and said it is a big missing piece of information and a permit would be the least obtrusive and no cost. Tina Moore said that these comments are for scoping and it seems there is enough interest from the AC to explore. They would also like to know if AC members would support a permit, and if it should be free or with a nominal cost. Blanton reiterated to the AC that their responsibility tonight is to help the division frame the FMP document. Because of the considerable size of our coast and tourism it might be good idea to have permit. Hamann asked staff to report back about how other states handle this. Ted Wilgis added that NCCF gets lots of calls in the summer about clamming. Any outreach should be provided in Spanish as well as English.

Joe Facendola explained that the Oyster Amendment 5, unlike previous plans, would only include wild harvest - shellfish leasing will be addressed separately through the lease program. There are three major issues that will be addressed. Subtidal oyster management using mechanical harvest, mostly in the north; intertidal hand harvest, mostly in south; and recreational harvest which Dobbs just went over and will be in both amendments. For mechanical harvest Facendola explained we currently use trigger sampling, with a 26% legal threshold. Staff is looking at a different way to manage, with rotational harvest of subtidal cultch planting sites. Subtidal oysters in the Pamlico system need to grow higher in the water column to have adequate oxygen at certain times. Mechanical harvest is not good for that because it lowers the reef profile. Staff is considering large cultch planting sites with a fixed season. Lauren Burch asked how mechanical harvest season is managed now. Facendola explained about trigger sampling, and different seasons in bays versus deeper water. The new method would allow mechanical harvest only on a subset of existing large cultch sites that are about 10 acres in deep water. Harvest would be a fixed season and

fishermen could continue harvesting on a cultch site until it was depleted of legal oysters. Then those sites would close for approximately three years until legal-sized oysters had reestablished.

Blanton asked about the number of participants. Facendola said it has been declining, ranging from 30 to 50 participants. The peak was in 2010. Moore said the high effort was due to shellfish license holders at that time being able to mechanical harvest which can no longer occur due to legislative changes no longer allowing this license for mechanical methods. Marshall added that in the 1990s it was a boom-and-bust fishery, and Dermo was a contributing factor. Late 1990s hardly any mechanical harvest and then in oysters started expanding again in the deep water and like said everyone pulled their gear out to harvest. Blanton thought oyster harvesters in the northern waters was declining in deep water due to the uncertainty of the season openings and closings. He would like that changed for mechanical harvesters. Other states manage through rotational harvesting and it is pretty successful and think it's possible for NC. Brian Shepard noted that some of the shellfish decline is due to increasing wastewater treatment plant discharges into rivers. This creates a dead layer. Maryland buys spat on shell and putting a huge amount out. NC doesn't do that – put rock out and sometimes it works well, sometimes not. Marshall Mentioned that the 26% trigger was an attempt to get more data, before we used number of violations and when trips came into the dealer. He supports trying different things. We need to protect the habitat and other factors. Tim Willis mentioned that in Chesapeake Bay and Louisiana they were dredging in dead zones to mix it up. Facendola added there are two issues – sediment and oxygen. Trying to lift shell up out of sediment for spat. Probably more sediment issue in bays since closer to runoff. He said that current management in the bays is working, but not in the deeper sound. Storm events reduce oxygen in the deeper areas and they die off on the bottom but stay alive higher up in the water column. With this strategy, oyster sanctuaries would continue to grow taller to allow survival and increase reproductive potential, and increased cultch around the sanctuaries would provide more recruitment area. Provide more spat to resettle on the sites to re-populate the deep water areas,

We'll need to do this in baby steps over the next few decades. Facendola said ultimately, we would want a stock assessment to identify what is available for harvest. In 10-20 years, a stock assessment might be feasible. Burch asked if you just want to go to season. For this paper the strategy would start with a subset of managed areas. Staff is looking at the trigger data to determine some correlations, such as when a certain percentage of oysters are legal-size, the season can open a specific number of weeks. Some certainty for fishermen on the duration of the season. A lot of effort to gear up for this fishery and they know how long to fish. Then harvest at rotational sites could occur after the set season for example, 8 weeks. The larger cultch planting sites will have 16 sites built this year and could potentially have 4 cultch areas open a year. Ted Wilgis supports looking at different strategies. He suggested that in the plan try to provide estimates on how much material you need to maintain adequate cultch planting areas, where they could be located, and enforcement. If you have records on monetary effort in management, the state can qualify for hurricane assistance funds for oyster planting. Hamann asked if runoff can be addressed. Anne Deaton replied that this is addressed in the Coastal Habitat Protection Plan (CHPP). A large focus of the most recent amendment (DEQ 2021) was addressing water quality.

Shepard thought a set season is a good idea for this fishery. Wilgis asked what tools can be used to adjust the season? Facendola said that changes could be made if necessary, through adaptive management and proclamations. Blanton asked how we can do this successfully if the 26% trigger now is not working for the the number of participants now if we don't know what is sustainable. Facendola said you can look at current bushel limits, how long it takes based on effort now, they are capped in rule at 25 bushels. Can look at changing the bushel limit. Corrin Flora noted that this plan takes effort off the natural reefs, which will enhance natural reefs with no pressure on them. Marshall mentioned for clarification that the 26% trigger was designed by a UNC study as habitat protection measure, to retain enough cultch in the water. The trigger was not a fishery management measure it was a habitat protection measure.

Discussion moved on to intertidal oysters. The fishery is by hand harvest, primarily in the southern coast, and accounts for the majority of landings. The landings have been stable. There currently is no sampling in this area. The only indicator used to gauge the fishery was whether a trip landed less than 5 bushels. The previous FMP reduced the commercial shellfish license holder limits from 5 to 2 bushels. We have seen the number of participants drop since that change in bushel limits. And we'll look into any changes in the participants and trips further in this plan. The previous plan also called for development of an intertidal sampling plan. Facendola explained it is under development by staff in Habitat and Enhancement and Fisheries Management sections. Wilgis asked if the sampling is tied to shellfish mapping and includes open and closed harvest areas and could provide information to aid cultch planting. Anne Deaton said yes, sampling would occur in mapped sentinel sites in closed and open areas. We also are trying a pilot study using drones to look at oyster reef height. Wilgis asked is you could use for cultch planting sites to identify areas needing more material? Facendola, yes that could be used just trying to build the infrastructure with material holding sites as well as people and equipment. Brian Shepard asked if the FMP could look at whether too many shellfish leases could negatively impact wild populations. Too many triploid oysters taking the resources from the wild stock. Wilgis said there are studies that show carrying capacity showing impacts to wild stocks, more of a research question. Willis noted there are studies ongoing in the South Atlantic or possibly the Gulf States. Staff said it could be included as a research question or passed on to the leasing program. Willis asked if there was any understanding between the natural bottom leases versus caged ones. Facendola said that is not my area of expertise. Flora said we could send those questions to the shellfish lease program.

Jeff Dobbs reviewed the major issues to be discussed in the clam FMP - mechanical clam harvest. There has been a decline in effort over the years, with only 4 participants in 2021. That, in addition to habitat concerns, have resulted in closing of some areas to mechanical clamming. Due to encroachment from oysters and seagrass in these mechanical areas. We close the area in Bogue Sound completely due to seagrass and modified other areas. He asked for input on: 1) ending the mechanical clam fishery; and 2) ending the opening of channels prior to navigational dredging. The latter has not been done since 2007. The dredging is problematic due to timing with working with the ACOE and timing when fishermen notifies DMF to open the area before the maintenance dredging activity occurs.

If the mechanical harvest season is removed, they would likely end the other as well. Dobbs noted that the negatives of the fishery are the effort to mark and enforce for low participation, and potential habitat impacts from turbidity and SAV. Willis asked why would we limit fishing activity of the gear when it is only four people now. If so few people why the issue? Dobbs said it was of historically important and of value to more fishers. Dobbs said DMF is responsible for marking the areas, it takes a lot of staff time and resources to mark, and enforce. Also, habitat concerns with dredging up the bottom and turbidity and uprooting seagrass. Willis reiterated it is not many people and so why consider. Flora noted the paper will address the fishery and number of participants. Willis said let the fishermen put out the signs then.

Hardison asked if the four remaining fishermen are increasing landings. Dobbs explained that the active participants are in New River and there is variability in landings as it is opened every other year. Because DMF rotates open areas, numbers are higher when New River is open, and lower when its closed. Shepard said although it is only a few participants it is important to them. He also mentioned that New River has had several clam die offs in deep water. He said stirring up the bottom and removing sediment is helpful, and since we've reduced trawling and clam dredging up there, conditions are worse. He added that for the participants that rely on this fishery, it is important. If we don't have activity up there the bottom will die and Hurricane Florence caused some die off as well.

PUBLIC COMMENT

No public comment.

ISSUES FROM AC MEMBERS

A Flounder Symposium will be held at the New Bern Convention Center on March 20, 2024. Details will be on the DMF website soon. No issues were brought forward by other members.

PLAN AGENDA ITEMS FOR THE NEXT MEETING

Moore said they don't have ideas from staff yet due to MFC upcoming in February and the MFC Liaison position is vacant. She noted the MFC Habitat and Water Quality AC is meeting next week to discuss as issue through the Shrimp FMP Amendment 2 to look at the open/closed areas to shrimp trawling and overlaps with seagrass presence. This paper will go to the MFC in February and may come back to other MFC ACs, dependent on the discussion with the MFC. No additional items were requested.

Tim Willis made a motion to adjourn. Seconded by Lauren Burch. The meeting adjourned at 7:46 p.m.

Jan. 23, 2024

MEMORANDUM

TO: Marine Fisheries Commission
Habitat and Water Quality Advisory Committee

FROM: Anne Deaton, Habitat Program Manager, Habitat and Enhancement Section
Jimmy Harrison, Fisheries Resource Specialist, Habitat and Enhancement Section

SUBJECT: Meeting of the Marine Fisheries Commission's Habitat and Water Quality Advisory Committee, Jan. 17, 2024

The Marine Fisheries Commission's (MFC) Habitat and Water Quality Advisory Committee (AC) held an in-person meeting on Jan. 17, 2024, at the Division of Marine Fisheries (DMF), Central District Office, Morehead City, NC. There was also a virtual option for those who could not attend in person.

The following AC members were in attendance: Doug Rader, Sarah Gardner, Nathan Hall, Scott Leahy, Lisa Rider, Joel Fodrie, Mark Parrish, Jack (Bart) Durham

Division of Marine Fisheries (DMF) Staff: Hope Wade, Debbie Manley, Corrin Flora, Anne Deaton, Jason Parker, Jimmy Harrison, Steve Poland, Dan Zapf, Casey Knight, Kathy Rawls, Tina Moore, Jason Rock, Carter Witten

Public: Glenn Skinner, Brent Fulcher, Brian Horsley, Larry Kellum, Sr., Kenny Rustick, Larry Kellum, Jr., Mike Styron, Bradley Styron, Zack Davis, Thomas Smith, Harry Mizelle, Allen Smith, Cayton Daniel. Thirteen in attendance, six of which gave comments, and 30 viewers on You Tube.

Habitat and Water Quality Chair Doug Rader called the meeting to order at 5:59 p.m.

The chair invited members to introduce themselves and a quorum was met.

APPROVAL OF AGENDA AND APPROVAL OF THE MINUTES

Doug Rader recommended that the public comment period be moved to occur immediately following the presentation by DMF staff. **Scott Leahy made a motion to approve the agenda as amended. The motion was seconded by Nathan Hall. The motion passed without objection.**

A motion was made by Nathan Hall to approve the minutes from the Habitat and Water Quality AC meeting held on April 19, 2023. Bart Durham requested that the minutes be sent to him, as he

had not seen them prior to the meeting. Doug Rader recommended that the motion be tabled until later in the meeting and Anne Deaton emailed them to Durham.

PROTECTION OF CRITICAL SEAGRASS HABITAT THROUGH SHRIMP TRAWL AREA CLOSURES PRESENTATION

This issue paper was developed because the 2022 Shrimp Fishery Management Plan Amendment 2 included a management strategy to use adaptive management to further protect submerged aquatic vegetation (SAV) habitat in North Carolina. The MFC motion required that staff draft the issue paper in collaboration with CHPP staff and input from the Habitat and Water Quality AC and stakeholders.

Chris Stewart gave a presentation on the issue paper and management options. Stewart reviewed the ecosystem functions provided by SAV, its benefit to NC's economy, and the negative impacts that bottom disturbing gear can cause to SAV. Trawling has been documented to shear, cut, or bury SAV leaves, flowers, or seeds, increase turbidity and sedimentation, disrupt ecosystem food webs, and reduce habitat complexity. The issue paper looked at areas where areas open to trawling overlapped with documented SAV habitat. Stewart reviewed the management options for each region. In Regions 1 and 9, it was determined that no further management was needed. Management options in Region 2 included prohibiting trawling on a portion of the western edge of Roanoke Island from Weir Point to the Manns Harbor Bridge, and limiting trawling to the main channel (100 ft to either side of the Roanoke Channel). For Region 3, the management option included prohibiting trawling year-round in designated pot areas of the Pamlico, Bay, and Neuse Rivers. For Region 4, the option included creating and expanding closures along a portion of the western shoreline of Dare and Hyde counties. For Region 5, the options included limiting trawling to the main channel plus 100 ft to either side, prohibiting trawling along a portion of the western shoreline of Roanoke Island, and modifying the existing trawl net prohibited area to include portions of the western shoreline behind Salvo and Buxton Harbor. The option for Region 6 included prohibiting trawling in Core Sound and its tributaries, except in the Mechanical Clam Harvest Area (MCHA). Options for Region 7 included prohibiting trawling in the Straits, Back Sound, and their tributaries, modifying or creating shrimp trawl closure lines in the North and Newport rivers, and limiting shrimp trawling to the Intracoastal Waterway from Cedar Point to Sanders Island. The option for Region 8 included modifying or creating new shrimp trawl closure lines in the New River. Interactive maps of these areas are available at:
https://ncdenr.maps.arcgis.com/apps/webappviewer/index.html?id=61f2b88f26f7416caba3000163231ce1

The DMF recommended implementation of all 12 management options in support of the CHPP goal of protecting and restoring SAV, and that modified closure lines include a buffer to protect SAV habitat from physical disturbance, turbidity increases, and sedimentation. Stewart explained that the next step is to present the issue paper and Habitat and Water Quality Advisory Committee (HWQ AC) recommendation(s) to the MFC at its February 2024 business meeting. If new management measures are selected, the proposed closures will be implemented via proclamation authority of the DMF Director in 2024 in accordance with Shrimp FMP Amendment 2. Monitoring of SAV will be conducted by the Albemarle-Pamlico National Estuary Partnership (APNEP) SAV Team during the spring and fall of each year on a rotating waterbody region schedule to evaluate SAV health and abundance.

Rader asked Stewart to clarify that this effort is part of the adaptive management process as approved by the MFC for the Shrimp FMP. Stewart responded yes. Flora noted the process for adaptive management decision-making involves the Commission requesting AC review and for stakeholder input, especially for those who may be impacted. The MFC could ask for additional AC input at the February MFC meeting. If so, the issue would be on the specified AC April agendas, and then go back to the MFC at their May meeting to make a final decision.

Rader noted that this issue paper is not saying that shrimp trawling was the sole threat of impacts to SAV. Other parallel efforts are underway to develop new Environmental Management Commission (EMC) water quality standards through consultation with the CHPP Steering Committee. The water clarity standard was specifically designed based on the sensitivity of seagrass and seagrass habitat to those non-trawling effects. Rader then asked Deaton about the timeframe. Deaton's response was it's at the NC Division of Water Resources (DWR) staff level now and they're hoping to present it to the EMC at the end of 2024.

Rader asked if the focus is not only protecting today's SAV footprint but what was previously present and documented since its distribution varies over time and can expand. Stewart responded that what was shown on the maps was representation of the full extent of mapped SAV over time, from 1981 to 2021. Rader noted that the location of habitat has to do with water clarity, sediments, and light penetration. Deaton noted that wave energy is another factor. Deaton also noted the MFC rulebook has a definition for SAV that includes bare spaces between the vegetation and areas with past documentation of SAV presence. Rader noted water clarity cascades into NC rules under all three Commissions pertaining to coastal development, water quality, runoff, and even to outside of NC where South Atlantic Fishery Management Council has designated SAV in NC as Essential Fish Habitat (EFH)- Habitat Area of Particular Concern (HAPC).

Rader asked if the AC members had questions for DMF staff. Lisa Rider asked for clarification on process differences in how the closure lines in the Newport and North rivers were determined. Stewart responded that in the Newport River, the trawling closure boundaries were limited to where SAV was concentrated in shallow waters bordering the eastern shoreline and lower portion of the river. In the North River, trawling boundaries were limited to the MCHA to protect SAV along the shoreline and surrounding area.

Hall asked why all of South River, Turnagain Bay, and West Bay were closed at the mouth since the centers are pretty deep. Stewart responded that SAV could be found in the shallow water of the water bodies, and that without a defined channel it was easier to set the boundary at the mouth of the creeks to create a buffer.

Leahy asked if these areas are being closed to restore SAV or protect what is currently present. Since it's unclear when SAV may have been lost in certain areas, are we trying to address decades old damage? Deaton responded that the GIS layer is displaying the maximum extent of SAV from all mapping events that have occurred since 1981. There are individual layers for the different mapping events that have been compiled because all areas are usually not mapped in the same year. Leahy asked if the proposed closures would guarantee SAV would regrow out to those lines. Deaton responded these measures would address one of the stressors on SAV and noted there are efforts underway to address other stressors as well. Rader noted a SAV restoration goal (acreage) was absent in the Fisheries Reform Act and is needed to determine success. He further noted that an investment in monitoring to track habitat trends is needed to understand whether management actions were successful. There shouldn't be any unnecessary negative impacts on users, which includes shrimp trawlers.

Durham asked if there was any measurable data to show closures are working? Deaton responded that the large No Trawl Area closure behind the Outer Banks was done as a preventative measure. The closure was put in place when there was less development and when the grass was in good condition. The SAV is still present, but we don't have specific enough monitoring data to say if areas where SAV had been lost due to trawling had revegetated.

Rader noted we need to be able to parse out how different management measures impact SAV and he's in favor of putting these in place to ensure accountability. Hall noted that the earliest mapping data is from 1981, although there's evidence of SAV locations throughout history in geological records for low salinity areas.

Fodrie noted that he appreciates DMF addressing the Straits Channel area, and that Option 2 leaves a narrow channel. Fodrie requested an explanation of the logic of the decision. Stewart noted that in Region 2 (Roanoke Sound, Option 2), the main channel only closure was shortened to create a broad buffer between SAV habitat and the main channel behind the Roanoke marshes.

Similarly, it was difficult to establish a buffer between the main channel adjacent to the Straits; thus, staff chose to create a broad buffer that increased connectivity with the proposed Core Sound closure and the existing Bogue Sound closure established in Amendment 2 and Crab Spawning Sanctuary closures in the Blue Crab FMP Amendment 3.

Rader said if insufficient marking is causing more SAV damage, perhaps they could mitigate the closure with improved marking. Stewart responded that Marine Patrol prefers straight-line closures that use channel markers and existing landmarks; Marine Patrol would like to avoid putting out additional signage in the water due to the cost. Stewart further noted that there is limited effort throughout much of this area; however, these closures would likely impact small trawlers and recreational gear license holders.

Rader asked if there were any other questions from AC members. With no response, Rader moved to the public comment period.

PUBLIC COMMENT

Multiple members of the public signed up to provide comment and were given two minutes each to address the AC. The comments were from individuals involved in the shrimp trawl industry in North Carolina, and most were concerned with how the proposed closures would affect their livelihoods.

Glen Skinner asked if the closures would be year-round. He also questioned if there is a "variable condition" as required when proclamation authority is used. Staff mentioned FMP compliance and ability to modify if monitoring detects SAV changes.

Brent Fulcher said that trawling can actually reduce sedimentation, and the boats used are small with low impact. He mentioned a thesis that suggested that shrimp trawling was not negatively impacting the SAV. Stewart responded that the Division reviewed the thesis and found it to be inconclusive for several reasons as noted in Amendment 1 to the Shrimp FMP.

Kenny Rustick was concerned about closing the Straits, Jarrett and Nelson bays, around Harker's Island, North River, South River, and Turnagain Bay. He said it will harm the small boats. He uses PVC on his chain to reduce SAV damage when working over grass, so it rolls over it. If these areas were to re-open in 10 years the shrimpers would be gone.

Bradley Styron said nor'easters cause more damage to SAV than shrimp trawlers. He also mentioned a shellfish lease where all the oysters died due to silt, but ones on the surface survived, indicating silt is the problem. He said when you close these places, they don't come back.

Zack Davis was concerned about the large acreage that would be closed that doesn't have SAV, particularly South River. While there is SAV along the sides, it's too deep in the middle to sustain grass.

He provided maps from the 2021 draft Amendment 2 of the Shrimp FMP of what he thought should close.

Thomas Smith operates a 50 ft trawler out of Beaufort and owns Miss Judy's Seafood, if this passes it will put us out of business. While I can work the Pamlico Sound, I work many of the tributaries that are proposed to be closed. I would like to see the scallops as well as some of the other fisheries come back but we don't need to put people out of business while trying to do it. Stewart asked how much total headrope he used. Smith said he can pull up to four nets but pulls two 45 ft nets when working these areas to meet the 90 ft requirement. Depending on the year, I work Core Sound as well as many of the other places, this will put me out of business.

Larry Kellum and Larry Kellum Jr. emailed comments to DMF following the meeting. They were concerned that there was lack of understanding on the habitat changes and that no explanation was offered on how the grass beds have survived decades of heavy shrimp trawling activity in open areas. They disagreed with closing the Straits and thought the public should get more than two minutes to speak.

ADVISORY COMMITTEE DISCUSSION ON ISSUE PAPER

Leahy noted that the AC's recommendation should include measurable goals to show that closures through adaptive management measures are successful. Rader noted that if an AC member wants to make a motion to put something on the table and is seconded for discussion, that's fine. Rader supported eliminating direct trawling damage from existing SAV beds and those areas likely to become SAV beds in the future, but unsure of how far away disturbing activities need to be. The job tonight is to recommend what the Commission and director ought to do to protect SAV as a critical habitat, and focus should be on that question.

Hall asked about the South River closure again because it is a deep waterbody. Stewart responded that there's a designated pot area in South River and that area is closed from June 1 to November 30 to trawls. Another option would be to extend the designated pot area closure to a year-round closure. Flora noted that another option is a distance from shore. Stewart responded that Marine Patrol has said that distance from shore is somewhat difficult to enforce. Rader recommended that the AC leave the line determination up to the MFC but move forward with a recommendation to protect SAV habitat. Rader raised the concern of enforceability of closures because they're not marked on the water. In response to a question about the Straits, Stewart mentioned that in Straits Channel, channel netting and shrimp pounds would continue to be allowed; however, it takes the right tide and spot to be fished efficiently.

Rader noted one way forward would be to endorse staff's lines as presented but with the recommendation to protect 100% of known and likely to develop habitats to address fishing and non-fishing impacts. It should be recognized that there are places where seagrass isn't likely to develop, and the necessary adjustments and compromises should be pursued but leave the specifics regarding narrowing the closure to the MFC. Rader did not support re-drawing lines that night. Hall thought that what was presented was fair considering the attention to enforcement and compliance and the difficulties in enforcing. Rader noted that based on what he heard, the intent of the committee was to protect all existing and prospective sea grass habitat from fishing and non-fishing threats and that we would endorse the proper actions to make it happen throughout the lines proposed by staff except in places shown not to be practical as sea grass habitat.

Rider added that their motion should include considerations for the stakeholder groups, including the shrimp industry and small vessel fishers impacted by potential decisions, and Hall agreed. Rader responded that there's currently no motion on the floor. He suggested that a motion include three parts: 1) protect existing and prospective seagrass habitat; 2) endorse (generally) the proposal made by staff with

the provision the lines not include areas that will never have seagrass habitat; and 3) a commitment be made by division and partners and through the CHPP process to continue quantifying the status of seagrass in NC and track the performance of this and other measures meant to protect/restore habitat. Deaton noted that APNEP has a document that details and quantifies mapping changes. Rader noted that he's asking for more than that- a program that actively monitors through time the progress made given management changes. Hall noted that APNEP's efforts are currently more focused on high salinity SAV and not on low salinity areas. A lot of shrimping occurs in these areas. Rader noted that the water quality standard development that's underway is partitioning those things that relate to SAV survival in different settings. He also noted that we shouldn't take today's salinity patterns as what will be there in the future, particularly following storm events.

During motion discussion, Stewart asked if language could be added recommending the use of buffers to protect SAV from sedimentation. Rader noted that a lot of great things have been done regarding buffers but you have to examine the social and economic tradeoffs (community impact) for them to be effective. Deaton asked Rader to clarify his second point. Rader noted in areas greater than six feet deep that it would be expectable to exempt these areas from closures if there is not a likelihood that SAV could be supported.

Rader recommended staff work with stakeholders to develop a practical way to address this before the MFC meeting. Rader noted that if there's an overreach, the Commission needs to be aware.

Leahy noted that budget and cost of enforcement are not included and that the fees collected from license sales should be covering some of those costs.

Rider and Gardner noted that it would help to define the criteria for closures, such as water depth, and clarity, and to be realistic when determining where SAV could come back because blanket closures will shut down people's livelihoods, which isn't the intent. Several noted that there are multiple examples of areas losing seagrass that aren't being fished by shrimpers. Rader agreed that this is important to protect the resources without undue hardship.

Leahy asked if there was a way to roll out the closures other than immediate closures. Rader agreed that a long-term plan would be a good idea and recommended the development of an SAV conservation plan that would track goals consistent with the coastal system. Deaton noted that the existing CHPP SAV issue paper was centered on SAV protection and restoration. Rader responded that he'd like to have more specific goals and Deaton responded that there is an overall goal of protecting and restoring to increase SAV extent to the maximum documented extent (~191,000 acres). We are currently below that acreage goal. Rader responded that prospective distribution is difficult because we don't know where the Outer Banks will be in the future and how that will impact SAV distribution by affecting environmental conditions.

Rader recommended that the AC endorse the development of a SAV Conservation Plan, built upon the CHPP and other plans, that creates goals and a tracking mechanism, beginning with the areas where SAV is most likely to survive. He also noted that there should be a mechanism to revisit the closure zones if SAV isn't returning because there's other stressors causing impacts. Deaton noted the assessment should allow sufficient recovery time. Parrish noted that trawling has been closed in some areas for extended periods, but they're not seeing the SAV recovery which is causing issue with supporting the recommended actions. It seems that SAV extent is getting worse. The closures could cause significant negative impacts on users that may not be the primary stressor. Agricultural and other sources of runoff is a greater threat that isn't being addressed by the MFC. Deaton responded that those are being addressed through the CHPP and water quality standards.

Rader said he hoped to have stakeholder engagement to address their concerns before the MFC meeting, particularly in areas where closures are unnecessarily expansive. Hall noted that he's concerned with the areas that cannot provide SAV habitat and the impact of the closures in those areas on the stakeholders. Flora asked if there was enough time to engage with stakeholders before the next MFC meeting, and the director indicated there was not. Stewart noted that staff can recommend to the MFC in February to send the issue paper out to additional AC groups to get more stakeholder input. Flora responded that this would need MFC approval.

Hall noted that the resource agencies should determine which areas aren't likely to support SAV then go to the stakeholders for collaboration. After further discussion, **Hall made a motion that the AC endorsed the division recommendations to protect existing and prospective SAV habitat. In portions of proposed closure areas where SAV cannot be supported, the division should work with stakeholders to maximize SAV protection while reducing impact on stakeholder use. A commitment should be made to quantify the status of SAV habitat in NC and a monitoring program to measure progress of these programs. Second by Leahy. Motion passed without dissent.**

OTHER ISSUES FROM AC MEMBERS

The motion by Hall to pass the minutes of the April 2023 business meeting was revisited and was seconded by Bart Durham. The motion passed without dissent.

Rader asked if there were other issues to discuss or to put on a list for the future. Leahy asked if there were any efforts to restore SAV through transplanting or seeding and suggested that the AC look into this as a possible solution. Deaton indicated that the Jarvis lab at UNCW is currently working on SAV seed banks. Fodrie messaged Deaton that UNC-IMS received grant funding to try seed restoration.

Rader would like the AC to have an opportunity to review the Oyster and Hard Clam FMP early in the review process and identify priorities for conservation. Deaton responded that the for both Oyster and Hard Clam FMP is in the scoping stage and input could at some point. Flora agreed and noted that there's still an online public questionnaire available. Rader asked that it be taken under advisement and bring back a recommendation. Rader noted that non-fishing impacts are likely dominant, and therefore the relief can be found outside of regulatory actions of the MFC. His opinion was that the AC should be able to make recommendations outside of that regulatory process, such as through the CHPP. Flora recommended that it be put on the agenda for the next meeting.

Rider commented that Coastal Carolina Riverwatch (CCRW) is working on a few research projects in the next three years studying oysters (wild and farm-raised populations) relative to potential water quality concerns brought up by the industry. For the upcoming oyster and clam FMP, she would like a heads up on data regarding this and a presentation if possible. Flora noted that the current amendment for oysters and clams will only be wild oysters and won't include farm-raised oysters in that amendment due to DMF's Habitat and Enhancement program covering that purview now.

Rader adjourned the meeting at 8:19 p.m.

February 2, 2024

MEMORANDUM

TO: N.C. Marine Fisheries Commission

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

SUBJECT: November 7, 2023, Commercial Fishing Resource Fund Committee Meeting

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Issue
The N.C. Commercial Fishing Resource Funding Committee met jointly with the N.C. Marine Fisheries Commission Commercial Resource Fund Committee at 6:00 p.m. on Tuesday, November 7, 2023, through Webex to hear a budget report and discuss a draft request for proposals (RFP).

Findings
The joint committees moved through consensus to make minor edits to the draft RFP. Once the RFP is published at a later date, the joint committees will review proposals at an in-person meeting at the DEQ Washington Regional Office.

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

Attachments
1) Draft meeting minutes from the November 7, 2023 joint meeting

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 1, 2023

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 6:00 p.m. on Tuesday, November 7, 2023, through Webex. The following members attended:

MFC Commercial Resource Fund Committee: Mike Blanton, Ryan Bethea

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

Absent: Sammy Corbett, Steve Weeks

Public Comment: Public comment was sent to committee members.

Approval of Agenda and Minutes

Chairmen Ernest Doshier and Mike Blanton called the meeting to order for the Funding Committee for the N.C. Commercial Fishing Resource Fund and the MFC Commercial Resource Fund Committee. William Brantley read the conflict-of-interest reminder, and no conflicts were noted. Brantley conducted a roll call for both committees.

The meeting agenda and minutes were reviewed.

Motion by Glenn Skinner to approve the agenda. Second by Doug Todd. Motion passed through a roll call vote of present members.

Motion by Ryan Bethea to approve the agenda. Second by Mike Blanton. Motion passed through a roll call vote of present members.

Motion by Doug Todd to approve the minutes from the March 1, 2023 meeting. Second by Glenn Skinner. Motion passed through a roll call vote of present members.

Motion by Ryan Bethea approve the minutes from the March 1, 2023 meeting. Second by Mike Blanton. Motion passed through a roll call vote of present members.

Brantley briefed the committees on the scope of the meeting, which was to hear an update on the balance in the Fund, and to further discuss an upcoming Request for Proposals.

Financial Report

Brantley briefed the Committees that the fiscal year 2023 transfer into the Commercial Fishing Resource Fund was $617,671. After obligations for on-going projects from the Fund, this leaves $1,483,078.16 available for the Committees to spend on projects allowed for in NCGS 113-173.1.

Incidental Take Permit Discussion

Chairman Doshier asked for an update on the ITP. Brantley said that the draft Environmental Assessment was on NOAA's webpage if anyone wanted to read it. Additionally, under NCGS 113-173.1, if costs rise to cover additional requirements of the forthcoming ITP, then it could result in a reduction in the amount of funds available to the Commercial Fishing Resource Fund. Skinner asked if law enforcement positions were being added to the ITP. Deputy Director Loeffler stated that investigator positions would be added to help enforce the observer call-in system.

CFRF REQUEST FOR PROPOSALS (RFP) DISCUSSION

A draft Request for Proposals was provided for the committees to review.

- Red Drum Characterization Study: At the last meeting, members inquired if the DMF was interested in conducting the red drum characterization study. Brantley noted that division staff had discussed the request and were not able to conduct their study at this time.
- Consumer Education Project: Skinner noted that it would be good to have presentations on prior project metrics before entertaining proposals on the new RFP.
- Blue Crab Study: Blanton inquired about the verbiage on the blue crab request, and wanted to make sure that the contracting of local crab fishermen could be included in the design methodology.
- Water Quality Project: Members discussed the requirement or preference of matching funds by applicants and putting funding caps on the project requests. The consensus was to note a high preference that applicants provide and show matching funds in their proposals, and that water quality proposals would be capped at $100,000 per year.

- Shrimp Trawl Fishery Project: Brantley said DMF had reviewed this request among division staff, and if this project remains in the RFP, that applicants should be informed that permits for trawling in any closed area would have to be discussed on a case-by-case basis and are not guaranteed.

Brantley said he would incorporate the edits and send to members before publishing the RFP.

Other Topics

Brantley asked for input on how members wanted to hear the updated public relations polling results. A listening station, committee meeting, or sub-committee assignment could be used to hear the firm's results. Skinner stated that he preferred a listening station, and members could hear the results before moving forward with additional public relations projects. Chairmen Doshier and Blanton agreed, noting the information is pertinent to understanding the next steps.

Brantley asked about a preference for the next meeting. Members requested an in-person meeting to review proposals at the Washington Regional Office.

Issues from Committee Members

Chairman Doshier thanked former members Doug Cross and Ana Shellem for their time served on the committees.

ADJOURNMENT

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

Motion by Ryan Bethea to adjourn. Second by Mike Blanton. Motion passed through a roll call vote of present members.

Meeting adjourned.

WB

NC Marine Fisheries Commission

Director's Report

February 2024 Business Meeting

Atlantic States Marine Fisheries Commission

2024 Winter Meeting Summary

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

2024 Winter Meeting
January 23 – 25, 2024

For more information, please contact Toni Kerns, ISFMP, Tina Berger, Communications or the identified individual at 703.842.0740

Meeting Summaries, Press Releases and Motions

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AMERICAN LOBSTER MANAGEMENT BOARD (JANUARY 23, 2024)

Press Release

American Lobster Board Initiates Draft Addendum XXX to Clarify Addendum XXVII Impacts on Foreign Imports

Arlington, VA – The Commission's American Lobster Management Board initiated Draft Addendum XXX to Amendment 3 to the Interstate Fishery Management Plan for American Lobster. The Draft Addendum is being considered to clarify how the measures of Addendum XXVII, approved in May 2023, will apply to foreign imports of American lobster.

The Magnuson-Stevens Act prohibits imports of whole live lobster smaller than the minimum possession size in effect at the time under the Commission's American lobster management program. This provision, referred to as the Mitchell Provision, was passed to prevent imports of lobster smaller than what the US industry can harvest. The current minimum gauge size for Lobster Conservation Management Area (LCMA) 1 of 3 ¼" is the smallest minimum size in effect for the US lobster fishery.

Under Addendum XXVII, changes to the current gauge and escape vent sizes in LCMA 1 (inshore Gulf of Maine) are triggered when a 35% decline in recruit abundance for the Gulf of Maine/Georges Bank stock is observed. As of October 2023, the trigger index had declined by 39% with the inclusion of 2022 survey data in the index. Therefore, a series of gradual changes to gauge and vent size will begin January 1, 2025, starting with an increase to the minimum gauge size in LCMA 1 from 3 ¼" to 3 $^{5}/_{16}$". Starting in January 2025, this 3 $^{5}/_{16}$" gauge size will be the smallest minimum gauge size in effect. Draft Addendum XXX aims to clarify that Addendum XXVII shall include compliance with the Mitchell Provision, meaning the smallest minimum size for foreign imports would match the smallest minimum size in effect for the US industry.

The Board will meet in late February/early March to consider approving Draft Addendum XXX for public comment. There are currently no regulations in place to restrict the maximum size of imported lobster, though the Board expressed interest in exploring this possibility further through a separate action. For more information, please contact Caitlin Starks, Senior Fishery Management Plan Coordinator, at cstarks@asmfc.org or 703.842.0740.

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PR24-03

Meeting Summary

The American Lobster Management Board met to consider reports from the American Lobster and Jonah Crab Technical Committees (TCs); implications of Addendum XXVII size limit changes on imports; federal and Commission rules for Lobster Conservation Management Areas (LCMAs) 2 and 3; a progress update on state implementation of Addendum XXIX on federal vessel trackers; and a nomination to the Jonah Crab Advisory Panel (AP).

The American Lobster TC Chair provided a report on the Board task from the October 2023 meeting to compile information on the lobster resource and fishery in and around the Northern Edge of Georges

Bank. This task responds to a potential action being considered by the New England Fishery Management Council (NEFMC) to allow scallop fishery access in Closed Area II. The TC identified various data sources that could be used to provide information on the seasonal presence and abundance of lobsters, including egg-bearing lobsters, as well as lobster fishery effort, in and around the Northern Edge. The TC will request data from federal trip reports, the Coonammesset Farm Foundation's seasonal bycatch scallop dredge survey, the Commercial Fisheries Research Foundation's Lobster and Jonah Crab Research Fleet, and the Northeast Fisheries Science Center trawl survey to provide analysis of lobster catch, abundance, and fishery effort so that this information can be considered by the NEFMC.

The Chair of the Jonah Crab TC reported on additional information and recommendations requested following approval of the 2023 Benchmark Stock Assessment. The TC recommended additional indicators including fishery-dependent CPUE from Rhode Island, fishery-dependent effort from Massachusetts, and price per pound data for landings of Jonah crab and other crustacean species should be reviewed regularly to monitor the Jonah crab stocks and fishery. The TC does not believe management action to address the stock condition is necessary at this time, but recommends indicator data for the offshore Southern New England stock, where the majority of the fishery occurs, be updated annually, while data for the other three stock areas should be updated every five years. It also recommended engaging the Advisory Panel annually to provide information on the market of the fishery. The Board supported the TC's recommendations.

The Board discussed the implications of the American lobster minimum gauge size increase that will go into effect January 1, 2025 as required by Addendum XXVII. Specifically, the LCMA 1 (inshore Gulf of Maine) minimum size will increase from 3 ¼" to 3 $^{5}/_{16}$"; after January 1, all LCMAs will have implemented a minimum gauge size greater than the coastwide minimum size of 3 ¼", the size in which no area can be below. The Board's intent is that the Mitchell provision of the Magnuson-Stevens Act, which was passed to prevent imports of lobster smaller than what the US industry can harvest, would prohibit imports of lobster below the new minimum size for LCMA 1, which will be the smallest active minimum size. The Board initiated an addendum to clarify that Addendum XXVII shall include compliance with the Mitchell provision, and the smallest minimum size in effect should apply to foreign imports.

In relation to the recent NOAA rulemaking to implement ownership and trap cap provisions for LCMAs 2 and 3, consistent with Addenda XXI and XXII, the Board discussed the measures included in the NOAA interim rule, how they differ from the Commission's addenda, and the impacts to industry. Addenda XXI and XXII, approved in 2013, aimed to scale the capacity of the Southern New England (SNE) fishery to the diminished size of the SNE resource. However, in the decade that has passed since the Commission intended for complementary federal measures to be implemented, increases in the cost of bait and fuel, the loss of fishing ground to wind energy development, marine mammal protections, and the expansion of the Jonah crab fishery have significantly changed the fishery. Given these changes, the industry no longer supports reduced maximum trap limits for LCMAs 2 and 3. The Board recommended the Commission withdraw its request to implement the measures set in Addenda XXI and XXII with two exceptions and tasked the Plan Development Team to review the original goals and objectives of the plans and make recommendations for alternate measures to achieve those goals, considering recommendations from the LCMA 2 and 3 Lobster Conservation Management Teams. At the ASMFC Spring Meeting, the Board will consider these recommendations and determine if an addendum or other

action is needed to solicit a change to the measures in NOAA's interim rule, which are scheduled to become effective May 1, 2025.

The Board received an update on the status of state implementation of Addendum XXIX. Addendum XXIX, approved in 2022, established electronic tracking requirements for federally-permitted vessels in the American lobster and Jonah crab fisheries. The Addendum went into effect on December 15, 2023 but several states have not yet implemented the required regulations. The Board agreed to send a letter to states that have not implemented the required measures, urging them to take action in a timely fashion to ensure compliance with the Interstate FMP for American Lobster.

The Board approved the nomination of Denny Colbert, a commercial offshore trap fisherman from Massachusetts, to the Jonah Crab Advisory Panel. Additionally, the Board agreed to postpone pursuing a Management Strategy Evaluation for American lobster until after the completion of the ongoing benchmark stock assessment.

For more information, please contact Caitlin Starks, Senior Fishery Management Plan Coordinator, at cstarks@asmfc.org.

Motions

Main Motion

Motion to initiate an addendum to clarify that Addendum XXVII shall include compliance with the Mitchel provision and signal to NMFS that the smallest implemented minimum size should apply to imports.

Motion made by Mr. McKiernan and seconded by Mr. Grout. Motion amended.

Motion to Amend

Motion to amend to add consideration of a maximum size limit for imports.

Motion made by Mr. Keliher and seconded by Mr. McKiernan. Motion passes by unanimous consent.

Main Motion as Amended

Motion to initiate an addendum to clarify that Addendum XXVII shall include compliance with the Mitchell provision, signal to NMFS that the smallest implemented minimum size should apply to imports, and also consideration of a maximum size limit for imports.

Motion passes by unanimous consent.

Move to recommend to the ISFMP Policy Board that the Commission send a letter to NOAA Fisheries to withdraw the Commission's recommendation to implement the measures of Sections 3 and 4, except Sections 3.1.1 and 3.2.1 – transfers of Multi-LCMA Trap Allocation of Addendum XXI and all of Addendum XXII.

Motion made by Mr. McKiernan and seconded by Mr. Borden. Motion passes with 1 null vote (ME) and 1 abstention (NOAA Fisheries).

Move to send states who have not implemented the electronic vessel tracking requirement for federal lobster permit holders a letter stating that the implementation deadline for this action was December 15, 2023 and states need to implement this requirement in a timely fashion to ensure compliance with the Lobster FMP.
Motion made by Mr. Keliher and seconded by Mr. Grout. Motion passes by unanimous consent.

Move to approve the nomination of Denny Colbert to the Jonah Crab Advisory Panel.
Motion made by Mr. McKiernan and seconded by Mr. Abbott. Motion passes by unanimous consent.

Move to have the Plan Development Team review the conservation measures originally set in Addenda XXI and XXII and make recommendations for alternate measures to achieve those reductions inclusive of the Lobster Conservation Management Team recommendations by the ASMFC Spring Meeting.
Motion made by Ms. Patterson and seconded by Mr. Keliher. Motion passes by unanimous consent.

SPINY DOGFISH MANAGEMENT BOARD (JANUARY 23, 2024)

Meeting Summary
The Spiny Dogfish Management Board met to review the results of the 2023 management track assessment, set the specifications for up to the next three fishing years, and elect a Vice-Chair.

Pending approval of identical quotas from the NOAA Fisheries Greater Atlantic Regional Fisheries Administrator, the Board approved the following coastwide commercial quotas for the 2024-2027 fishing years (May 1-April 30): 10,699,021 pounds for 2024/2025; 10,972,394 pounds for 2025/2026, and 11,223,720 pounds for 2026/2027. The quotas are consistent with the measures recommended to NOAA Fisheries by the Mid-Atlantic Fishery Management Council. The Board also established a 7,500-pound commercial trip limit for the northern region states of Maine through Connecticut, while New York through North Carolina have the ability to set state-specific trip limits based on the needs of their fisheries. The Mid-Atlantic and New England Fishery Management Councils will forward their recommendations for federal waters (3 –200 miles from shore) to the Regional Administrator for final approval.

	Northern Region (ME-CT)	NY	NJ	DE	MD	VA	NC
Possession Limit	7,500	To be specified by the individual southern region states					
Allocation	58%	2.71%	7.64%	0.90%	5.92%	10.80%	14.04%
2024-2025	**6,205,432**	**289,708**	**817,903**	**95,868**	**633,385**	**1,154,982**	**1,501,743**
2025-2026	**6,363,989**	**297,110**	**838,802**	**98,317**	**649,569**	**1,184,494**	**1,540,115**
2026-2027	**6,509,758**	**303,915**	**858,015**	**100,569**	**664,447**	**1,211,625**	**1,575,391**

The quotas are based on the 2023 management track assessment, which updated the 2022 research track assessment to include data through 2022, extended the initial year from 1989 to 1924, and updated the stock projections through 2026. For the terminal year of 2022, the assessment estimated spawning output to be 101% of the target and fishing mortality to be at 89% of the threshold. However, while the stock is neither overfished nor experiencing overfishing, the assessment also found a lower productivity of the stock, requiring reduced quotas to prevent overfishing in the future.

The Board also elected Joe Cimino (NJ) as Vice-Chair.

For more information, please contact James Boyle, FMP Coordinator, at jboyle@asmfc.org.

Motions

Move to approve FY2024-2026 spiny dogfish specifications: commercial quota 2024-2025 be set at 10,699,021 pounds; 2025-2026 be set at 10,972,394 pounds; 2026-2027 be set at 11,223,720 pounds consistent with those adopted by the Mid-Atlantic Fishery Management Council pending their approval by NOAA Fisheries.

Motion made by Ms. Meserve and seconded by Mr. Kaelin. Motion passes (11 in favor and 1abstention from NOAA Fisheries).

Move to approve the spiny dogfish northern region trip limit for fishing years 2024/25, 2025/26, and 2026/27 at 7,500 lb.

Motion made by Mr. Kaelin and seconded by Mr. Grout. Motion carries with 1 abstention (NOAA Fisheries).

Move to nominate Joe Cimino as Vice-Chair of the Spiny Dogfish Board.

Motion made by Mr. Batsavage and seconded by Mr. Luisi. Motion passes by unanimous consent.

AMERICAN EEL MANAGEMENT BOARD (JANUARY 23, 2024)

Meeting Summary

The American Eel Management Board met to approve two Draft Addenda for public comment, and the Fishery Management Plan (FMP) Review for the 2022 fishing year. The Board initiated both addenda in August 2023. Draft Addendum VI addresses Maine's glass eel quota. Maine's glass eel quota has been set at 9,688 pounds since 2015 and a new addendum is needed to establish a quota for the 2025 fishing year and beyond. The Draft Addendum considers maintaining the current Maine quota level, and the duration of the quota once established.

Draft Addendum VII considers reducing the yellow eel commercial catch cap in response to the recent stock assessment, which found the coastwide stock is depleted and recommended reducing yellow eel landings. Specifically, the draft addendum considers options for setting the coastwide cap using a new tool proposed in the assessment called I_{TARGET}. I_{TARGET} recommends harvest levels based on catch and abundance indices, and the management goals. In addition, Draft Addendum VII considers modifying monitoring requirements for the state young-of-year (YOY) surveys and trip level catch and effort reporting based on stock assessment and Technical Committee (TC) recommendations. The stock assessment and TC recommended making some biological sampling components of the YOY survey

optional because the data have not been useful in informing stock-wide trends. The stock assessment also noted that the harvester catch per unit effort data that are currently required under Addendum I have not been indicative of trends in the stock as a whole, and thus have not been used in any of the American eel assessments. Draft Addendum VII considers options to make the collection of these data optional to ease the monitoring burden on states.

Finally, the Board approved the American Eel FMP Review for the 2022 fishing year, state compliance reports, and *de minimis* requests for New Hampshire, Massachusetts, Pennsylvania, D.C., and Georgia. A press release will follow with information on state public hearings on Draft Addenda VI and VII.

For more information, please contact Caitlin Starks, Senior Fishery Management Plan Coordinator, at cstarks@asmfc.org.

Motions

Move to remove in Section 3.1, Option 2: Reduce Maine's glass eel quota by 21.8%.
Motion made by Ms. Ware and seconded by Mr. Reid. Motion passes (14 in favor, 3 opposed, 2 abstentions).

Move to approve Draft Addendum VI for public comment, as modified today.
Motion made by Ms. Ware and seconded by Ms. Patterson. Motion passes by consent.

Move to remove Sections 3.1 and 3.2 from the draft addendum VII and postpone further action on the coastwide cap options until coastwide landings reach 600,000 lb. in a given year.
Motion made by Mr. Clark and seconded by Mr. Dize. Motion fails (1 in favor, 18 opposed).

Motion to remove Section 3.1, option 2
Motion made by Mr. Clark and seconded by Ms. Ware. Motion fails (8 in favor, 11 opposed).

Move to approve Draft Addendum VII for public comment, as modified today.
Motion made by Ms. Patterson and seconded by Ms. Madsen. Motion passes by consent.

Move to approve the American Eel FMP Review for the 2022 fishing year, state compliance reports, and *de minimis* status for New Hampshire, Massachusetts, Pennsylvania, D.C., and Georgia.
Motion made by Ms. Braun and seconded by Ms. Fegley. Motion passes by consent.

Move to approve Sara Rademaker and Timothy LaRochelle to the American Eel Advisory Panel.
Motion made by Ms. Ware and seconded by Mr. McKiernan. Motion passes by consent.

EXECUTIVE COMMITTEE (JANUARY 24, 2024)

Meeting Summary

The Executive Committee met to discuss several issues, including a Legislative Committee update; tasking a revitalized Committee on Economics & Social Sciences (CESS); refining the Commission election process; reviewing the Commission's Draft 2024-2028 Strategic Plan; and discussing future meeting week

format and a letter to NOAA regarding fisheries disaster funding. The following action items resulted from the Committee's discussions:

- Staff presented a report on behalf of the Legislative Committee. He presented on the uncertain nature of Fiscal Year 2024 appropriations; plans within Congress to address Magnuson-Stevens Act reauthorization and failures of the Marine Recreational Information Program; and the need for a working waterfronts protection program.
- Staff reported on the revitalization of CESS, including a new Chair, Sabrina Lovell, and Vice Chair, Andrew Scheld, as well as presented a summary of potential projects for the future including potentially looking into the economic impact of year-round recreational fishing for northern states as well as developing standardized social and economic indicators for species or regions.
- Staff presented the updated Officer Election Procedures, which clarified the processes with regard to two-year terms and regional rotation of the officers, aligning the processes with the way the Commission has been operating.
- Staff presented a report on the development of the Draft 2024-2028 Strategic Plan. There was consensus among Commissioners the document did not need a full re-write, rather some course corrections to the current plan. Staff detailed the proposed changes and after receiving Committee input, staff will finalize the plan for review and action by the Business Session of the Commission later in this meeting.
- Staff led a discussion on the potential for moving to three in-person and one fully virtual meeting a year. After thorough discussion, it was decided to keep the schedule of four in-person meetings a year, retaining the option to attend virtually if necessary.
- Florida requested, and the Committee supported, sending a letter to NOAA regarding fisheries disaster funding.

For more information, please contact Laura Leach, Director of Finance and Administration, at lleach@asmfc.org.

Motions
No motions were made.

COASTAL PELAGICS MANAGEMENT BOARD (JANUARY 24, 2024)

Meeting Summary
The Coastal Pelagics Management Board met to consider the terms of reference for the Benchmark Assessment for Atlantic Migratory Group (AMG) Cobia (SEDAR 95), receive a progress update on the AMG cobia recreational allocation draft addendum, consider the Spanish Mackerel Fishery Management Plan (FMP) Review for the 2022 fishing year, and receive an update from the South Atlantic Fishery Management Council (SAFMC) on Coastal Migratory Pelagics (CMP) Framework Amendment 13 and the upcoming mackerel port meetings.

The Board reviewed and approved the SEDAR 95 terms of reference, developed by SEDAR and the Cobia Technical Committee (TC), for use in the assessment. Most notably, the terms of reference include a review of the stock structure and unit stock definitions through genetic, tagging, and other

data sources as available. SEDAR 95 is scheduled to be completed in November 2025 and presented to the Board in early 2026.

The Board received a progress update from the Cobia Plan Development Team (PDT) on the scoping of the recreational reallocation draft addendum initiated at the Commission's Annual Meeting in October 2023. The PDT asked for Board feedback on a number topics related to the proposed alternatives including, the applicability of an automatic allocation trigger, the data range for calculating recreational allocations, recreational measures setting timelines, and the incorporation of management uncertainty into the action. The Board discussed how upcoming changes to the Marine Recreational Information Program (MRIP) Fishing Effort Survey (FES) estimates may affect aspects of the draft addendum, especially for the state-by-state and regional allocation alternatives. Ultimately, the Board supported continuing efforts to complete the draft addendum for implementation in 2025. The Board supported the PDT further exploring all proposed alternatives outlined in the staff presentation. The Board also supported the removal of COVID-19 impacted years from allocation calculations and exploration of a five-year recreational measures setting process timeline.

The Board reviewed the Spanish Mackerel FMP Review for the 2022 fishing year and state compliance. All states' regulations were consistent with the FMP, and the Board approved *de minimis* requests from Rhode Island, New Jersey, Delaware, and Georgia. The Spanish Mackerel Plan Review Team (PRT) emphasized the need to understand the dynamics of the fishery across regions, especially as the fishery increases in more northern states. The PRT noted that some of this regional analysis could be included in the forthcoming paper that was tasked by the Board to the newly formed Spanish Mackerel TC to characterize the fisheries along the coast. The PRT also emphasized the importance of continuing coordination between the Commission and SAFMC on future management action that could address differences between the Interstate and federal FMPs, which include differences in commercial management zones, trip limits, and closures.
The Board received an update from SAFMC on CMP Framework Amendment 13, which has been postponed until after the Spanish and king mackerel port meetings are concluded. Spanish mackerel port meetings remain in the planning process and are scheduled to be held along the Atlantic coast from April-November 2024.

Lastly, the Board elected Lynn Fegley from Maryland as Vice-Chair. For more information on cobia, please contact Chelsea Tuohy, FMP Coordinator, at ctuohy@asmfc.org, and for more information on Spanish mackerel, please contact Emilie Franke, FMP Coordinator, at efranke@asmfc.org.

Motions
Move to approve the Terms of Reference for the SouthEast Data, Assessment, and Review Atlantic Cobia Benchmark Stock Assessment (SEDAR 95).
Motion made by Ms. Fegley and seconded by Dr. Rhodes. Motion carries by unanimous consent.

Move to approve the Spanish Mackerel Fishery Management Plan Review for the 2022 fishing year, state compliance reports, and *de minimis* requests from Rhode Island, New Jersey, Delaware, and Georgia.
Motion made by Mr. Haymans and seconded by Ms. Burgess. Motion carries by consent.

Move to elect Ms. Lynn Fegley from Maryland as Vice Chair of the Coastal Pelagics Management Board. Motion made by Ms. Madsen and seconded from Dr. Rhodes. Motion passes by consent.

ATLANTIC STRIPED BASS MANAGEMENT BOARD (JANUARY 24, 2024)

Press Release

ASMFC Atlantic Striped Bass Board Approves Addendum II
Establishes Measures to Continue Progress Towards Stock Rebuilding

Arlington, VA – The Commission's Atlantic Striped Bass Management Board approved Addendum II to Amendment 7 to the Interstate Fishery Management Plan (FMP) for Atlantic Striped Bass. The Addendum modifies recreational and commercial measures to reduce fishing mortality in 2024, establishes an expedited response process to upcoming stock assessments, and addresses requirements for recreational filleting. Addendum II builds upon the 2023 emergency action by changing the measures in the FMP to reduce fishing mortality and support stock rebuilding. Addendum II measures will replace the emergency action measures upon its implementation by the states by May 1, 2024.

"First and foremost, thank you to the 2,000 members of the public who submitted public comments. The Board had difficult issues to discuss, and public comments were a crucial part of the deliberations," said Board Chair Megan Ware from Maine. "The Board remains focused on rebuilding the stock by 2029. The upcoming 2024 stock assessment will be an important checkpoint on progress toward rebuilding."

For the ocean recreational fishery, the Addendum implements a 28" to 31" slot limit, 1-fish bag limit, and maintains 2022 season dates for all fishery participants; this maintains the same ocean recreational measures adopted under the recent emergency action. For the Chesapeake Bay recreational fishery, the Addendum implements a 19" to 24" slot limit, 1-fish bag limit, and maintains 2022 season dates for all fishery participants. For the commercial fishery, the Addendum reduces commercial quotas by 7% in both the ocean and Chesapeake Bay.

To address concerns about recreational filleting allowances and compliance with recreational size limits, the Addendum establishes two requirements for states that authorize at-sea/shore-side filleting of striped bass: racks must be retained and possession limited to no more than two fillets per legal fish.

To enable an expedited management response to upcoming stock assessments prior to the 2029 rebuilding deadline, the Addendum establishes a mechanism allowing the Board to respond to a stock assessment via Board action if the stock is not projected to rebuild by 2029.

States must submit implementation plans by March 1, 2024 for Board review and approval, which will take place at a special Board meeting to be scheduled for later in March. All Addendum II measures must be implemented by May 1, 2024.

Addendum II will be available in February on the Commission website at http://www.asmfc.org/species/atlantic-striped-bass under Management Plans and FMP Reviews. For more information, please contact Emilie Franke, Fishery Management Plan Coordinator, at efranke@asmfc.org or 703.842.0740. PR24-02

Meeting Summary

In addition to approving Addendum II, the Board met to consider a conservation equivalency (CE) proposal submitted by New Jersey under Addendum II, and to approve nominations to the Atlantic Striped Bass Advisory Panel.

New Jersey submitted a CE proposal to continue the state's recreational Striped Bass Bonus Program (SBBP) under Addendum II. New Jersey has reallocated its commercial quota to the recreational SBBP through CE for the past several years. The SBBP is based on New Jersey's existing commercial quota and is managed using that quota. Participants must apply to the SBBP and a tag system is used to ensure quota is not exceeded. New Jersey proposed to continue the quota reallocation, and outlined SBBP size limits and quota levels dependent on the measures selected under Addendum II. Based on the final Addendum II measures selected by the Board, New Jersey specified the SBBP would maintain the status quo SBBP size limit (24" to <28") with a 7% quota reduction to 200,798 pounds. This proposal was unanimously approved by the Board.

Lastly, the Board approved Toby Lapinski representing Connecticut and Julie Evans representing New York to the Atlantic Striped Bass Advisory Panel.

For more information, please contact Emilie Franke, Fishery Management Plan Coordinator, at efranke@asmfc.org.

Motions

Main Motion

Move to approve in Section 3.1.1 Ocean Recreational Fishery Option B: 1 fish at 28" to 31" with 2022 seasons for all modes.

Motion made by Dr. Armstrong and seconded by Mr. Abbott.

Motion to Amend

Motion to amend to replace Option B with Option C: 1 fish at 28" to 31" with 2022 seasons for private vessel/shore anglers; 1 fish at 28" to 33" with 2022 seasons for the for-hire mode.

Motion made by Dr. Davis and seconded by Mr. Hasbrouck. Motion fails (7 in favor, 9 opposed).
(Roll Call: In favor – RI, CT, NY, NJ, PRFC, MD, DE; Opposed – NH, ME, VA, DC, NC, PA, NOAA, USFWS, MA)

Main Motion

Move to approve in Section 3.1.1 Ocean Recreational Fishery Option B: 1 fish at 28" to 31" with 2022 seasons for all modes.

Motion made by Dr. Armstrong and seconded by Mr. Abbott. Motion passes (14 in favor, 2 opposed).
(Roll Call: In favor – NH, ME, DE, MD, PRFC, VA, DC, NC, PA, NOAA, USFWS, CT, MA, RI; Opposed – NY, NJ)

Main Motion

Move to approve in section 3.1.2 Chesapeake Bay Recreational Fishery Option C2: 19" to 24" slot, 1 fish for private vessels/shore anglers, 2 fish for for-hire, 2022 seasons.

Motion made by Mr. Luisi and seconded by Ms. Braun.

Motion to Substitute
Move to substitute to approve in Section 3.1.2 Chesapeake Bay Recreational Fishery Option B2: 19" to 24" slot, 1 fish for all modes, 2022 seasons.
Motion made by Mr. Sikorski and seconded by Mr. Geer. Motion passes (13 in favor, 3 opposed). (Roll Call: In favor – RI, MA, CT, NY, USFWS, NOAA, PA, NC, VA, DC, DE, ME, NH; Opposed – NY, PRFC, MD)

Main Motion as Substituted
Move to approve in Section 3.1.2 Chesapeake Bay Recreational Fishery Option B2: 19" to 24" slot, 1 fish for all modes, 2022 seasons.

Motion to Substitute
Move to substitute in section 3.1.2 Chesapeake Bay Recreational Fishery Option C2: (19" to 24" slot, 1 fish for private vessels/shore anglers, 2 fish for for-hire, 2022 seasons) for 2024, and Option B2 (19" to 24" slot, 1 fish for all modes, 2022 seasons) beginning January 1, 2025.
Motion made by Mr. Luisi and seconded by Ms. Braun. Motion fails (4 in favor, 12 opposed). (Roll Call: In favor – MD, PRFC, VA, NJ; Opposed – RI, MA, CT, NY, USFWS, NOAA, PA, NC, DC, DE, ME, NH)

Main Motion as Substituted
Move to approve in Section 3.1.2 Chesapeake Bay Recreational Fishery Option B2: 19" to 24" slot, 1 fish for all modes, 2022 seasons.

Motion to Substitute
Move to substitute in section 3.1.2 Chesapeake Bay Recreational Fishery Option C1: (19" to 23" slot, 1 fish for private vessels/shore anglers, 2 fish for for-hire, 2022 seasons) for 2024, and Option B2 (19" to 24" slot, 1 fish for all modes, 2022 seasons) beginning January 1, 2025.
Motion made by Mr. Luisi and seconded by Dr. Davis. Motion fails (6 in favor, 9 opposed, 1 abstention). (Roll Call: In favor – RI, CT, NY, NJ, MD, DE; Opposed – NH, ME, PRFC, VA, DC, NC, PA, NOAA, MA; Abstention – USFWS)

Main Motion as Substituted
Move to approve in Section 3.1.2 Chesapeake Bay Recreational Fishery Option B2: 19" to 24" slot, 1 fish for all modes, 2022 seasons.
Motion passes (14 in favor, 2 opposed). (Roll Call: In favor – NH, ME, DE, PRFC, VA, DC, NC, PA, NOAA, USFWS, NY, CT, MA, RI; Opposed – MD, NJ)

Main Motion
Move to approve in Section 3.1.4 Recreational Filleting Allowance Requirements Option B: For states that authorize at-sea/shore-side filleting of striped bass, establish minimum requirements, including requirements for: racks to be retained; skin to be left intact; and possession to be limited to no more than two fillets per legal fish.
Motion made by Dr. Armstrong and seconded by Ms. Patterson.

Motion to Amend
Move to amend to remove "skin to be left intact."
Motion made by Mr. Gary and seconded by Mr. Cimino. Motion passes (12 in favor, 2 opposed, 2 abstentions). (Roll Call: In favor – DE, MD, PRFC, VA, DC, NC, PA, NJ, NY, CT, MA, RI; Opposed – ME, NH; Abstention – NOAA, USFWS)

Main Motion as Amended
Move to approve in Section 3.1.4 Recreational Filleting Allowance Requirements Option B: For states that authorize at-sea/shore-side filleting of striped bass, establish minimum requirements, including requirements for racks to be retained and possession to be limited to no more than two fillets per legal fish.
Motion passes (14 in favor, 2 abstentions). (Roll Call: In favor – NH, ME, DE, MD, PRFC, VA, NC, DC, PA, NJ, NY, CT, MA, RI; Abstentions – NOAA, USFWS)

Main Motion
Move to approve in Section 3.2.1 Commercial Quota Reduction Option B: 14% reduction from ocean and Chesapeake Bay 2022 quotas with 2022 size limits.
Motion made by Dr. Armstrong and seconded by Ms. Patterson.

Motion to Substitute
Move to substitute to approve in Section 3.2.1. Commercial Quota Reduction Option A status quo.
Motion made by Mr. Clark, second by Mr. Hasbrouck. Motion fails (3 in favor, 13 opposed). (Roll Call: In favor – DE, VA, NY; Opposed – NH, ME, MD, PRFC, DC, NC, PA, NOAA, USFWS, NJ, CT, MA, RI)

Main Motion
Move to approve in Section 3.2.1 Commercial Quota Reduction Option B: 14% reduction from ocean and Chesapeake Bay 2022 quotas with 2022 size limits.
Motion made by Dr. Armstrong and seconded by Ms. Patterson.

Motion to Amend
Motion to amend to replace 14% with 7%.
Motion made by Mr. Luisi and seconded by Mr. Kaelin. Motion passes 8 in favor, 6 opposed, 2 abstentions). (Roll Call: In favor – RI, MA, NY, NJ, VA, PRFC, MD, DE; Opposed – NH, ME, DC, NC, PA, CT; Abstentions – NOAA, USFWS)

Main Motion as Amended
Move to approve in Section 3.2.1 Commercial Quota Reduction Option B: 7% reduction from ocean and Chesapeake Bay 2022 quotas with 2022 size limits.
Motion passes (13 in favor, 1 opposed, 2 abstentions). (Roll Call: In favor – NH, ME, DE, MD, PRFC, VA, DC, PA, NJ, NY, CT, MA, RI; Opposed - NC; Abstentions – NOAA, USFWS)

Move to approve in Section 3.3 Response to Stock Assessments Option B: Board could respond via Board action to change management measures by voting to pass a motion at a Board meeting.
Motion made by Dr. Davis and seconded by Mr. Borden. Motion passes (11 in favor, 5 opposed). (Roll Call: In favor – RI, MA, CT, NY, USFWS, NOAA, PA, NC, DE, ME, NH; Opposed – MD, PRFC, VA, DC, NJ).

Main Motion
Move to approve the following compliance schedule:

- **States must submit implementation plans by March 1, 2024.**
- **The Board will review and consider approving implementation plans in March 2024.**
- **States must implement regulations by May 1, 2024.**

Motion made by Dr. Armstrong and seconded by Mr. Borden

Motion to Amend
Motion to amend to replace "implement regulations by May 1, 2024" with "implement recreational regulations by May 1, 2024, and all commercial measure in 3.2.1 effective January 1, 2025."
Motion made by Mr. Geer and seconded by Mr. Clark. Motion fails (7 in favor, 7 opposed, 2 abstentions). (Roll Call: In favor – NH, ME, DE, MD, VA, PRFC, NC; Opposed – DC, PA, NJ, NY, CT, MA, RI; Abstentions – NOAA, USFWS)

Main Motion
Move to approve the following compliance schedule:

- **States must submit implementation plans by March 1, 2024.**
- **The Board will review and consider approving implementation plans in March 2024.**
- **States must implement regulations by May 1, 2024.**

Motion passes (10 in favor, 4 opposed, 2 abstentions). (Roll Call: In favor – NH, ME, DC, NC, PA, NJ, NY, CT, MA, RI; Opposed – DE, MD, PRFC, VA; Abstentions: NOAA, USFWS)

Move to approve Addendum II to Amendment 7 to the Atlantic Striped Bass FMP, as amended today.
Motion made by Dr. Davis and seconded by Mr. Kane. Motion passes (12 in favor, 4 opposed).
(Roll call: In favor – RI, MA, CT, NY, NJ, USFWS, NOAA, PA, NC, DC, ME, NH; Opposed – DE, MD, PRFC, VA)

Move to approve New Jersey's conservation equivalency proposal to allow the commercial quota to be shifted to the bonus tag program. The program will continue with its status quo tag administration and size limit of 24 to less than 28 inches. The starting commercial quota will be 200,798 pounds.
Motion made by Mr. Cimino and seconded by Mr. Grout. Motion passes by unanimous consent.

Move to approve Toby Lapinski representing Connecticut and Julie Evans representing New York to the Striped Bass Advisory Panel.
Motion made by Mr. Gary and seconded by Mr. Sikorski. Motion passes by unanimous consent.

INTERSTATE FISHERIES MANAGEMENT PROGRAM POLICY BOARD (JANUARY 25, 2024)

Meeting Summary
The ISFMP Policy Board met to receive an update from Executive Committee; review results of the 2023 Commissioner Survey; consider a species declared interest request; discuss aquaculture in the exclusive economic zone (EEZ); review a trawl survey white paper from Northeast Fisheries Science Center (NEFSC); consider a request from the Atlantic Striped Bass Board; provide clarification to the American Lobster Board; and receive updates from NOAA Fisheries and the Atlantic Coastal Cooperative Statistics Program (ACCSP).

The Commission Chair, Joe Cimino, presented the Executive Committee Report (see Executive Committee meeting summary earlier in this document) to the Board. The Executive Committee recommended the Commission send a letter to congressional leadership supporting legislations that would establish a federal working waterfront grant program. The Policy Board unanimously supported the letter.

Commissioners completed a survey of Commission performance in 2023, which measures Commissioners' opinions regarding the progress and actions of the Commission in 2023. Cooperation with federal partners consistently scored as the issue of greatest concern with sentiment expressed it's the responsibility of the federal partners to engage with the Commission more. Utilization and availability of Commission resources consistently rated high among Commissioners. Climate change and changing environmental conditions continue to be the top impediment to rebuilding stocks. Other listed concerns included data reliability and short-term interests or political pressures outweighing long-term progress. Issues the Commission should focus on more include the incorporation of socioeconomics into allocation, incorporating environmental factors into analyses, and building climate resilient stocks.

The Policy Board approved New York's request to be a participating state under the Commission Cobia Fishery Management Plan. Since 2019, New York has seen a significant increase of cobia in its state waters, which is reflected in both its commercial and recreational catch. Per the guidelines of the Commission's Rules and Regulations, New York meets the criteria to participate in the management program for this fishery.

Danielle Blacklock of the NOAA Fisheries Aquaculture Office presented on aquaculture in the EEZ. The Office is seeking opportunities to expand US aquaculture in the Atlantic, specifically Atlantic striped bass, but it is illegal to harvest striped bass from the EEZ. The Board raised several concerns and requested Ms. Blacklock provide further information on several issues including economic impacts to the wild caught commercial market, potential biological impacts on the wild Atlantic striped bass population (including measures to prevent impacts), spatial impacts to the fishing industry (e.g., some areas of the Atlantic have several competing uses like alternative energy areas and closed fishing areas, such as sanctuaries, monuments, habitat areas, and other aquaculture areas), and how enforcement would be addressed.

As a result of the loss of sea days experienced in the NEFSC 2023 Spring Bottom Trawl Survey and the accumulated loss of sea days since 2015, the New England Fishery Management Council (NEFMC) requested the NEFSC provide an overview of survey status and steps being taken to maintain the quality and quantity of survey data used to support fishery management in the region. Based on the information provided by the NEFSC, management bodies requested NEFSC prepare a white paper outlining an industry-based survey that is complementary to the Spring and Autumn Bottom Trawl Survey (BTS). Dr. Kathryn Ford presented the white paper, which is part of the effort to consider at least four options for contingencies in the event the R/V Bigelow is not available for the BTS, including (1) the R/V Pisces, (2) an NEFSC-operated vessel, (3) industry-based vessels calibrated to the R/V Bigelow, and (4) a parallel industry-based survey. The white paper addressed option #4. The full contingency plan including all options is anticipated to be completed in FY2024. The plan for an industry-based multispecies BTS was developed in coordination with the Northeast Trawl Advisory Panel (NTAP), which includes commercial fishing, fisheries science, and fishery management professionals in the Northeast. An NTAP working group provided feedback to ensure the feasibility and maximize the value of the industry-based survey

(IBS) as a contingency to the BTS. While there was not complete agreement on all details of the IBS, the white paper represented a starting point to further develop an IBS. If implemented, the IBS would develop its own unique time series that could be used to generate indices of abundance and other data useful to stock assessments, fishery management, ecosystem status, and scientific studies. When the BTS is conducting regular survey operations on the R/V Bigelow, the IBS would be a parallel survey to increase the number of stations sampled in a given stratum. When the BTS is not conducting regular survey operations on the R/V Bigelow and cannot operate under other contingency options, the IBS would be the only shelf-wide fishery-independent bottom trawl survey in the Northeast region. The Board expressed the importance of an IBS, as stakeholder buy-in and confidence in the data are significantly increased. As a member of NTAP, the Board recommended NTAP and the NTAP IBS Working Group develop an outline detailing a proposal to conduct an IBS Pilot Program to test the viability of the program as presented in the white paper. The pilot should concentrate on adapting the survey design elements of the white paper (section 2) to current Industry platform capabilities, with a focus on the NEAMAP platform. The Board asked for a delivery date in time for the Commission's Spring Meeting and the Council's April meetings. NEFSC expressed that timeline would likely not be possible.

In addition to the American Lobster Management Board's recent action to initiate an addendum to address the Mitchell Provision (see Draft Addendum XXX press release under the American Lobster Board header earlier in this document), the Policy Board recommended that the Lobster Board address concerns about the lack of regulations to restrict the maximum size of imported lobster through a separate management document. This issue would need to be addressed through the amendment process.

Due to the length of the Atlantic Striped Bass Management Board meeting on January 24, there was no time to address an issue requested under other business. There is continued concern about the difficulty of addressing the challenges associated with striped bass recreational release mortality. The Board agreed to assign a workgroup to review past discussions on striped bass recreational release mortality and consider how the Atlantic Striped Bass Management Board could address it moving forward, particularly following the upcoming striped bass benchmark stock assessment.

NOAA Fisheries received a petition from the Friends of Animals to list the Atlantic horseshoe crab as threatened or endangered throughout its range under the Endangered Species Act (ESA). The petition also requests that critical habitat be designated for the species in Atlantic waters. The petition states "several of the listing criteria identified in the ESA are contributing to the decline of the Atlantic horseshoe crab: it has been historically overutilized for commercial and scientific purposes; existing regulatory mechanisms purportedly protecting it are inadequate for its survival; its habitat is threatened by sea-level rise associated with climate change; and other man-made factors threaten its continued existence." NOAA is processing the petition and will keep the Commission informed.

Lastly, ACCSP has recently completed an update to the ACCSP Public and Login Data Warehouse system to reflect the direction of the Marine Recreational Information Program (MRIP) on the presentation of cumulative and wave level data. These changes have been in development over the past 6 months with feedback from staff and volunteer testers from the Recreational Technical Committee. These changes are supported by MRIP and available via the ACCSP website now. There will be additional ACCSP outreach notifications to aid in information dissemination to expanded target audiences.

For more information, please contact Toni Kerns, Fisheries Policy Director, at tkerns@asmfc.org.

Motions
Move to add New York as a state with a declared interest in the Cobia FMP.
Motion made by Mr. Gary and seconded by Mr. Kane. Motion passes by consent.

Move to recommend to task NTAP and the NTAP Industry Based Survey (IBS) Working Group to develop an outline detailing a proposal to conduct an IBS Pilot Program to test the viability of the program as presented in the "Proposed Plan for a Novel Industry Based Bottom Trawl Survey" white paper with a particular focus on adapting Section 2 "Survey Design Elements" to current Industry platform capabilities. Delivery date for the outline should be in time for further discussion at the Spring 2024 meeting cycle for the Commission and both the Mid-Atlantic and New England Councils in April 2024.
Motion made by Mr. Reid and seconded by Mr. Keliher. Motion passes by consent.

BUSINESS SESSION OF THE COMMISSION (JANUARY 25, 2024)

Meeting Summary
The Commission met to consider an addition to the 2024 Action Plan, approval of the 2024-2028 Strategic Plan, and a recommendation from the American Lobster Management Board. In its first order of business, the Commission approved the addition to the 2024 Action Plan of a new task to take a management action with the Mid-Atlantic Fishery Management Council to address summer flounder commercial measures.

The Commission also considered approval of the 2024-2028 Strategic Plan, which guides the Commission's programs and activities for the next five years. The Commission approved the Plan, with the minor changes recommended by the Executive Committee and additional input from other Commissioners. The final Strategic Plan will be available on the Commission's website at https://asmfc.org/about-us/guiding-documents by the end of January.

In response to NOAA Fisheries Interim Rule on implementing measures consistent with the Commission's Addenda XXI and XXII, the Commission considered and approved a recommendation from the American Lobster Management Board to send a letter to NOAA Fisheries to withdraw the Commission's recommendation to implement certain measures of Addenda XXI and XXII. More information on this issue can be found under the meeting summary for the American Lobster Board earlier in this document.

For more information, please contact Robert Beal, Executive Director, at rbeal@asmfc.org.

Motions
On Behalf of the Lobster Board move the Commission send a letter to NOAA Fisheries to withdraw the Commission's recommendation to implement the measures of Sections 3 and 4, except Sections 3.1.1 and 3.2.1 transfers of multi-LCMA Trap Allocation of Addendum XXI and all of Addendum XXII.
Motion made by Dr. McNamee. Motion passes by consent.

December 2023 Council Meeting Summary

The Mid-Atlantic Fishery Management Council met December 12-14, 2023, in Philadelphia, PA. Presentations, briefing materials, motions, and webinar recordings are available at http://www.mafmc.org/briefing/december-2023.

HIGHLIGHTS

During this meeting, the Council:

- Reviewed analysis of several summer flounder commercial mesh regulations and agreed to develop a framework/addendum to further consider potential changes to the Small Mesh Exemption Program and the flynet exemption*
- Approved the use of regional conservation equivalency to achieve the required 28% reduction in recreational harvest of summer flounder in 2024-2025*
- Agreed that the states will work through the Commission process to achieve the required 10% reduction in the recreational harvest of scup in 2024-2025*
- Recommended removing the previously-adopted closure of the recreational scup fishery in federal waters from January 1-April 30 (resulting in a year-round open season in federal waters)*
- Approved status quo recreational black sea bass measures for 2024*
- Modified the preliminary range of alternatives for the Summer Flounder, Scup, Black Sea Bass, and Bluefish Recreational Measures Setting Process Framework/Addenda
- Approved a Guidance Document for Council review of Exempted Fishing Permit (EFP) applications for species designated as Ecosystem Components through the Unmanaged Forage Amendment
- Adopted spiny dogfish specifications 2024-2026, including a 10.7-million-pound commercial quota for 2024
- Adopted Atlantic mackerel specifications for 2024-2025, including a 1.9-million-pound commercial quota for both years
- Reviewed the golden tilefish Individual Fishing Quota program review and initiated a 30-day public comment period
- Approved the 2024 Implementation Plan
- Received a presentation from the Responsible Offshore Science Alliance (ROSA)

** Items denoted with an asterisk (*) were undertaken during joint meetings with the Atlantic States Marine Fisheries Commission's Summer Flounder, Scup, Black Sea Bass Management Board or Interstate Fisheries Management Program Policy Board*

Summer Flounder Commercial Mesh Size Regulations and Exemptions

The Council met jointly with the Atlantic States Marine Fisheries Commission's Summer Flounder, Scup, and Black Sea Bass Management Board (Board) to review analysis of, and public input on, several summer flounder commercial mesh regulations, including: 1) the current 5.5-inch diamond and 6.0-inch square minimum mesh size, 2) the summer flounder Small Mesh Exemption Program (SMEP), and 3) the summer flounder flynet exemption.

The Council and Board recommended no change to the current summer flounder minimum mesh sizes, due to the lack of sufficient evidence to suggest a change is warranted. They agreed that additional selectivity studies should

be considered as a research priority, including exploring the selectivity of a wider range of square mesh sizes and further comparing selectivity between square and diamond mesh.

The Council and Board also recommended development of a framework/addendum to further consider potential changes to the two mesh exemptions as a priority in 2024. Specifically, this action would consider revisions to the definition of a flynet as well as modifications to the western boundary of the small-mesh exemption area. The changes are intended to be implemented by November 1, 2024, if possible.

Summer Flounder, Scup, and Black Sea Bass Recreational Management Measures

The Council and Board also adopted recreational management measures (i.e., bag, size, and season limits) for summer flounder, scup, and black sea bass. This was the second year of setting measures under the Percent Change Approach, and the first year of setting measures for two-year cycles for summer flounder and scup. Black sea bass measures were set for 2024 only due to the timing of the management track assessment.

The Percent Change Approach uses a comparison of the RHL to an estimate of expected harvest, in addition to stock size, to determine if measures should be restricted, liberalized, or remain unchanged for the next two years.

Prior to their deliberations for each species, the Council and Board received a brief overview of the Recreation Demand Model (RDM). The RDM was developed by the Northeast Fisheries Science Center (NEFSC) to predict the effect of proposed recreational measures on angler satisfaction, fishing effort, recreational harvest, and recreational discards of summer flounder, scup, and black sea bass. The RDM was first used in setting 2023 measures and will be used again for the upcoming years.

2024-2025 Summer Flounder Recreational Measures

The Percent Change Approach requires a 28% reduction in recreational harvest of summer flounder in 2024-2025. This reduction is needed because the RHL for 2024-2025 (6.35 million pounds) falls below the confidence interval around projected harvest for these years, and the stock size is below the target level. Measures will be restricted to achieve the full 28% reduction in 2024 and then will remain unchanged in 2025 unless new information suggests a major change in the expected impacts of those measures on the stock or the fishery.

The Council and Board also approved the use of regional conservation equivalency in 2024-2025. Non-preferred coastwide measures, which are written into the federal regulations but waived in favor of state measures, include an 18.5-inch minimum size, 3 fish possession limit, and open season from May 8-September 30. Precautionary default measures include a 20-inch minimum size, 2 fish possession limit, and open season from July 1-August 31. These measures are only intended to be used for states/regions which do not comply with the conservation equivalency process. State waters measures will be determined through the Commission process in early 2024.

2024-2025 Scup Recreational Measures

A 10% reduction in recreational harvest of scup in 2024-2025 is required under the Percent Change Approach. This reduction is needed because the average RHL for 2024-2025 (12.51 million pounds) falls below the confidence interval around estimated harvest under status quo measures for these years, and stock biomass is more than 150% of the target level. Measures will be restricted to achieve the full 10% reduction in 2024 and then will remain unchanged in 2025 unless new information suggests a major change in the expected impacts of those measures on the stock or the fishery. The Council and Board agreed that the 10% coastwide harvest reduction will be achieved by the states through the Commission process in early 2024.

The Council and Board revisited their previous decision to close the recreational scup fishery in federal waters from January 1 to April 30. The shortened season was recommended by the Council and Board in December 2022, but due to the timing of federal rule making, it is not expected to go into effect until 2024. During this meeting,

the Council and Board discussed concerns that some states may be disproportionately impacted by the federal waters closure. Staff presented an analysis of Vessel Trip Report (VTR) data which were used to estimate total recreational harvest during this time period. The analysis suggests the closure would have minimal impact on overall coastwide harvest given the limited recreational effort for scup that typically occurs between January and April. Based on this analysis and recommendations from the Monitoring Committee, the Council and Board recommended a year-round open season in federal waters for 2024-2025 to give the states greater flexibility when modifying measures to meet the 10% reduction. The Council and Board recommended no changes to the current 40 fish possession limit and 10-inch minimum size in federal waters.

2024 Black Sea Bass Recreational Measures

The Council and Board discussed the approach for recreational black sea bass management in 2024. Recreational measures for 2023 were set for a single year with the intent of setting 2024-2025 measures based on a 2023 management track assessment. However, this assessment was later delayed to 2024 to allow more time to fully develop a research track assessment.

The RDM indicates the confidence interval around the estimated 2024 harvest based on 2023 measures exceeds the 2024 RHL. Combined with the most recent estimate of biomass from the 2021 management track assessment (i.e., 210% of the target level), this would require a 10% reduction in harvest under the Percent Change Approach. However, the Percent Change Approach did not contemplate a situation where the RHL would be revised without updated stock assessment information, as was the case with the 2024 black sea bass RHL. The 2024 RHL is about 5% lower than the 2023 RHL due to three additional years of catch data in the calculations. As such, updated information is only available for one of the two factors that guide decision making under the Percent Change Approach (i.e., an updated comparison of the harvest estimate confidence interval to the RHL, but no updated biomass information). Therefore, the Council and Board agreed with the Monitoring Committee's recommendation to leave recreational black sea bass measures unchanged in 2024. This would treat 2024 as the second year in a two-year cycle with 2023. They noted that this is the only opportunity for unchanged measures across two years for black sea bass under the Percent Change Approach given the expected timing of management track assessments and the sunset of the Percent Change Approach after 2025. Measures for 2025 and 2026 will be set based on updated stock assessment information and updated runs of the RDM.

If states wish to consider slight season adjustments under this status quo approach (e.g., to maintain a Saturday opening), those proposals must be supported by additional runs of the RDM and approved by the Board.

The Council and Board also agreed to continue the use of conservation equivalency to waive federal waters measures in favor of state waters measures. Under the status quo approach, the non-preferred coastwide measures will remain a 15-inch minimum fish size, a 5 fish possession limit, and a May 15 – October 8 open season. Under conservation equivalency, these measures are waived in favor of state measures. The precautionary default measures will remain a 16-inch minimum fish size, a 2 fish possession limit, and a June 1 – August 31 open season. These measures are only intended for states/regions which do not comply with the conservation equivalency process.

Summer Flounder, Scup, Black Sea Bass and Bluefish Recreational Measures Setting Process Framework/Addenda

The Council met jointly with the ASMFC's Interstate Fisheries Management Program Policy Board (Policy Board) to receive an update on the Summer Flounder, Scup, Black Sea Bass, and Bluefish Recreational Measures Setting Process Framework/Addenda. The Council and Policy Board agreed to refine the preliminary range of alternatives by modifying the Biological Reference Point Approach and Biomass Based Matrix Approach alternatives such that measures will no longer be assigned to all bins the first time either approach is used through the specifications process. Over the next several months, the Fishery Management Action Team (FMAT)/Plan Development Team

(PDT) will continue to develop all alternatives under consideration, including providing greater detail on how measures would be set under the Biological Reference Point and Biomass Based Matrix Approaches.

Guidance Document for Council Review of Exempted Fishing Permit Applications for Unmanaged Forage Amendment Ecosystem Component Species

The Council reviewed and approved a Guidance Document for Council Review of Exempted Fishing Permit (EFP) Applications for Unmanaged Forage Amendment Ecosystem Component (EC) Species. The document is intended to establish a standard process for Council review of EFP applications for the 50+ species listed as EC species under the Unmanaged Forage Omnibus Amendment (Forage Amendment). Implemented in 2017, the Forage Amendment established a 1,700-pound possession limit for EC species in Mid-Atlantic Federal waters. The goal of this amendment was to prohibit the development of new and expansion of existing directed commercial fisheries for these species until the Council has had an adequate opportunity to assess the relevant scientific information and consider potential impacts. The Forage Amendment requires use of an EFP as a first step towards the Council considering allowing landings beyond the 1,700-pound possession limit. In addition to establishing a standardized process for EFP review, the guidance document is intended to communicate the Council's priorities regarding EC species to prospective EFP applicants. The final document is available on the Council website at https://www.mafmc.org/forage.

Spiny Dogfish 2024-2026 Specifications

After reviewing advice from its Scientific and Statistical Committee (SSC) and considering input from the public, the Council adopted spiny dogfish specifications for the 2024-2026 fishing years. The Council's recommendations are summarized in the table below.

	2024	**2025**	**2026**
	Million pounds		
Acceptable Biological Catch	15.7	16.1	16.5
Commercial Quota	10.7	11.0	11.2

The Council recommended no changes to the current federal trip limit of 7,500 pounds. These specifications are expected to keep the stock slightly above its target biomass. The 2023 management track assessment concluded that the spiny dogfish stock was neither overfished nor experiencing overfishing in 2022. However, due to the stock's reduced productivity, these relatively low future catches are needed for the stock to stay at the target. The 2024 quota is an 11% decrease compared to the 2023 quota and a 64% decrease compared to the 2022 quota. During the meeting, several fishing industry participants expressed serious concerns about the potential consequences of lower quotas.

A key debated component of setting the commercial quota was the set-aside for dead commercial discards. The Council considered several approaches and ultimately decided to set aside the same amount in 2024 as the assessment estimated in 2022, the most recent year available – about 4.7 million pounds (2,134 MT). The Council noted that there has been a downward trend in discards over the last 10 years, making the most recently estimated discard amount a reasonable proxy for near-future discards. To account for the assessment's prediction of slight increases in biomass for 2025 and 2026, the Council voted to set aside slightly more discards in those years (about 4.8 million pounds and 4.9 million pounds respectively). There are no recreational regulations, but recreational mortality is accounted for when calculating the commercial quota.

Because the spiny dogfish fishery is managed jointly, the New England Fishery Management Council must also make recommendations for spiny dogfish specifications at its upcoming meeting in January 2024.

2024-2025 Atlantic Mackerel Specifications

After reviewing advice from the SSC and considering input from the public, the Council adopted Atlantic mackerel specifications for the 2024-2025 fishing years. The Council's recommendations are summarized in the table below.

	2024	**2025**
	Metric Tons	
Acceptable Biological Catch	3,200	3,200
Commercial Quota	868	868

These specifications will replace the preliminary measures approved by the Council in August. As requested by the Council, the SSC provided two sets of ABC recommendations – one using a "varying" approach, which would set the ABC lower in 2024 and higher in 2025, and one using an "averaged" approach, which would produce an average ABC for both years. The Council ultimately selected the averaged approach, resulting in ABCs of 3,200 MT for both years. After accounting for expected Canadian catch, U.S. recreational catch, and U.S. commercial discards, the Council recommended setting the commercial quota at 868 metric tons (1.9 million pounds) for both years. Given the low quota, the commercial fishery will be limited to mostly incidental landings. To constrain catch to the very low quotas while avoiding excessive discarding, the Council recommended setting an initial trip limit of 20,000 pounds for limited access permits and 5,000 pounds for open access permits. Once 80% of the quota has been landed, trip limits would change to 10,000 pounds for limited access permits and 2,500 pounds for open access permits. No changes were recommended for the recreational sector; the impacts of recent recreational measures (a first ever 2023 bag-limit of 20 fish per person) will be evaluated in the future.

Atlantic mackerel has been under a rebuilding program since November 2019, and a revised rebuilding plan was implemented in 2023. The most recent management track stock assessment found that the stock remains overfished, with spawning stock biomass estimated to be at about 12% of the biomass target. While these measures should support rebuilding across a range of recruitments, achieving a rebuilt Atlantic mackerel stock that regularly supports optimum yield near the assessment's target fishing rate will depend on getting more typical recruitment and increased survival of more mackerel into older age classes.

Golden Tilefish Individual Fishing Quota Program Twelve-Year Review

The Council received a presentation on the golden tilefish Individual Fishing Quota (IFQ) program review report prepared by Northern Economics, Inc. The golden tilefish fishery has operated under an IFQ program, which is a type of limited access privilege (LAPP) program, since the implementation of Amendment 1 in 2009. The 2007 reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) established new requirements related to the monitoring and review of LAPP programs. In 2017, the Council conducted the first golden tilefish IFQ program review, which covered performance from fishing year (FY) 2010 to FY2015. The current review includes updated data and analyses through FY2021. This presentation marked the beginning of a 30-day public comment period which will end on January 12, 2024. Details and comment instructions are available at https://www.mafmc.org/newsfeed/2023/golden-tilefish-ifq-review.

2024 Implementation Plan

The Council reviewed and approved the 2024 Implementation Plan after making several revisions. The Council recommended removing Deliverable #9 (scup GRA framework) from the main list of deliverables and replacing it with a framework to consider moving the western boundary of the summer flounder small-mesh exemption area and to clarify the regulatory definition of a flynet, along with several associated issues (enrollment period, evaluation criteria). The Council also agreed to modify the wording of Deliverable #74 and move it from Possible Additions to the main list of deliverables. This task will involve coordinating with the New England Council to

explore the utility of Vessel Monitoring Systems (VMS) for enforcement. The approved implementation plan is available at https://www.mafmc.org/strategic-plan.

Responsible Offshore Science Alliance

The Executive Director of the Responsible Offshore Science Alliance (ROSA) provided an update to the Council on ROSA's mission and 5-year strategic goals and objectives. ROSA is a non-profit organization that advances research, monitoring, and methods on the effects of offshore wind energy development on fisheries across US federal and state waters. Key strategies include: 1) coordinating offshore wind fisheries research and monitoring, 2) facilitating assessment of regional and cumulative impacts, and 3) maintaining ROSA offshore wind project monitoring framework and guidelines.

Next Meeting

The next Council meeting will be held **February 6-7, 2024, in Arlington, VA.** A complete list of upcoming meetings can be found at https://www.mafmc.org/council-events.

South Atlantic Fishery Management Council
Full Council and Committee
SUMMARY MOTIONS
December 4-8, 2023

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.

Full Council I Sessions

MOTION 1: APPOINT THE FOLLOWING INDIVIDUALS TO THE **DOLPHIN MANAGEMENT STRATEGY EVALUATION (MSE) WORKGROUP**:

OTHER VESTED STAKEHOLDERS
ALANA HARRISON, DAVID WAMER, GREGORY JACKOSI, AND SCOTT TRAVERS.

NORTHERN REGION
MARK DECABIA, CHRISTOPHER JOBES, AND ANTHONY DILERNIA.

NORTHERN NORTH CAROLINA
CHESTER CONKLIN, ROM WHITAKER, ERNEST DOSHIER, JAMES BYRD, AND DEWEY HEMILRIGHT.

SOUTHERN NORTH CAROLINA TO CENTRAL FLORIDA
CHIP BERRY, PETER LOY, ARNOLD BRUNELL, TAYLANA STERNS.

SOUTH FLORIDA AND THE FLORIDA KEYS
JONATHON REYNOLDS, JORDAN SCHLEIDER, AND TRIP AUKEMAN

MOTION 2: APPOINT TRIP AUKEMAN, MARTHA GUYAS, DARRIN WILLINGHAM, CLEMENT CULLENS, AUSTIN DOHRN, LOGAN BARNES, DANIEL LESCHORN, BRENDAN RUNDE, BRADLEY SCHENK, AND JOHN COOPER TO THE **PRIVATE ANGLER REPORTING AD-HOC AP**.

MOTION 3: APPOINT SCOTT BAKER, WALTER BUBLEY, ROB CHESHIRE, RICK DEVICTOR STEPHEN DONALSON, MICHELLE DUVAL, BRYAN FLUECH, WILLIAM HEYMAN, RUSSELL HUDSON, JAMES HULL, KATHY KNOWLTON, SHELLY KRUEGER, NIKHIL MEHTA, SARA MIRABILIO, AND MATTHEW PERKINSON TO THE **CITIZEN SCIENCE POOL.**

MOTION 4: REAPPOINT WALTER BUBLEY, ROB CHESHIRE, SCOTT BAKER, AND MICHELLE DUVAL TO THE **CITIZEN SCIENCE OPERATIONS COMMITTEE** FOR 3 YEAR TERMS.

MOTION 5: APPOINT NIKHIL MEHTA, JIMMY HULL, KATHY KNOWLTON, AND WILL HEYMAN TO THE **CITIZEN SCIENCE OPERATIONS COMMITTEE** FOR 5 YEAR TERMS.

MOTION 6: APPOINT RICHARD GOMEZ, ANDY PILAND, STEPHEN DONALSON, THOMAS NEWMAN, JON REYNOLDS, JUSTIN SMITH, MIMI STAFFORD, CASEY KNIGHT, BRYAN FLUECH, AND MATT PERKINSON TO THE **CITIZEN SCIENCE PROJECTS ADVISORY COMMITTEE**.

MOTION 7: REAPPOINT JON REYNOLDS, CHIP BERRY, RICHARD DELIZZA, ROBERT FREVERT, RICHARD HARRIS, GLENN HOPKINS, TIM SCALISE, AND ROM WHITTAKER TO THE **DOLPHIN WAHOO AP**.

MOTION 8: APPOINT DAVID MOSS TO THE **DOLPHIN WAHOO AP**.

MOTION 9: REAPPOINT STEVE DOUGHERTY, BEBE DALTON HARRISON, GEORGE PATANE, MARK PHELPS, AND ROBERT TODD TO THE **OUTREACH AND COMMUNICATIONS AP**.

MOTION 10: APPOINT CAMILLA WARREN (AT LARGE SEAT) AND JEANNA MERRIFIELD (COMMERCIAL SEAT) TO THE **OUTREACH AND COMMUNICATIONS AP**.

MOTION 11: APPOINT GETTYS BRANNON (NGO SEAT) AND REAPPOINT RICHARD GOMEZ TO THE **SNAPPER GROUPER AP**.

MOTION 12: APPROVE THE FOLLOWING APPOINTMENTS/REAPPOINTMENTS TO THE **HABITAT AND ECOSYTEM AP**:

NC SUBPANEL
REAPPOINT BRENDAN RUNDE AND CASEY KNIGHT

SC SUBPANEL
REAPPOINT PAULA KEENER AND DAVID WHITAKER

GA SUBPANEL
REAPPOINT THOMAS JONES AND APPOINT STEPHEN MORRISON

FL SUBPANEL
REAPPOINT DAVID WEBB AND SAM YOUNG

NON-SUBPANEL MEMBERS
REAPPOINT WILSON LANEY AND KEVIN SPANIK AND APPOINT RUA MORDECAI

MOTION 13: APPOINT JAMES GARTLAND TO THE **SCIENTIFIC AND STATISTICAL COMMITTEE**.

MOTION 14: APPOINT CHRISTINA PACKAGE-WARD TO THE **SOCIO-ECONOMIC PANEL**. ADD ONE SEAT TO THE SOCIO-ECONOMIC PANEL AND APPOINT EUGENE FRIMPONG.

MOTION 15: INITIATE AN ACTION TO MODIFY SEFHIER TO IMPROVE COMPLIANCE, STRENGTHEN REPORTING REQUIREMENTS, AND EXPLORE VALIDATION

Executive Committee (Met via webinar in November 2023)

MOTION 16: APPROVE THE DRAFT 2024 OPERATIONAL BUDGET AS PRESENTED AND MODIFIED.

Mackerel Cobia Committee

MOTION 17: ADD AN ACTION TO FRAMEWORK AMENDMENT 13 TO CONSIDER MODIFICATION TO THE LONG-TERM OY FOR ATLANTIC SPANISH MACKEREL.

MOTION 18: ADD AN ACTION TO FRAMEWORK AMENDMENT 13 TO INCLUDE IN-SEASON AND POST-SEASON ACCOUNTABILITY MEASURES FOR THE RECREATIONAL SECTOR.

MOTION 19: ADOPT THE FOLLOWING TIMING AND TASKS:

- ASK THE LAW ENFORCEMENT ADVISORY PANEL TO PROVIDE INPUT ON THE SALE OF TOURNAMENT CAUGHT ATLANTIC KING AND SPANISH MACKEREL.
- CONTINUE WORK ON CMP FRAMEWORK AMENDMENT 13, BRING AN UPDATED DECISION DOCUMENT TO THE MARCH 2024 COUNCIL MEETING.
- CONTINUE DEVELOPMENT OF MACKEREL PORT MEETINGS, BRINGING A FINAL PLAN FOR COUNCIL APPROVAL AND IMPLEMENTATION TO THE MARCH 2024 COUNCIL MEETING.

Note: *the Council instructed staff to pause development of Framework Amendment 13 until after the conclusion of Mackerel Port Meetings to be held throughout 2024.*

Dolphin Wahoo

MOTION 20: DIRECT STAFF TO DO THE FOLLOWING:

- CONTINUE WITH PLANNED UPDATES ON PROGRESS OF THE DOLPHIN MSE AT THE JUNE 2024 AND DECEMBER 2024 COUNCIL MEETINGS.
- MAINTAIN DISCUSSION OF REGULATORY AMENDMENT 3 ON THE AGENDA FOR THE DECEMBER 2024 COUNCIL MEETING.

Snapper Grouper Committee

Amendment 48 (Wreckfish)

MOTION 21: APPROVE ALL MOTIONS AND RECOMMENDATIONS MADE BY THE WRECKFISH SUB-COMMITTEE, AS PRESENTED IN THE SEPTEMBER 2023 SUB-COMMITTEE REPORT (SEE MOTIONS APPENDED TO SNAPPER GROUPER COMMITTEE REPORT)

Amendment 46 (Recreational Permit)

MOTION 22: SELECT ALTERNATIVE 3 AS PREFERRED IN ACTION 1.
Action 1. Establish a private recreational snapper grouper permit to fish for, harvest, or possess snapper grouper species in the South Atlantic region

Alternative 3. Require a federal permit for all private anglers to fish for, harvest, or possess snapper grouper species in the South Atlantic exclusive economic zone.

MOTION 23: SELECT ALTERNATIVE 2 AS PREFERRED IN ACTION 2.
Action 2. Specify the species for which a private recreational snapper grouper permit would be required

Alternative 2. A federal private recreational snapper grouper permit would be required when fishing for, harvesting, or possessing any species in the snapper grouper fishery management unit.

MOTION 24: APPROVE ALL ACTIONS IN AMENDMENT 46, AS REVISED.

Regulatory Amendment 36 (Gag and Black Grouper Recreational Vessel Limits and On-Demand Gear for Black Sea Bass

MOTION 25: APPROVE REGULATORY AMENDMENT 36 FOR SCOPING.

Amendment 55 (Scamp/Yellowmouth Complex and Other SA Shallow Water Groupers)

MOTION 26: SELECT ALTERNATIVE 2 AS THE PREFERRED ALTERNATIVE FOR ACTION 1.
Action 1. Reorganize the Other South Atlantic Shallow Water Grouper complex and establish a new Scamp and Yellowmouth Grouper complex

Alternative 2. Remove yellowmouth grouper from the Other South Atlantic Shallow Water Grouper complex and establish a new Scamp and Yellowmouth Grouper complex. The reorganized Other South Atlantic Shallow Water Grouper complex would contain rock hind, red hind, coney, graysby, and yellowfin grouper.

MOTION 27: SELECT ALTERNATIVE 3 AS THE PREFERRED ALTERNATIVE FOR SUB-ACTION 2A.

Sub-Action 2a. Establish the maximum sustainable yield for the Scamp and Yellowmouth Grouper complex.

Alternative 3. Establish the maximum sustainable yield proxy at the fishing mortality at 40% of the spawning potential ratio for the Scamp and Yellowmouth Grouper complex.

MOTION 28: SELECT ALTERNATIVE 3 AS THE PREFERRED ALTERNATIVE FOR SUB-ACTION 2B.

Sub-Action 2b. Establish the maximum fishing mortality threshold for the Scamp and Yellowmouth Grouper complex.

Alternative 3. Establish the maximum fishing mortality threshold equal to the maximum sustainable yield proxy of fishing mortality at 40% spawning potential ratio for the Scamp and Yellowmouth Grouper complex.

MOTION 29: SELECT ALTERNATIVE 3 AS THE PREFERRED ALTERNATIVE FOR SUB-ACTION 2C.

Sub-Action 2c. Establish the minimum stock size threshold for the Scamp and Yellowmouth Grouper complex.

Alternative 3. Establish the minimum stock size threshold equal to 75% of the spawning stock biomass at maximum sustainable yield.

MOTION 30: SELECT ALTERNATIVE 3 AS THE PREFERRED ALTERNATIVE FOR ACTION 3.

Action 3. Establish a rebuilding timeframe for the Scamp and Yellowmouth Grouper complex

Alternative 3. Establish a rebuilding timeframe equal to Tmax. This would equal 10 years with the rebuilding period ending in 2035. 2025 would be Year 1.

MOTION 31: SELECT ALTERNATIVE 2 AS THE PREFERRED ALTERNATIVE FOR ACTION 4.

Action 4. Establish the acceptable biological catch and total annual catch limit for the Scamp and Yellowmouth Grouper complex

Alternative 2. Establish the acceptable biological catch and set it equal to the recommendation from the Scientific and Statistical Committee. Establish the total annual catch limit for the Scamp and Yellowmouth Grouper complex and set it equal to the recommended acceptable biological catch. The recommended acceptable biological catch is inclusive of recreational estimates from the Marine Recreational Information Program's Fishing Effort Survey.

MOTION 32: SELECT ALTERNATIVE 2 AS THE PREFERRED ALTERNATIVE FOR ACTION 6.

Action 6. Establish commercial accountability measures for the Scamp and Yellowmouth Grouper complex

Alternative 2. If commercial landings for the Scamp and Yellowmouth Grouper complex reach or are projected to reach the commercial annual catch limit, the commercial sector will close for the remainder of the fishing year.

If commercial landings for the Scamp and Yellowmouth Grouper complex exceed the commercial annual catch limit, the total annual catch limit is exceeded, and the Scamp and Yellowmouth Grouper complex is overfished, the commercial annual catch limit for the following fishing year will be reduced by the amount of the commercial annual catch limit overage in the prior fishing year.

Amendment 44 (Yellowtail Snapper)

MOTION 33: DEPRIORITIZE WORK ON SNAPPER GROUPER AMENDMENT 44/REEF FISH AMENDMENT 55 UNTIL AFTER THE COMPLETION OF THE UPDATED SEDAR 64 OPERATIONAL ASSESSMENT THAT INCORPORATES CALIBRATED SRFS RECREATIONAL LANDINGS ESTIMATES.

Regulatory Amendment 35 (Red Snapper & Discard Mortality Reduction)

MOTION 34: RESCIND THE MARCH 2023 ACTION TO APPROVE SNAPPER GROUPER REGULATORY AMENDMENT 35 FOR SECRETARIAL REVIEW.

Other Items

MOTION 35: INITIATE AN AMENDMENT TO ESTABLISH LIMITED ENTRY FOR THE FOR-HIRE COMPONENTS OF THE SNAPPER GROUPER, COASTAL MIGRATORY PELAGICS, AND DOLPHIN WAHOO FISHERIES.

MOTION 36: TO PREVENT SPECULATIVE ENTRY, ESTABLISH AN ADDITIONAL CONTROL DATE OF DECEMBER 8, 2023, THAT THE SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL (COUNCIL) MAY USE IF IT DECIDES TO CREATE RESTRICTIONS LIMITING PARTICIPATION IN THE EXCLUSIVE ECONOMIC ZONE FOR THE FEDERAL CHARTER VESSEL/HEADBOAT (FOR-HIRE) COMPONENT OF THE RECREATIONAL SECTORS OF THE COASTAL MIGRATORY PELAGICS FISHERY IN THE ATLANTIC, DOLPHIN AND WAHOO FISHERY IN THE ATLANTIC, AND SNAPPER-GROUPER FISHERY IN THE SOUTH ATLANTIC. ANYONE OBTAINING A FEDERAL FOR-HIRE PERMIT FOR THESE RECREATIONAL SECTORS AFTER THE CONTROL DATE WILL NOT BE ASSURED OF FUTURE ACCESS SHOULD A MANAGEMENT REGIME THAT LIMITS PARTICIPATION IN THE SECTOR BE PREPARED AND IMPLEMENTED. ADDITIONALLY, FEDERAL PERMIT HOLDERS THAT HAVE NOT REPORTED SNAPPER-GROUPER, COASTAL MIGRATORY PELAGIC, AND/OR DOLPHIN AND WAHOO CATCH FROM THE SOUTH ATLANTIC TO THE SOUTHEAST FOR-HIRE INTEGRATED ELECTRONIC REPORTING PROGRAM ON OR PRIOR TO DECEMBER 5, 2023 WILL NOT BE ASSURED OF FUTURE ACCESS SHOULD A MANAGEMENT REGIME THAT LIMITS PARTICIPATION IN THE SECTOR BE PREPARED AND IMPLEMENTED.

MOTION 37: DIRECT STAFF TO DO THE FOLLOWING:

- CONTINUE TO DEVELOP SNAPPER GROUPER AMENDMENT 48 (WRECKFISH) AND CONVENE THE NEXT MEETING OF THE WRECKFISH SUB-COMMITTEE VIA WEBINAR PRIOR TO THE MARCH 2024 COUNCIL MEETING.
- CONTINUE DEVELOPMENT OF AMENDMENT 46 FOR REVIEW AT THE MARCH 2024 COUNCIL MEETING (SEE DIRECTION TO STAFF ABOVE).
- CONDUCT SCOPING FOR REGULATORY AMENDMENT 36, INCLUDING COMMUNICATION WITH BLACK SEA BASS POT ENDORSEMENT HOLDERS.
- DRAFT A LETTER ON BEHALF OF THE COUNCIL REGARDING WHAT THE COUNCIL WOULD LIKE INCLUDED IN FUTURE STOCK STATUS LETTERS.
- RED SNAPPER TASKS (SEE DIRECTION TO STAFF IN COMMITTEE REPORT).
- PREPARE AN UPDATED INFORMATION PAPER DESCRIBING THE SNAPPER GROUPER COMMERCIAL 2 FOR 1 PERMIT POLICY AND SG2 PERMITS.

Citizen Science

MOTION 38: ADOPT THE UPDATED CITIZEN SCIENCE RESEARCH PRIORITIES WITH MODIFICATIONS AS SUGGESTED.

Habitat and Ecosystem Committee

MOTION 39: APPROVE LIST OF AGENDA ITEMS FOR APRIL 2024 HABITAT AND ECOSYSTEM AP MEETING

MOTION 40: ADOPT THE FOLLOWING TIMING AND TASKS:

- ADD CORAL 10 AND DEEPWATER CHAPC MODIFICATIONS TO THE COUNCIL WORKPLAN.
- CONVENE THE HABITAT AND ECOSYSTEM AP IN SPRING 2024 INCORPORATING APPROVED AGENDA ITEMS.
- CONVENE THE IPT TO REVIEW CORAL 10 AND PRESENT THE MODIFICATIONS THAT ARE NEEDED AT A FUTURE COUNCIL MEETING.

SEDAR Committee

MOTION 41: APPROVE SEDAR 94 (HOGFISH) TERMS OF REFERENCE

Full Council Session 2

MOTION 42: APPROVE THE ALLOCATION REVIEW GUIDELINES AND UPDATED ALLOCATION REVIEW TRIGGER POLICY.

February 1, 2024

MEMORANDUM

TO: N.C. Marine Fisheries Commission
FROM: Col. Carter Witten
SUBJECT: Law Enforcement Report

Issue
Quarterly update on Marine Patrol law enforcement activities.

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

Overview
Marine Patrol officers continue to work hard during the winter fishing season. We have new hires completing their certification process and starting their 16-week field training. We have completed our mandated in-service and specialized training for 2023 and have begun planning training for 2024. Marine Patrol continues to engage in education and outreach opportunities throughout the state.

Officers have been checking for crab pots north of the Highway 58 Bridge to make sure none have been set in violation of the closure, a few citations have been written. Marine Patrol, in partnership with the Coastal Federation, are cleaning up derelict or 'ghost' pots left in the area. These efforts are going well.

Marine Patrol officers are required to do at least 24 hours of in-service training every year to remain certified with Criminal Justice and Training Standards. Our officers completed those training hours in 2023 with many earning additional hours above and beyond mandated training. We had the opportunity this year to share some of that training with Division and other Department of Environmental Quality staff members in December 2023 and January 2024 at Head Quarters and all coastal offices. Officer Mike Williams and Sgt. Jason Parker presented staff with active shooter training and answered questions. Staff were instructed on methods and best practices to safeguard their own lives and what to expect from law enforcement entering active shooter situations. We were very pleased to see that the training was well received.

I often update you on our Swiftwater Rescue Team deployments and training and today I would like to share with you some additional recognition of the team's efforts. I am proud to announce that the Swiftwater Team received the DEQ Team Achievement Award at the Distinguished Employee & Team Achievement Awards Ceremony held on January 8th in Raleigh.

Marine Patrol had three new hires complete their Basic Law Enforcement Training recently. Once they are sworn-in at the completion of their certification process, they will begin their 16-week field training.

Several officers participated in outreach and education at the Bass & Saltwater Fishing Expo in Raleigh this month and are planning participation in several other such events throughout the year. Our staff are also working on a Marine Patrol Junior Academy for 12 middle school age children. This week-long event slated to begin June 10th of this year will give opportunities for cadets to learn about conservation law enforcement, fish and gear identification, boat handling, water safety, and ethical angling practices.

January 28, 2024

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 to provide updates related to recent Endangered Species Act (ESA) Section 10 Incidental Take Permit (ITP) reports to National Marine Fisheries Service (NMFS), submission of an ITP application to NMFS for September 1, 2023 – August 31, 2033, and development of a fisherman call-in system to arrange observed trips.

Seasonal reports to NMFS are required for the sea turtle ITP and monthly reports, if a take is observed, are required for the Atlantic Sturgeon ITP. The seasonal report for the sea turtle ITP and the October monthly report for the Atlantic Sturgeon ITP can be found in the briefing materials. There were no observed incidental takes of Atlantic Sturgeon during September or November. Note that the seasonal and monthly reports are preliminary and updates can occur in the final reports submitted to NMFS.

The Division did not receive the renewed ITP before the sea turtle ITP expired at the end of August 2023. However, NMFS provided a letter authorizing the Division to continue operating under the sea turtle ITP until a final determination is made on the application. The letter did not reference the Atlantic sturgeon ITP because it does not expire until the end of August 2024. The public comment period for the draft Environmental Assessment of the ITP renewal application closed on September 11th. The NMFS is working through public comments and an Endangered Species Act (ESA) Section 7 consultation, which is an interagency process "..designed to assist federal agencies in fulfilling their duty to ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat" (https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-consultations-greater-atlantic-region). It is not known at this time when a determination will be made on the ITP application.

The Division continues to coordinate with NC Department of Information Technology to develop the Observer Trip Scheduling System (OTSS). The OTSS will help ensure that ITP observer coverage requirements are met, and that the observer coverage is distributed evenly among participants and representative of the fishery. Currently, the OTSS is in the internal testing phase. Once this testing phase is complete, the Observer Program will be reaching out to members of the commercial fishing industry, including those on the Marine Fisheries Commission, to further test the system. An implementation date for requiring participation in the OTSS has not been set, but is expected to occur in 2024. Public information meetings and trainings will occur before the OTSS is fully implemented.

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

Overview
Sea Turtle Seasonal Report
During fall 2023, onboard and alternative platform methods were used to obtain observed trips. Hereafter, all references to gill nets are for estuarine anchored nets only unless stated otherwise. Estimates of observer coverage percentages for open management units were calculated using preliminary observer data and estimates of fishing effort. Management Unit D1 was not opened to large-mesh (≥ 5 inches stretch mesh; ISM) gill nets during fall of 2023. Estimated observer coverage of the large-mesh gill-net fishery exceeded the 7% minimum required threshold in all open management units (263 observed trips; percent coverage range: 17.1–22.0%; Table 1).

Estimated observer coverage of the small-mesh (< 4 ISM) gill-net fishery met or exceeded the 1% minimum required threshold in all management units (51 observed trips; percent coverage range: 1.0–5.0%; Table 2). Additionally, observers and Marine Patrol officers logged 224 No-Contact trips, primarily looking for small-mesh effort (Table 3).

There were 18 observed live sea turtle interactions in large-mesh gill nets and two live in small-mesh gill nets during fall 2023 (Tables 4). Of the 20 overall interactions, 15 occurred in MU B, one in D2, and four in MU E. Green Sea Turtle (*Chelonia mydas*) interactions were observed most frequently ($n = 14$) followed by Kemp's Ridley (*Lepidochelys kempii*) interactions ($n = 5$). A single observed sea turtle could not be identified as it fell out of the net before the observer was able to positively identify it. The live Green Sea Turtle in MU D2 required resuscitation and was subsequently transported for rehabilitation at the NC Aquarium at Pine Knoll Shores. After its rehabilitation, it was successfully released into Bogue Sound on November 10, 2023. No deceased sea turtles were observed. Cumulative estimated and observed interactions during fall months did not reach or exceed authorized levels for the ITP year (Table 5).

In addition to observed sea turtle interactions, there were two fisher-reported sea turtle takes in large-mesh gill nets during October (Table 6): one in MU B and one in MU D2. The sea turtle in B was positively identified as a Green Sea Turtle; however, the species of the sea turtle take in D2 was not known by the fisher. Both were released alive.

During fall 2023, observers logged 930 contacts or contact attempts. Observers spoke with a fisherman on 447 of the 930 contact attempts but only arranged 63 trips in advance (6% of 930).

Atlantic Sturgeon Monthly Report

During October 2023, there were 35 live Atlantic sturgeon, one live unidentified sturgeon, and four dead Atlantic sturgeon incidental takes in the large-mesh gill-net fishery. There was also one live Atlantic Sturgeon incidental take in the small-mesh gill-net fishery (Table 7). All observed takes in large-mesh gill nets occurred in Management Unit A and the single observed take in a small-mesh gill net occurred in Management Unit E. Cumulative estimated and observed interactions during fall months did not reach or exceed authorized levels for the ITP year (Table 8). There were no observed incidental takes of Atlantic Sturgeon during September or November.

Table 1. For estuarine anchored large-mesh gill nets, estimated percent observer coverage calculated from observer trips (≥4 ISM) and estimated fishing trips using Trip Ticket Program data (≥5 ISM) by management unit during fall (September–November) 2023 for Incidental Take Permit Year 2024. The large-mesh gill-net fishery was never opened in Management Unit D1. ISM=Inches Stretch Mesh.

Management Unit	Estimated Fishing Trips	Observed Trips	Percent Observer Coverage
A	414	73	17.6
B	409	70	17.1
C	165	36	21.8
D1	*Closed*	*Closed*	*Closed*
D2	71	15	21.1
E	314	69	22.0
Total	1,373	263	19.2

Table 2. For estuarine anchored small-mesh gill nets, estimated percent observer coverage calculated from observer trips (<4 ISM) and estimated fishing trips using Trip Ticket Program data (<5 ISM) by management unit during fall (September–November) 2023 for Incidental Take Permit Year 2024. ISM=Inches Stretch Mesh.

Management Unit	Estimated Fishing Trips	Observed Trips	Percent Observer Coverage
A	349	9	2.6
B	1,117	22	2.0
C	191	2	1.0
D1	40	2	5.0
D2	95	4	4.2
E	355	12	3.4
Total	2,147	51	2.4

Table 3. Number of "No Contact" trips by management unit completed by Marine Patrol and observers during fall 2023 (September–November) for Incidental Take Permit Year 2024. "No Contact" refers to unsuccessful attempts to find and observe gill-net effort.

Management Unit	Marine Patrol No-Contact Trips	Observer No-Contact Trips	Total No-Contact Trips
A	48	5	53
B	17	1	18
C	30	6	36
D1	4	1	5
D2	16	1	17
E	95	0	95
Total	210	14	224

Table 4. Summary of observed sea turtle interactions (n=20) in estuarine anchored gill nets during fall 2023 (September–November) for Incidental Take Permit (ITP) Year 2024. Eighteen interactions were observed in large-mesh (≥4 ISM) gill nets, and two interactions were observed in small-mesh (<4 ISM) gill nets. An asterisk (*) denotes straight line measurements. A plus (+) denotes sea turtles that were in poor condition and transferred to veterinary care. An endash (–) indicates data were not recorded. CCL=Curved Carapace Length. CCW=Curved Carapace Width. MU=Management Unit. ISM=Inches Stretch Mesh.

Date	MU	Mesh-Size Category	Latitude (N)	Longitude (W)	Species	Condition	CCL (mm)	CCW (mm)
10/3/2023	B	Large	35.34248	-76.34852	Green	Alive	370	320
10/4/2023	D2	Large	34.69521	-77.01405	Green	Alive+	–	–
10/5/2023	B	Large	35.44966	-75.51020	Green[a]	Alive	280	240
10/5/2023	B	Large	35.44966	-75.51020	Green[a]	Alive	310	263
10/5/2023	B	Large	35.45285	-75.51367	Green[a]	Alive	269	224
10/5/2023	B	Large	35.45285	-75.51367	Green[a]	Alive	323	273
10/5/2023	B	Large	35.29443	-75.62300	Kemp's Ridley	Alive	254	254
10/5/2023	E	Large	33.90444	-77.95500	Green[b]	Alive	–	–
10/5/2023	E	Large	33.91194	-77.97083	Green[b]	Alive	310	270
10/10/2023	E	Large	33.92614	-77.95354	Green	Alive	343	286
10/12/2023	B	Large	34.85972	-76.38262	Green[c]	Alive	318*	254*
10/12/2023	B	Large	34.85995	-76.38281	Green[c]	Alive	279*	216*
10/12/2023	B	Large	34.86136	-76.38174	Green[c]	Alive	304*	241*
10/12/2023	B	Large	35.59622	-75.50462	Kemp's Ridley	Alive	368	368
10/12/2023	B	Large	35.53693	-75.48909	Kemp's Ridley[d]	Alive	–	–
10/12/2023	B	Large	35.53658	-75.48952	Kemp's Ridley[d]	Alive	254	241
10/18/2023	E	Large	34.56384	-77.38109	Green	Alive	–	–
10/18/2023	B	Large	35.23998	-75.66854	Unidentified	Alive	–	–
10/21/2023	B	Small	35.43642	-76.01433	Green	Alive	320	280
10/24/2023	B	Small	34.84171	-76.38321	Kemp's Ridley	Alive	–	–

[a] Observed on the same 10/5/2023 trip
[b] Observed on the same 10/5/2023 trip
[c] Observed on the same 10/12/2023 trip
[d] Observed on the same 10/12/2023 trip

Table 5. Total annual authorized and actual takes (observed and estimated) of sea turtles by species and, for estimated takes, by condition for the 2024 Incidental Take Permit (ITP) Year to date (September 2023–August 2024). One observed sea turtle interaction could not be identified to species (Management Unit B, large-mesh [≥4 ISM] gill net and is listed under Any Species). Estimated takes denoted with an endash (–) are for species whose authorized takes in the ITP are expressed only as counts. ISM=Inches Stretch Mesh.

Species	Observed (Live/Dead)		Estimated			
	Authorized	Actual	Authorized		Actual	
			Alive	Dead	Alive	Dead
Green	18	2	330	165	52.6	0
Hawksbill	8	0	–	–	–	–
Kemp's Ridley	12	1	98	49	19.1	0
Leatherback	8	0	–	–	–	–
Loggerhead	24	0	–	–	–	–
Any Species	8	1	–	–	–	–
Total	78	4	428	214	71.7	0

Table 6. Summary of sea turtle interactions ($n = 2$) reported by fishers in anchored gill nets during September–November (fall) 2023 for Incidental Take Permit Year 2024. Large-mesh is defined as ≥4 ISM; small-mesh is defined as <4 ISM. Measurements were not recorded for either sea turtle. Endash (–) indicates data that were not recorded. MU=Management Unit. ISM=Inches Stretch Mesh.

Date	MU	Mesh-Size Category	Latitude (N)	Longitude (W)	Species	Disposition
10/10/2023	B	Large	35.41167	-76.42583	Green	Alive
10/10/2023	D2	Large	–	–	Unidentified	Alive

Table 7. Summary of observed sturgeon ($n = 41$) interactions in estuarine anchored gill nets during September 2022 for Incidental Take Permit Year 2023. Mesh-size categories are large (≥5 ISM) and small (<5 ISM). * = Denotes observed trip where most nets were 80 yds but varied such that total yards = 1500. ISM=Inches Stretch Mesh.

No.	Date	Species	Condition	Management Unit	Mesh-Size Category	Soak Time (Mins)	Length of Net (Yards)	Number of Nets
1	10/3/2023	Atlantic	Alive	A	Large	720	84	15
2	10/4/2023	Atlantic[a]	Alive	A	Large	720	200	7
3	10/4/2023	Atlantic[a]	Dead	A	Large	720	200	7
4	10/5/2023	Atlantic	Alive	A	Large	720	1500	1
5	10/10/2023	Unidentified	Alive	A	Large	720	200	7
6	10/11/2023	Atlantic	Alive	A	Large	720	100	10
7	10/19/2023	Atlantic[b]	Alive	A	Large	720	75	18
8	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
9	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
10	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
11	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
12	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
13	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
14	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
15	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
16	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
17	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
18	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
19	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
20	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
21	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
22	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
23	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
24	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
25	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
26	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
27	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
28	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
29	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
30	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
31	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
32	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
33	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
34	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18

Table 7. continued

No.	Date	Species	Condition	Management Unit	Mesh-Size Category	Soak Time (Mins)	Length of Net (Yards)	Number of Nets
35	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
36	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
37	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
38	10/19/2023	Atlantic[b]	Dead	A	Large	720	80*	18
39	10/19/2023	Atlantic[b]	Dead	A	Large	720	80*	18
40	10/19/2023	Atlantic	Dead	A	Large	720	75	3
41	10/20/2023	Atlantic	Alive	E	Small	15	300	1

[a] Observed on the same 10/4/2023 trip
[b] Observed on the same 10/19/2023 trip

Table 8. Summary of estimated (Management Unit A) or observed (Management Units B–E) Atlantic Sturgeon interactions during fall 2023 (September–November) by management unit and disposition for large-mesh (≥5 ISM) and small-mesh (<5 ISM) gill nets for Incidental Take Permit Year 2024. ISM=Inches Stretch Mesh.

	Large Mesh		Small Mesh	
Management Unit	Alive	Dead	Alive	Dead
A	219.5	23.6	0	0
B	0	0	0	0
C	0	0	0	0
D	0	0	0	0
E	0	0	1	0
Total	219.5	23.6	1	0

2023 Fall Seasonal Progress Report
for Activities under Endangered Species Act
Section 10 Incidental Take Permit No. 16230
September 1–November 30, 2023
ITP Year 2024

David J. Ushakow, Barbie L. Byrd, & Matthew R. Doster
North Carolina Department of Environmental Quality
North Carolina Division of Marine Fisheries
Protected Resources Program
3441 Arendell Street
Morehead City, NC 28557

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SUMMARY

This report summarizes activities of the North Carolina Division of Marine Fisheries (NCDMF) Observer Program during September–November (i.e., fall) 2023 of the Incidental Take Permit (ITP) Year 2024 (September 1, 2023–August 31, 2024) for ITP No. 16230. Although the permit expired on August 31, 2023, the NCDMF received guidance from the National Marine Fisheries Service (NMFS) to continue operating under the permit until a final determination is made on the NCDMF's ITP permit renewal application. Throughout this document, all references to gill nets are for estuarine anchored gill nets unless stated otherwise. Mesh-size categories for gill nets are large-mesh (i.e., ≥4 inches stretched mesh [ISM]) and small-mesh (i.e., <4 ISM). Finally, data used in this seasonal report are preliminary and subject to change.

During fall 2023, the ITP Management Units (MU) were subject to a variety of restrictions on gill-net fishing activity (Table 1). Restrictions for large-mesh gill nets were based primarily on Amendment 3 to the N.C. Southern Flounder Fishery Management Plan, which was adopted by the North Carolina Marine Fisheries Commission (MFC) on May 26, 2022. Among other things, Amendment 3 sets an annual quota for the commercial flounder fishery that is divided between mobile gears (primarily, but not limited to, anchored gill nets and gigs) and pound nets with separate sub-allocations by flounder Management Area (MA). For calendar year 2023, commercial total allowable landings (TAL) for the Mobile Gear Northern MA (ITP MUs A, B, and C) was 123,879 pounds while the TAL for the Mobile Gear Southern MA (ITP MUs D1, D2, and E) was 62,309 pounds.

Proclamations set October 3 as the opening date for the flounder large-mesh gill-net fishery (FF-32-2023) in MUs A (M-16-2023), B (shallow waters of Pamlico Sound only), C, D2, and E (M-17-2023). Management Unit D1 was not opened per the ITP, which requires the MU to be closed May 8–October 14. For open MUs, the proclamations established a three-day per week schedule whereby fishers were allowed to deploy nets in open MUs one hour prior to sunset Monday through Wednesday and were required to retrieve nets daily within one hour after sunrise Tuesday through Thursday. Yardage restrictions for each fishing operation were set to 1,500 yards or less in MUs A, B, and C and 750 yards in MUs D2 and E.

To ensure the quota was accurately monitored during the commercial flounder season, dealers were required to hold an Estuarine Flounder Dealer Permit to purchase, possess, sell, or offer for sale flounder taken from estuarine waters (M-15-2023). As a condition of this permit, dealers were required to report daily flounder landings by noon of the following weekday to ensure that landing data were available for use by NCDMF flounder quota monitoring staff. As the quota was nearly met following the third week of the season, the NCDMF issued proclamations closing mobile gears state-wide effective October 23 (M-23-2023, M-24-2023). Therefore, due to the Tuesday through Thursday weekly fishing restriction, the last open day of the large-mesh gill-net fishery was Thursday, October 19.

Management Units A, C, D2, and E were open throughout fall 2023 to anchored small-mesh gill nets (Table 1). At the beginning of fall, only Shallow Water Gill Net Restricted Area (SGNRA) 2 and SGNRA 4 (M-14-2023) within MU B were open to anchored small-mesh gill nets as a continuation of restrictions from August. The closed portions of MU B were re-opened on October

9, 2023 (M-22-2023). Management Unit D1 initially remained closed from the summer season; however, on October 9, 2023 it was reopened. Multiple attendance requirements for anchored small-mesh gill nets were in place across the state based on a series of rules and proclamations. For more information regarding these requirements, the NCDMF has published an interactive web map of the gill-net attendance regulations that are in rule (Rule Map Link Here). For MU A, attendance requirements for small-mesh gill nets are maintained in proclamations generally from May through November (e.g., see M-10-2023 and M-25-2023).

Prior to the start of the fall season, the Observer Program projected the number of observed trips by mesh-size category, month, and MU needed to meet the coverage levels required in the ITP (i.e., 7–10% observer coverage of large-mesh gill-net fishing trips and 1–2% observer coverage of small-mesh gill-net fishing trips). Projecting the required number of observer trips for the small-mesh gill-net fishery was accomplished, as in years past, by calculating 2% of the average number of fishing trips reported to the Trip Ticket Program (TTP) by month and MU from the previous five years, 2018–2022. A different approach was used for the large-mesh gill-net fishery targeting flounder due to changes in management strategies per Amendment 3 of the Southern Flounder FMP.

For the large-mesh fishery, the Observer Program reevaluated last year's coverage estimation methods as the 2022 commercial flounder season was the first to be quota managed. This was another significant change for the fishery because previously it had been open for a set number of days for fall 2019-2021. In 2022, a conservative approach was used to develop a sea-day schedule with the intent of estimating the maximum fishing effort. Using 2021 TTP data, staff identified the week with the greatest number of distinct fishers for each MU and assumed that each one would fish every day in 2022 until the quota was filled and the fishery was closed. The maximum number of fishers for each MU was multiplied by the number of days that MU was open for a given week (e.g., Management Unit B was not open Saturday through Monday). The projected number of observer trips for each MU per week was based on 10% (ITP requires 7% coverage) of the corresponding expanded number. In preparation for the 2023 season, the final observer coverage from the previous season was calculated. It was apparent that the 2022 method greatly overestimated fishing effort as observer coverage ranged from 12.8% to 39.4%. As such, a different method to estimate fishing effort for the 2023 season was explored. It was determined that data from the 2022 season may be the best predictor of fishing effort for the second year of the quota-managed fishery. However, there was concern over having only one year of data to predict fishing effort (i.e., trips). To account for this uncertainty, the observer coverage target was set to 15% of reported number of trips from the 2022 season. This percentage is more than twice that of the required minimum coverage level of 7% and exceeds the coverage level of 10% that DMF typically targets for the large-mesh gill-net fishery. Using this 15% target, the Observer Program identified a daily target for the number of observed trips needed for each MU. In August 2023, this approach was communicated to NMFS who provided their concurrence, that same month, on the daily targets for the 2023 flounder season.

During September, in preparation for the fall flounder season, Observer Program staff conducted virtual and in-person observer trainings for other NCDMF staff. Although these trainings were new to some, most NCDMF staff had both observed commercial gill-net fishing operations and attended observer trainings previously.

Observers attempted to locate trips through many different strategies. Initially, observers attempted to contact fishers via phone using fisher-provided contact information of current Estuarine Gill Net Permit (EGNP) holders. In doing so, they prioritized those who have either reported gill-net landings over the previous three years or who were known to be currently fishing in a targeted area. Fishers' contacts and contact attempts were then logged in a database. For each contact or contact attempt, responses were categorized and recorded as one of 15 response categories (Table 2).

During fall 2023, observer coverage met or exceeded coverage requirements outlined in the ITP. There were 51 observed small-mesh gill-net trips that resulted in 1.0–5.0% coverage across MUs (Table 3; Figure 3) and 263 observed large-mesh gill-net trips that resulted in 17.1–22.0% coverage across all open MUs (Table 4, Figure 3). Not only did these coverage levels exceed the ITP requirements for the large-mesh fishery, they also exceeded the 15% planned coverage as communicated with NMFS.

There were 18 observed live sea turtle interactions in large-mesh gill nets and two live in small-mesh gill nets during fall 2023 (Table 5 & Table 6; Figure 3). Of the 20 overall interactions, 15 occurred in MU B, one in D2, and four in MU E. Green Sea Turtle *Chelonia mydas* interactions were observed most frequently (n = 14) followed by Kemp's Ridley *Lepidochelys kempii* interactions (n = 5). A single observed sea turtle could not be identified as it fell out of the net before the observer was able to positively identify it. The live Green Sea Turtle in MU D2 required resuscitation and was subsequently transported for rehabilitation at the NC Aquarium at Pine Knoll Shores. After its rehabilitation, it was successfully released into Bogue Sound on November 10, 2023. No deceased sea turtles were observed.

In addition to observed sea turtle interactions, there were two fisher-reported sea turtle takes in large-mesh gill nets during October (Table 7): one in MU B and one in MU D2. The sea turtle in B was positively identified as a Green Sea Turtle; however, the species of the sea turtle take in D2 was reportedly not known by the fisher. Both were released alive.

During fall 2023, 930 contacts were made with 48% (n = 447) representing occasions where observers and fishers communicated with each other (Figure 4). Only 6% (n = 63) of all contacts and attempts resulted in a booked trip. If staff failed to schedule a trip in advance through phone calls, observers either scouted for fishers at boat ramps or attempted to locate effort on-the-water. During these alternative platform observations where no trip was scheduled, observers and Marine Patrol officers regularly located effort but occasionally did not ("No-Contact" trips). During fall 2023, observers and Marine Patrol officers logged 224 No-Contact trips during fall 2023 (Table 8).

As a condition of the EGNP, fishers are required to provide current contact information so that observers can schedule trips. In the event of a change to a phone number or address, fishers are required to update their contact information with the NCDMF within 14 days of the change. During spring 2023, observers began to closely track contact attempts that ended in a disconnected number and again attempted contact after 14 days. If the number was still disconnected on the second attempt, a Notice of Violation (NOV) was initiated. This approach continued during fall 2023. An

NOV is the NCDMF's administrative process to suspend a permit and is initiated by an officer or other division employee when a permit holder is found to be in violation of general or specific permit conditions.

As part of their regular duties, Marine Patrol officers monitor fishing activity to ensure regulatory compliance. When Marine Patrol officers find gear or fishing practices to be out of compliance, they can issue either a citation, NOV, or both. A citation is an enforcement action taken by a Marine Patrol officer for person(s) found to be in violation of general statues, rules, or proclamations under the authority of the MFC and is considered a proceeding for district court. A citation and an NOV may both be initiated by the same permit condition violation; however, they are two separate actions. For this report, NOVs or citations associated with gill-net activities or the ENGP were compiled. In early September 2023, Marine Patrol violation codes for citations and NOVs were changed from the former "EGNP" and "NETG" codes to the actual rule and General Statue codes. Additionally, violation descriptions were changed to specify the rule or statute language and, where appropriate, proclamation number that was violated. During fall 2023, Marine Patrol issued six citations (Table 9) and 11 NOVs for anchored gill nets (Table 10).

TABLES

Table 1. Proclamations issued during calendar year 2023 affecting estuarine anchored gill-net fisheries during September–November (fall) 2023.

Effective Date	Proclamation Number	Proclamation Summary
4/30/2023	M-10-2023	This proclamation supersedes proclamation M-6-2023 dated March 15, 2023. In Management Unit A, it implements small mesh gill net attendance requirements and keeps open a portion of Management Unit A to the use of run-around, strike, and drop gill nets with a stretched mesh length of 5 ½ inches through 6 ½ inches for harvesting blue catfish.
8/10/2023	M-14-2023	This proclamation supersedes proclamation M-13-2023 dated May 24, 2023. It closes portions of Management Unit B and opens Management Unit E to the use of fixed or stationary gill nets less than 4 inches stretch mesh.
8/16/2023	M-15-2023	This proclamation supersedes M-14-2022 and clarifies the requirement that for any fish dealer to possess, purchase, sell or offer for sale flounder taken from Internal Coastal Waters during open seasons they must possess an Estuarine Flounder Dealer Permit for the applicable fisheries and harvest area.
9/15/2023	FF-32-2023	This proclamation supersedes Proclamation FF-55-2022, dated October 26, 2022. It establishes the commercial flounder season for Internal Coastal and Joint Fishing Waters by Gear Management Area. This action is being taken to comply with the requirements of Amendment 3 to the N.C. Southern Flounder Fishery Management Plan and maintain harvest within the total allowable landings (TAL).
9/25/2023	M-18-2023	This proclamation supersedes proclamation M-14-2023 dated August 8, 2023. It decreases the yardage limits for the commercial Spanish mackerel drift gill net fishery in Management Unit B.
10/2/2023	M-16-2023	This proclamation supersedes proclamation M-10-2023 dated April 28, 2023. It opens Management Unit A to the use of gill nets for the purpose of harvesting flounder in accordance with Amendment 3 to the N.C. Southern Flounder Fishery Management Plan and the Incidental Take Permits for threatened or endangered sea turtles and endangered Atlantic sturgeon. It maintains the exempted areas in MUA open to the use of run-around, strike, and drop gill nets to harvest blue catfish. It also maintains small mesh gill net attendance requirements in the entirety of Management Unit A.
10/2/2023	M-17-2023	This proclamation supersedes proclamation M-8-2023 dated April 13, 2023. This proclamation opens Management Units B (subunits only), C, D2, and E to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches (except as described in Section III.) in accordance with Amendment 3 to the N.C. Southern Flounder Fishery Management Plan and the Federal Incidental Take Permits for endangered and threatened Sea Turtles and endangered Atlantic sturgeon.
10/9/2023	M-22-2023	This proclamation supersedes proclamation M-18-2023 dated September 22, 2023. It opens Management Unit D1 and Management Unit B to the use of fixed or stationary gill nets with a stretched mesh length less than 4 inches.

Table 1. (Continued)

Effective Date	Proclamation Number	Proclamation Summary
10/23/2023	M-23-2023	This proclamation supersedes proclamation M-16-2023 dated September 8, 2023. In Management Unit A, it removes anchored gill nets with overnight soaks for the purpose of harvesting flounder, maintains small mesh gill net attendance requirements, and keeps open a portion of Management Unit A to the use of run-around, strike, and drop gill nets with a stretched mesh length of 5 ½ inches through 6 ½ inches for harvesting blue catfish.
10/23/2023	M-24-2023	This proclamation supersedes proclamation M-17-2023 dated September 8, 2023. This proclamation closes all management units south of Management Unit A to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches (except as described in Section III.) in accordance with Amendment 3 to the N.C. Southern Flounder Fishery Management Plan and the Federal Incidental Take Permits for endangered and threatened Sea Turtles and endangered Atlantic sturgeon.
12/1/2023	M-25-2023	This proclamation supersedes proclamation M-6-2023 dated March 15, 2023. In Management Unit A, it implements small mesh gill net attendance requirements and keeps open a portion of Management Unit A to the use of run-around, strike, and drop gill nets with a stretched mesh length of 5 ½ inches through 6 ½ inches for harvesting blue catfish.

Table 2. Fisherman contact code and associated descriptions for fisherman contact attempts during September–November (fall) 2023 of Incidental Take Permit Year 2024.

Code	Description	Total
1	Left message with someone else	6
2	Not fishing general	167
3	Fishing other gear	71
4	Not fishing - weather	5
5	Not fishing - boat issues	13
6	Not fishing - medical issues	5
7	Booked trip	63
8	Hung up, got angry, trip refused	10
9	Call back later time/date	111
10	Saw in person	2
11	Disconnected	28
12	Wrong number	8
13	No answer	181
14	No answer, left voicemail	260
15	Not fishing - natural disaster	0
	Response Total	930

Table 3. For small-mesh gill nets, estimated percent observer coverage calculated from observed trips (<4 inches stretched mesh [ISM]) and estimated fishing trips using Trip Ticket Program data (<5 ISM) by Management Unit during September–November 2023 (fall) of Incidental Take Permit Year 2024.

Management Unit	Estimated Fishing Trips	Observed Trips	Percent Observer Coverage
A	349	9	2.6
B	1,117	22	2.0
C	191	2	1.0
D1	40	2	5.0
D2	95	4	4.2
E	355	12	3.4
Total	2,147	51	2.4

Table 4. For large-mesh gill nets, estimated percent observer coverage calculated from observed trips (≥4 inches stretched mesh [ISM]) and estimated fishing trips using Trip Ticket Program data (≥5 ISM) by Management Unit during September–November 2023 (fall) of Incidental Take Permit Year 2024.

Management Unit	Estimated Fishing Trips	Observed Trips	Percent Observer Coverage
A	414	73	17.6
B	409	70	17.1
C	165	36	21.8
D1	*Closed*	*Closed*	*Closed*
D2	71	15	21.1
E	314	69	22.0
Total	1,373	263	19.2

Table 5. Total annual authorized and actual takes (observed and estimated) of sea turtles by species and, for estimated takes, by condition for the 2024 Incidental Take Permit (ITP) Year to date (September 2023–August 2024). One observed sea turtle interaction could not be identified to species (Management Unit B, large-mesh [≥4 inches stretched mesh] gill net) and is listed under Any Species. Estimated takes denoted with an endash (–) are for species whose authorized takes in the ITP are expressed only as counts.

Species	Observed (Live/Dead)		Estimated			
	Authorized	Actual	Authorized		Actual	
			Alive	Dead	Alive	Dead
Green	18	2	330	165	52.6	0
Hawksbill	8	0	–	–	–	–
Kemp's Ridley	12	1	98	49	19.1	0
Leatherback	8	0	–	–	–	–
Loggerhead	24	0	–	–	–	–
Any Species	8	1	–	–	–	–
Total	78	4	428	214	71.7	0

Table 6. Summary of observed sea turtle interactions ($n = 20$) in anchored gill nets during September–November (fall) 2023 for Incidental Take Permit Year 2024. Eighteen interactions were observed in large-mesh (≥4 inch) gill nets, and two interactions were observed in small-mesh (<4 inch) gill nets. An asterisk (*) denotes straight line measurements. A plus ($^{+}$) denotes sea turtles that were in poor condition and transferred to veterinary care. An endash (–) indicates data were not recorded. CCL=Curved Carapace Length. CCW=Curved Carapace Width. MU=Management Unit.

Date	MU	Mesh-Size Category	Latitude (N)	Longitude (W)	Species	Condition	CCL (mm)	CCW (mm)
10/3/2023	B	Large	35.34248	-76.34852	Green	Alive	370	320
10/4/2023	D2	Large	34.69521	-77.01405	Green	Alive^{+}	–	–
10/5/2023	B	Large	35.44966	-75.51020	Green[a]	Alive	280	240
10/5/2023	B	Large	35.44966	-75.51020	Green[a]	Alive	310	263
10/5/2023	B	Large	35.45285	-75.51367	Green[a]	Alive	269	224
10/5/2023	B	Large	35.45285	-75.51367	Green[a]	Alive	323	273
10/5/2023	B	Large	35.29443	-75.62300	Kemp's Ridley	Alive	254	254
10/5/2023	E	Large	33.90444	-77.95500	Green[b]	Alive	–	–
10/5/2023	E	Large	33.91194	-77.97083	Green[b]	Alive	310	270
10/10/2023	E	Large	33.92614	-77.95354	Green	Alive	343	286
10/12/2023	B	Large	34.85972	-76.38262	Green[c]	Alive	318*	254*
10/12/2023	B	Large	34.85995	-76.38281	Green[c]	Alive	279*	216*
10/12/2023	B	Large	34.86136	-76.38174	Green[c]	Alive	304*	241*
10/12/2023	B	Large	35.59622	-75.50462	Kemp's Ridley	Alive	368	368
10/12/2023	B	Large	35.53693	-75.48909	Kemp's Ridley[d]	Alive	–	–
10/12/2023	B	Large	35.53658	-75.48952	Kemp's Ridley[d]	Alive	254	241
10/18/2023	E	Large	34.56384	-77.38109	Green	Alive	–	–
10/18/2023	B	Large	35.23998	-75.66854	Unidentified	Alive	–	–
10/21/2023	B	Small	35.43642	-76.01433	Green	Alive	320	280
10/24/2023	B	Small	34.84171	-76.38321	Kemp's Ridley	Alive	–	–

[a] Observed on the same 10/5/2023 trip
[b] Observed on the same 10/5/2023 trip
[c] Observed on the same 10/12/2023 trip
[d] Observed on the same 10/12/2023 trip

Table 7. Summary of sea turtle interactions (n = 2) reported by fishers in anchored gill nets during September–November (fall) 2023 for Incidental Take Permit Year 2024. Large-mesh is defined as ≥ 4 inch; small-mesh is defined as < 4 inch. Measurements were not recorded for either sea turtle. Endash (–) indicates data that were not recorded. MU=Management Unit.

Date	MU	Mesh-Size Category	Latitude (N)	Longitude (W)	Species	Disposition
10/10/2023	B	Large	35.41167	-76.42583	Green	Alive
10/10/2023	D2	Large	–	–	Unidentified	Alive

Table 8. Summary of "No-Contact" trips by Management Unit completed by observers and Marine Patrol during September–November (fall) 2023 of Incidental Take Permit Year 2024. "No Contact" refers to unsuccessful attempts to find and observe anchored gill-net effort.

Management Unit	Marine Patrol No-Contact Trips	Observer No-Contact Trips	Total No-Contact Trips
A	48	5	53
B	17	1	18
C	30	6	36
D1	4	1	5
D2	16	1	17
E	95	0	95
Total	210	14	224

Table 9. Citations written by Marine Patrol officers for anchored gill nets by date and violation code during September–November 2023 (fall) of Incidental Take Permit Year 2024. Violation codes were updated in September 2023 from the former "EGNP" and "NETG" codes to the actual rule and General Statue codes. Of note, the single "EGNP" coded violation was recorded prior to the changeover.

Date	Violation Code	Description
9/2/2023	EGNP99	Failure to comply with statue(s), rule(s), and/or proclamation(s).
10/4/2023	15A NCAC 03H .0103(a)	Violation of proclamation M-17-2023, set time restrictions.
10/9/2023	15A NCAC 03H .0103(a)	FF-15-2023 Set/ deploy gillnet before allowed time.
10/10/2023	15A NCAC 03O .0502(a)	It is unlawful for an EGNP holder to avoid or mislead observers including but not limited to failure to return phone calls (regardless of whether or not the EGNP holder is actively fishing or not), failure to notify the Division of Marine Fisheries of a phone number change within 14 calendar days of such change, and proving incorrect information on fishing activity.
10/12/2023	15A NCAC 03H .0103(a)	M-17-2023 V.C. Nets set for Thursday retrieval may be set no sooner than one hour before sunset on Wednesday and must be retrieved no later than one hour after sunrise on Thursday.
10/25/2023	15A NCAC 03H .0103(a)	M-23-2023 B. 2. It is unlawful to use fixed or stationary gill nets with a stretched mesh length of 3 inches through 3 ¾ inches unless the nets are attended at all times.

Table 10. Notice of Violations (NOVs) for Estuarine Gill Net Permit (EGNP) holders using anchored gill nets by date and violation code issued during September–November 2023 (fall) of Incidental Take Permit Year 2024. Violation codes were updated in September 2023 from the former "EGNP" and "NETG" codes to the actual rule and General Statue codes.

Date	Violation Code	Description
10/2/2023	15A NCAC 03H .0103(a)	M-8-2023 Use large-mesh gill nets other than during the setting and retrieval periods.
10/4/2023	15A NCAC 03H .0103(a)	M-18-2023 Use unattended small-mesh nets in a closed area.
10/4/2023	15A NCAC 03H .0103(a)	M-17-2023 Use large-mesh gill nets other than during the setting and retrieval periods.
10/4/2023	15A NCAC 03H .0103(a)	M-17-2023 Use large-mesh gill nets other than during the setting and retrieval periods
10/4/2023	15A NCAC 03H .0103(a)	M-17-2023 Use large-mesh gill nets other than during the setting and retrieval periods
10/6/2023	15A NCAC 03H .0103(a)	M-17-2023 Use large-mesh gill nets other than during the setting and retrieval periods
10/9/2023	15A NCAC 03H .0103(a)	M-17-2023 Use large-mesh gill nets other than during the setting and retrieval periods.
10/10/2023	15A NCAC 03O .0502(a)	EGNP Permit Condition - It is unlawful for an EGNP holder to avoid or mislead observers providing incorrect information on fishing activity.
10/12/2023	15A NCAC 03H .0103(a)	M-17-2023 Use large-mesh gill nets other than during the setting and retrieval periods.
10/17/2023	15A NCAC 03O .0502(a)	EGNP Permit Condition - It is unlawful for an EGNP holder to avoid or mislead observers including but not limited to failure to return phone calls (regardless of whether or not the EGNP holder is actively fishing or not), failure to notify the Division of Marine Fisheries of a phone number change within 14 calendar days of such change, and providing incorrect information on fishing activity and it is unlawful to fail to provide a phone number that the EGNP holder can be reached.
10/25/2023	15A NCAC 03O .0502(a)	It is unlawful to violate any provisions of rules or proclamations issued in regards to, the conditions set out in the federally issued ESA section 10 Incidental Take Permits to reduce incidental takes in large- or small-mesh gill net fisheries.

FIGURES

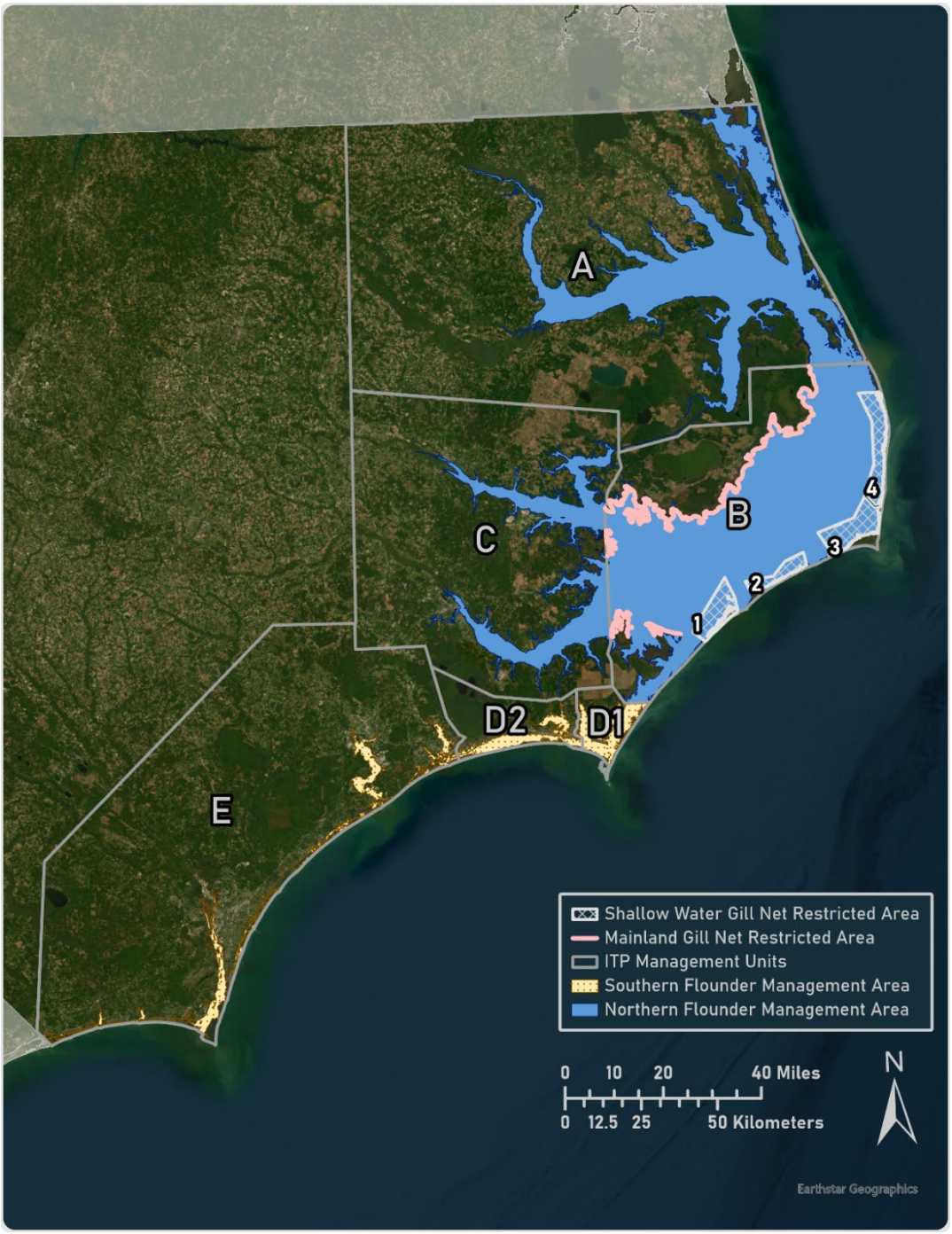

Figure 1. Management Units (A, B, C, D1, D2, and E) as outlined in the Incidental Take Permit (ITP)**.** In the Pamlico Sound portion of B, large-mesh (≥4 inches stretched mesh) gill nets were confined to Shallow Water Gillnet Restricted Areas 1-4 and the Mainland Gillnet Restricted Area (200 yards from shore). The two Southern Flounder Management Areas are shown with differently colored backgrounds: northern (blue) and southern (yellow).

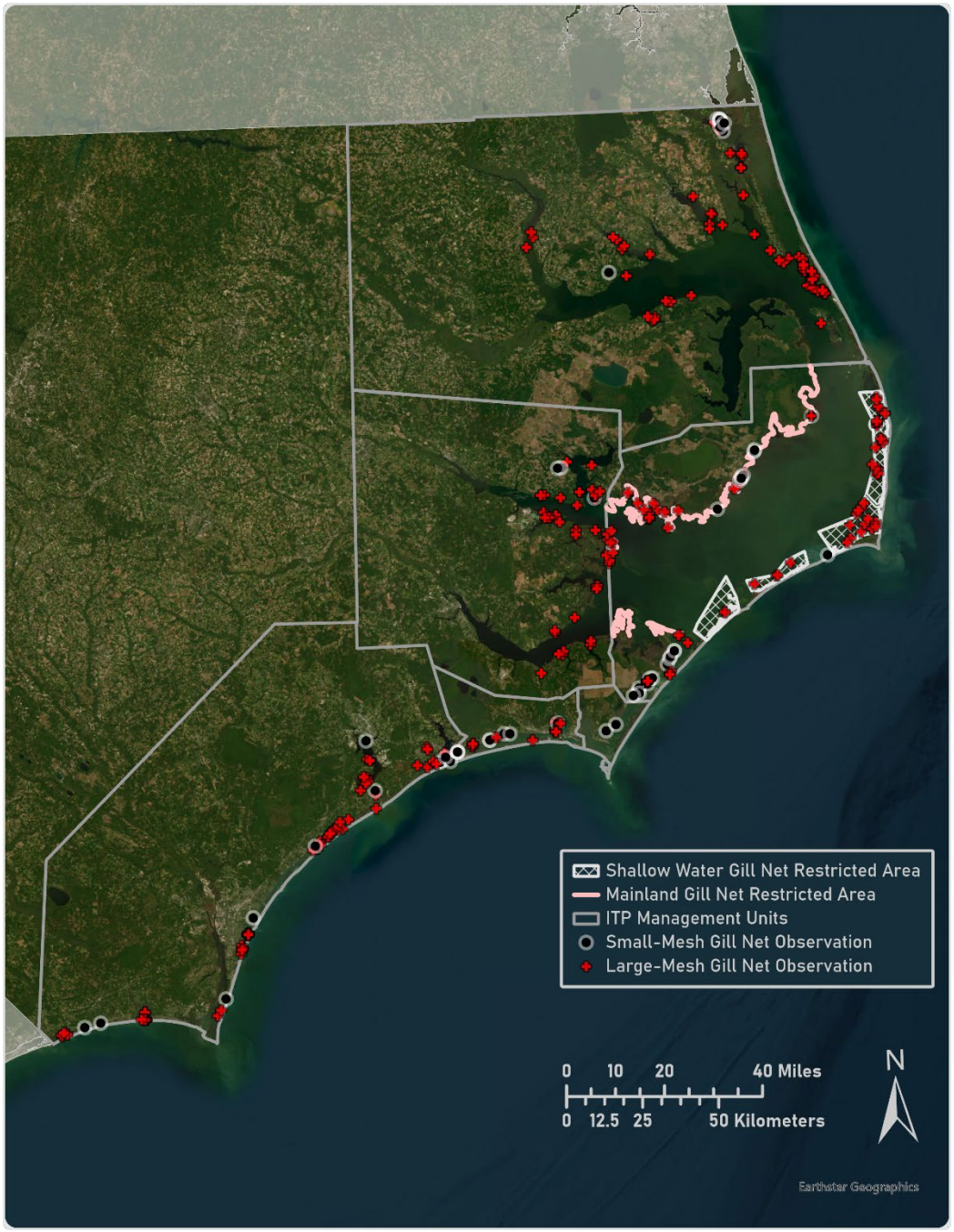

Figure 2. Observed large-mesh gill-net trips (n = 263, ≥4 inches stretched mesh [ISM]) and small-mesh (n = 51, <4 ISM) gill-net trips during September–November (fall) 2023 of Incidental Take Permit Year 2024. Note that in some areas, multiple observations may be depicted as fewer observations due to the point layering and map scale. For example, a single point may be visible; however, multiple points may exist at that location. For observed trip totals within each Management Unit, please see Table 2.

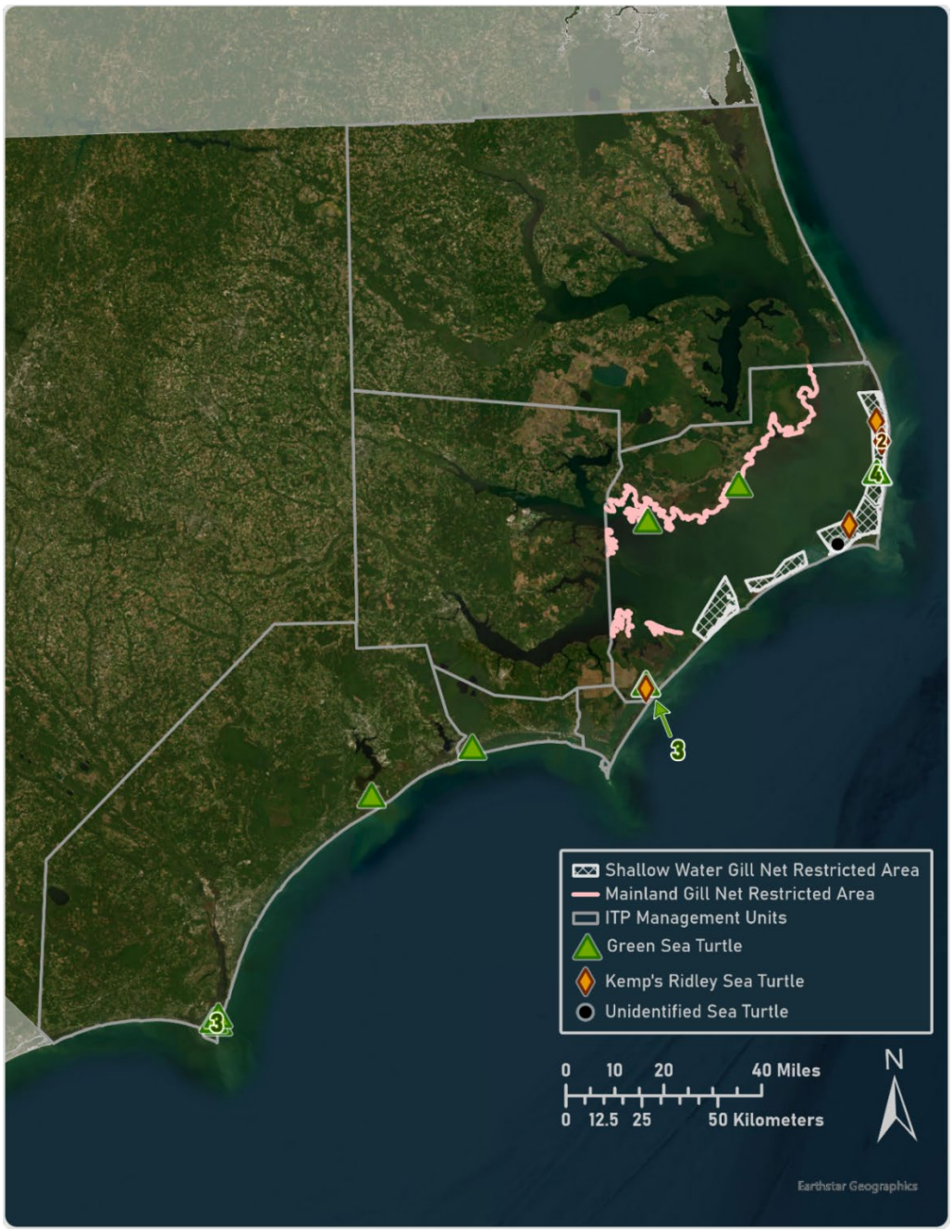

Figure 3. Observed sea turtle interactions (green, *n* = 14; Kemp's ridley, *n* = 5; and unidentified, *n* = 1) during September–November (fall) 2023 of Incidental Take Permit Year 2024. Note that all sea turtles were released alive. Additionally, in some areas multiple observations may be depicted as fewer point symbols due to the map scale. For example, a single point may be visible; however, multiple points may exist at that location. In these instances, a number of similar color scheme has been placed on or near the grouped symbols with the number of interactions that the symbol(s) represent.

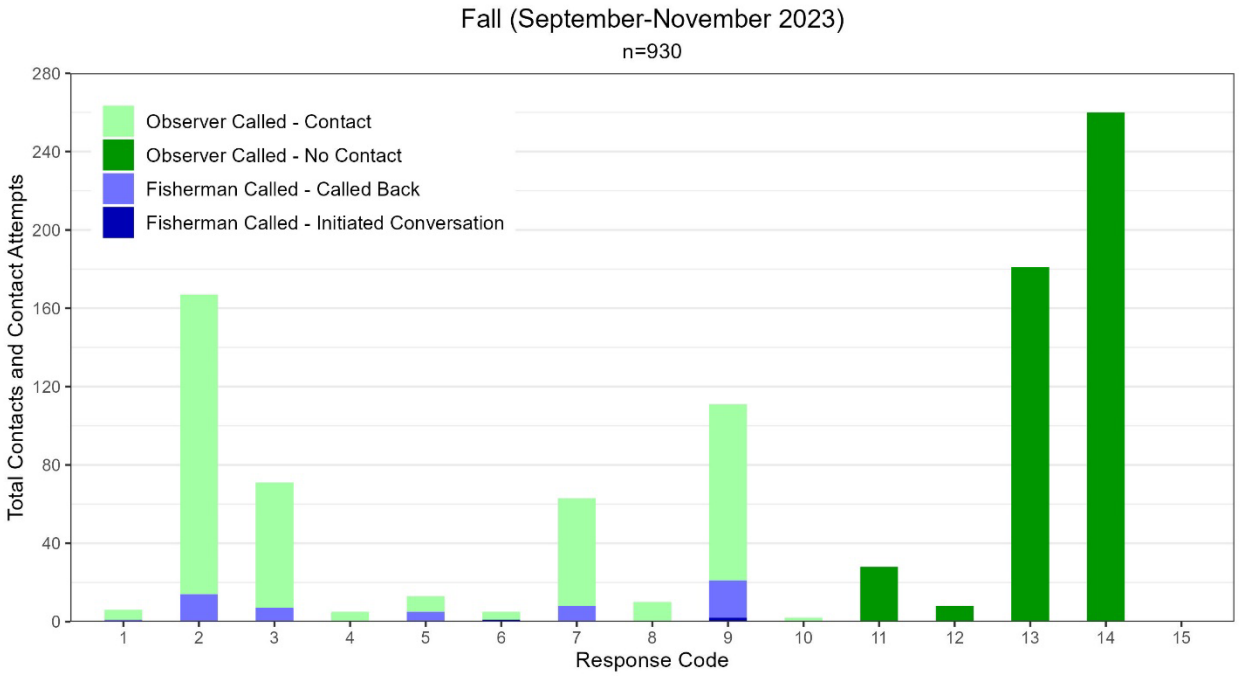

Figure 4. Responses to contacts by phone or in person (n = 930) to schedule observer trips during September–November (fall) 2023 of Incidental Take Permit Year 2024. Contact response categories include the following: 1) Left message with someone else; 2) Not fishing general; 3) Fishing other gear; 4) 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 responses are stratified by occasions when observers initiated a successful contact (light green), when the observer initiated an unsuccessful contact (dark green), when the fisherman returned an observer's call (light blue), and when the fisherman initiated contact (dark blue).

ROY COOPER
Governor

ELIZABETH S. BISER
Secretary

KATHY B. RAWLS
Director

Monthly Progress Report
Incidental Take Permit No. 18102
November 3, 2023

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

Dear Celeste,

This memo serves as a report on observer program activities during October 2023 of the 2024 ITP Year (September 1, 2023 – August 31, 2024) for Permit #18102.

Throughout October 2023, Management Units (MU) A, C, D2, E, and areas of MU B were open to anchored small-mesh gill nets (i.e., < 5 inches stretched mesh). The remaining portions of MUs B and D1 were later opened to anchored small-mesh gill nets on October 9, 2023 (M-22-2023). The estuarine anchored large-mesh gill-net fishery (≥ 5 inches stretched mesh) opened in all MUs except for MU D1 on October 2, 2023 (M-16-2023; M-17-2023) and closed October 19, 2023 (M-23-2023; M-24-2023). During this period, the fishery was only open Monday through Thursday each week whereas anchored large-mesh gill nets were only allowed to be in the water from one hour prior to sunset on Monday through one hour following sunrise on Thursday.

During October 2023, there were observations of 263 anchored large-mesh trips and 33 anchored small-mesh trips coastwide (Table 1). Of the observed large-mesh trips, 35 live Atlantic sturgeon, one live unidentified sturgeon, and four dead Atlantic sturgeon were observed. The unidentified sturgeon fell out of the net and the observer was only able to see it briefly. Of the small-mesh trips, only one live Atlantic Sturgeon was observed (Table 2). In addition to observed trips, there were 53 unsuccessful attempts to locate anchored gill-net fishing activity during October (i.e., No-Contact Trips; Table 1).

Cumulative estimated and observed interactions during the 2024 ITP Year to date are included in Tables 3 and 4 for anchored large-mesh gill nets and small-mesh gill nets, respectively. As a reminder, estimated take numbers are preliminary

Table 1. Total observed estuarine anchored gill-net trips (n = 296) by Management Unit and mesh-size category during October 2023 for ITP Year 2024. Mesh-size categories are large (≥ 5 inches stretched mesh) and small (< 5 inches stretched mesh). Numbers of No-Contact trips (n = 53) by Management Unit are also provided. No-Contact refers to unsuccessful attempts to find and observe anchored gill-net effort.

Month	Management Unit	Large-Mesh Observed Trips	Small-Mesh Observed Trips	No-Contact Trips
October	A	73	4	14
	B	70	15	4
	C	36	2	11
	D1	*closed*	2	1
	D2	15	2	3
	E	69	8	20
	Overall	263	33	53

Table 2. Summary of observed Sturgeon (n = 41) interactions in estuarine anchored gill nets during October 2023 for ITP Year 2024. Mesh-size categories are large (≥ 5 inches stretched mesh) and small (< 5 inches stretched mesh). * = Denotes observed trip where most nets were 80 yds but varied such that total yards = 1500.

No.	Date	Species	Condition	Management Unit	Mesh-Size Category	Soak Time (Mins)	Length of Net (Yards)	Number of Nets
1	10/3/2023	Atlantic	Alive	A	Large	720	84	15
2	10/4/2023	Atlantic[a]	Alive	A	Large	720	200	7
3	10/4/2023	Atlantic[a]	Dead	A	Large	720	200	7
4	10/5/2023	Atlantic	Alive	A	Large	720	1500	1
5	10/10/2023	Unidentified	Alive	A	Large	720	200	7
6	10/11/2023	Atlantic	Alive	A	Large	720	100	10
7	10/19/2023	Atlantic[b]	Alive	A	Large	720	75	18
8	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
9	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
10	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
11	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
12	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
13	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
14	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
15	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
16	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
17	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
18	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
19	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18

Table 2. (Continued)

No.	Date	Species	Condition	Management Unit	Mesh-Size Category	Soak Time (Mins)	Length of Net (Yards)	Number of Nets
20	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
21	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
22	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
23	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
24	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
25	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
26	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
27	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
28	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
29	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
30	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
31	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
32	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
33	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
34	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
35	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
36	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
37	10/19/2023	Atlantic[b]	Alive	A	Large	720	80*	18
38	10/19/2023	Atlantic[b]	Dead	A	Large	720	80*	18
39	10/19/2023	Atlantic[b]	Dead	A	Large	720	80*	18
40	10/19/2023	Atlantic	Dead	A	Large	720	75	3
41	10/20/2023	Atlantic	Alive	E	Small	15	300	1

[a] Observed on the same 10/4/2023 trip
[b] Observed on the same 10/19/2023 trip

Table 3. For anchored large-mesh (≥ 5 inch) gill nets, a current comparison of observed (live, *n* = 35; dead, *n* = 5) incidental takes of Atlantic Sturgeon by management unit during 2024 ITP Year through October 2023 to authorized thresholds expressed as either estimated total takes based on observed takes for Management Unit A or counts of observed takes (i.e., not estimated) for Management Units B–E. Estimated takes in Management Unit A are based on projected fishing effort; therefore, 95% confidence intervals are not provided. Genetic results were not available to determine the Distinct Population Segment (DPS) of observed interactions.

		Authorized				Actual	
		Carolina DPS		Other DPS		All DPS	
Management Unit	Season	Alive	Dead	Alive	Dead	Alive	Dead
A	Annual	1,604	65	535	21	219.5	23.6
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	219.5	23.6

Table 4. For small-mesh (< 5 inch) gill nets, a comparison of observed (alive, *n* = 1) incidental takes of Atlantic Sturgeon by management unit during the 2024 ITP Year through October 2023 to authorized thresholds expressed as either estimated total takes based on observed takes (Management Unit A) or counts of actual observed takes (Management Units B–E). Estimated takes in Management Unit A are based on projected fishing effort; therefore, 95% confidence intervals are not provided Authorized takes in Management Units C, D, and E were for the Carolina Distinct Population Segment (DPS) only and listed as not applicable (*n/a*) for Other DPS. Genetic results were not available to determine DPS of observed interactions.

		Authorized				Actual	
		Carolina DPS		Other DPS		All DPS	
Management Unit	Season	Alive	Dead	Alive	Dead	Alive	Dead
A	Annual	569	45	114	10	0	0
B	Annual	14	5	3	0	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*	1	0
Total	Annual	607	58	117	10	1	0

Best regards,

David Ushakow
Protected Resources Program, Biologist

cc: Wendy Piniak, Angela Somma (NMFS); Kathy Rawls, Mike Loeffler, Steve Poland, Casey Knight, Barbie Byrd, Matthew Doster, and Jonathon McFall (NCDMF)

January 26th, 2024

MEMORANDUM

TO: N.C. Marine Fisheries Commission

FROM: Steve Poland, Fisheries Management Section Chief

SUBJECT: Temporary Rule Suspensions

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 November 2023 business meeting.

Action Needed
For informational purposes only, **no 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. They include:

NCMFC Rule 15A NCAC 03O .0501 (e)(4) PROCEDURES AND REQUIREMENTS TO OBTAIN PERMITS

Suspension of portion of this rule for an indefinite period. Suspension of this rule allows the division to issue the Shellfish Relocation Permit to permittees already issued a Division of Coastal management permit for development activity. This suspension was implemented in Proclamation M-11-2023.

NCMFC 15A NCAC 03R .0117 (c), (i), and (j) of section (1) OYSTER SANCTUARIES

Suspension of portion of this rule for an indefinite period. Suspension of this rule allows the division to publish correct coordinates for the Pea Island, Raccoon Island, and Swan Island Oyster Sanctuaries to ensure that the sanctuaries continue to be protected according to the FMP restrictions while the rule is modified to reflect the correct boundary coordinates. This suspension was implemented in Proclamation SF-6-2022.

NCMFC Rule 15A NCAC 03M .0515 (a)(2) Dolphin

Suspension of portion of this rule for an indefinite period. Suspension of this rule allows the division to adjust the recreational vessel limit to complement management of dolphin under the South Atlantic Fishery Management Council's Amendment 10 to the Fishery Management Plan for the Dolphin and Wahoo Fishery of the Atlantic. This suspension was implemented in Proclamation FF-30-2022.

NCMFC Rule 15A NCAC 03L .0105 (2) Recreational Shrimp Limits

Suspension of portion of this rule for an indefinite period. Suspension of this rule allows the division to modify the recreational possession limit of shrimp by removing the four quarts heads on and two and a half quarts heads off prohibition from waters closed to shrimping in accordance with Amendment 2 to the North Carolina Shrimp Fishery Management Plan. This suspension was implemented in Proclamation SH-4-2022.

NCMFC Rule 15A NCAC 03J .0103 (h) Gill Nets, Seines, Identification, Restrictions

Continued suspension of portion of this rule for an indefinite period. Suspension of this rule allows the division to implement year-round small mesh gill net attendance requirements in certain areas of the Tar-Pamlico and Neuse rivers 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 areas of the state. This suspension continues in Proclamation M-22-2023.

NCMFC Rule 15A NCAC 03L .0103 (a)(1) Prohibited Nets, Mesh Lengths and Areas

Continued suspension of portions of this rule for an indefinite period. This allows the division to adjust trawl net minimum mesh size requirements in accordance with the Amendment 2 to the North Carolina Shrimp Fishery Management Plan. This suspension was implemented in proclamation SH-3-2019 and continues in SH-1-2022.

NCMFC Rule 15A NCAC 03J .0501 (e)(2) Definitions and Standards for Pound Nets and Pound Net Sets

Continued suspension of portions of this rule 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 (a) and (b) Shad & 03Q .0107 (4) Special Regulations: Joint Waters

Continued suspension of portions of these rules 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-67-2021(Revised)

NC Marine Fisheries Commission

Update on Strategic Habitat Areas Study Report

February 2024 Business Meeting

COASTAL RECREATIONAL FISHING LICENSE

FINAL REPORT

DEVELOPING METHODOLOGY FOR ASSESSING FISH USE IN STRATEGIC HABITAT AREAS

Anne Deaton, Casey Knight, and Charlie Deaton

Grant Award # 2017-H-061

2023

Description of Work:

Identification of specific critical areas for important fishery species is a means of prioritizing conservation, enhancement, and restoration of coastal habitats. This, in turn, will enhance fishing opportunities in coastal North Carolina. The division completed a GIS-based spatial analysis in coastal watersheds to identify a network of high-quality habitat areas, referred to as Strategic Habitat Areas (SHAs) in 2017. Analyses were done for each of the four Coastal Habitat Protection Plan (CHPP) coastal regions (Figure 1). Field sampling was necessary to validate fish use and habitat condition of the SHAs selected by the GIS analysis and/or refine the SHA boundaries if necessary.

This CRFL project began as a pilot study within one SHA region (White Oak River Basin, Region 3; Figure 2) to determine the most ecologically sound and effective method to verify the quality of SHAs and define habitat metrics. Multiple gears were used to sample the shellfish and finfish communities in or adjacent to three coastal fish habitats (wetlands, submerged aquatic vegetation (SAV), and shell bottom) along with several metrics for these habitats. Sampling was conducted both inside and outside of designated SHAs.

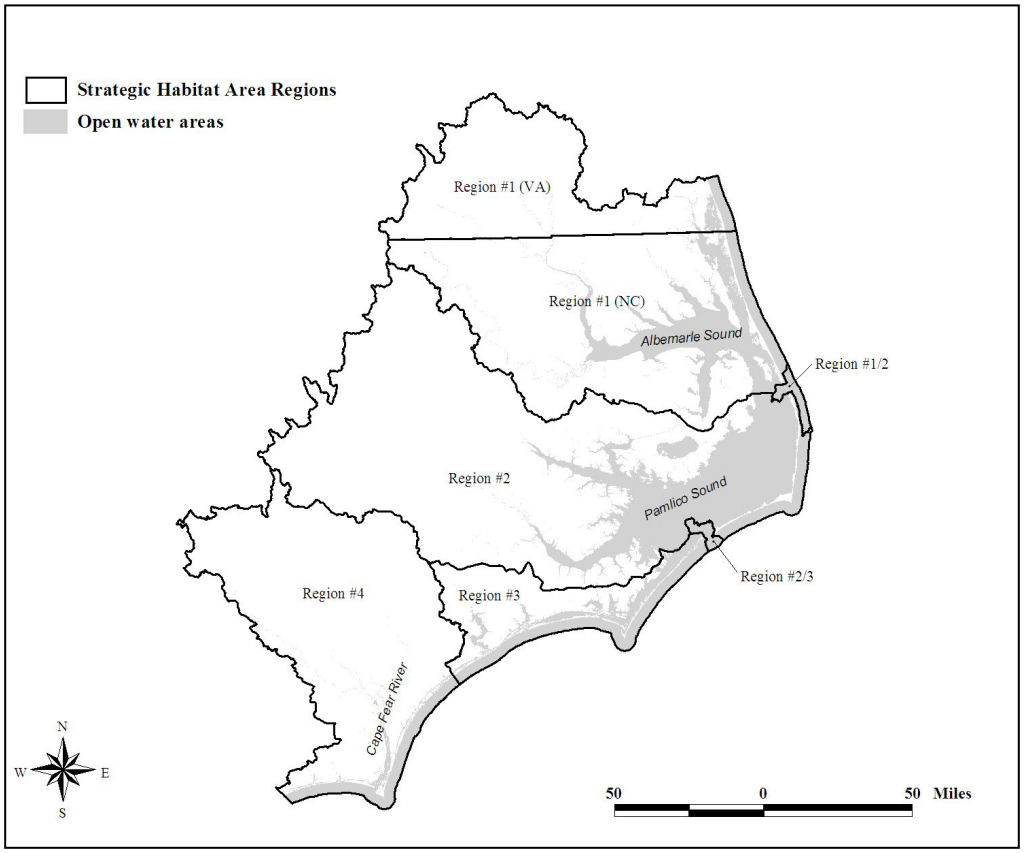

Figure 1. Regional boundaries for Strategic Habitat Areas delineations.

Region 3 includes waters in Carteret and Onslow counties, as well as a small amount of Jones and Craven counties, and the entire watershed is contained within the White Oak River Basin. This region lacks extensive riverine systems and consists primarily of estuarine waters and small to moderate sized sounds such as Core, Bogue, and Stump sounds. New River is the largest river. Submerged Aquatic Vegetation (SAV) and wetlands (marsh and forest) are extensive, and intertidal and subtidal oyster reefs and ocean hard bottom are also present. Oyster, clam, bay scallop, blue crab, shrimp, southern flounder, red drum, spotted seatrout, weakfish, and spot were determined to be priority fishery species in this region, and an important nursery area for gag grouper and black sea bass. There were 48 discrete SHA units selected within Region 3.

Region 4 is the southernmost region and includes riverine and estuarine waters in Pender, New Hanover, and Brunswick counties, as well as portions of Duplin, Sampson, Bladen, and Cumberland counties. It includes the Cape Fear River system upstream to approximately Lillington, the historical anadromous fish spawning grounds of Smiley Falls (approximate fall line). The estuarine waters include multiple small tidal creeks and sounds and extensive intertidal oyster reefs and marsh. Relatively small areas of SAV occur in the northern portion of the region. The priority fisheries species of the Cape Fear River Basin include eastern oyster, hard clam, blue crab, shrimp, bay scallop, southern, red drum, spotted seatrout, kingfishes, and spot. The Cape Fear River system is vital to anadromous species, including striped bass, American shad, river herring, and sturgeon, that migrate upstream for spawning; while the nearshore provides important habitat for gag grouper, black sea bass, sheepshead, and mackerels. There were 43 discrete SHAs selected within Region 4.

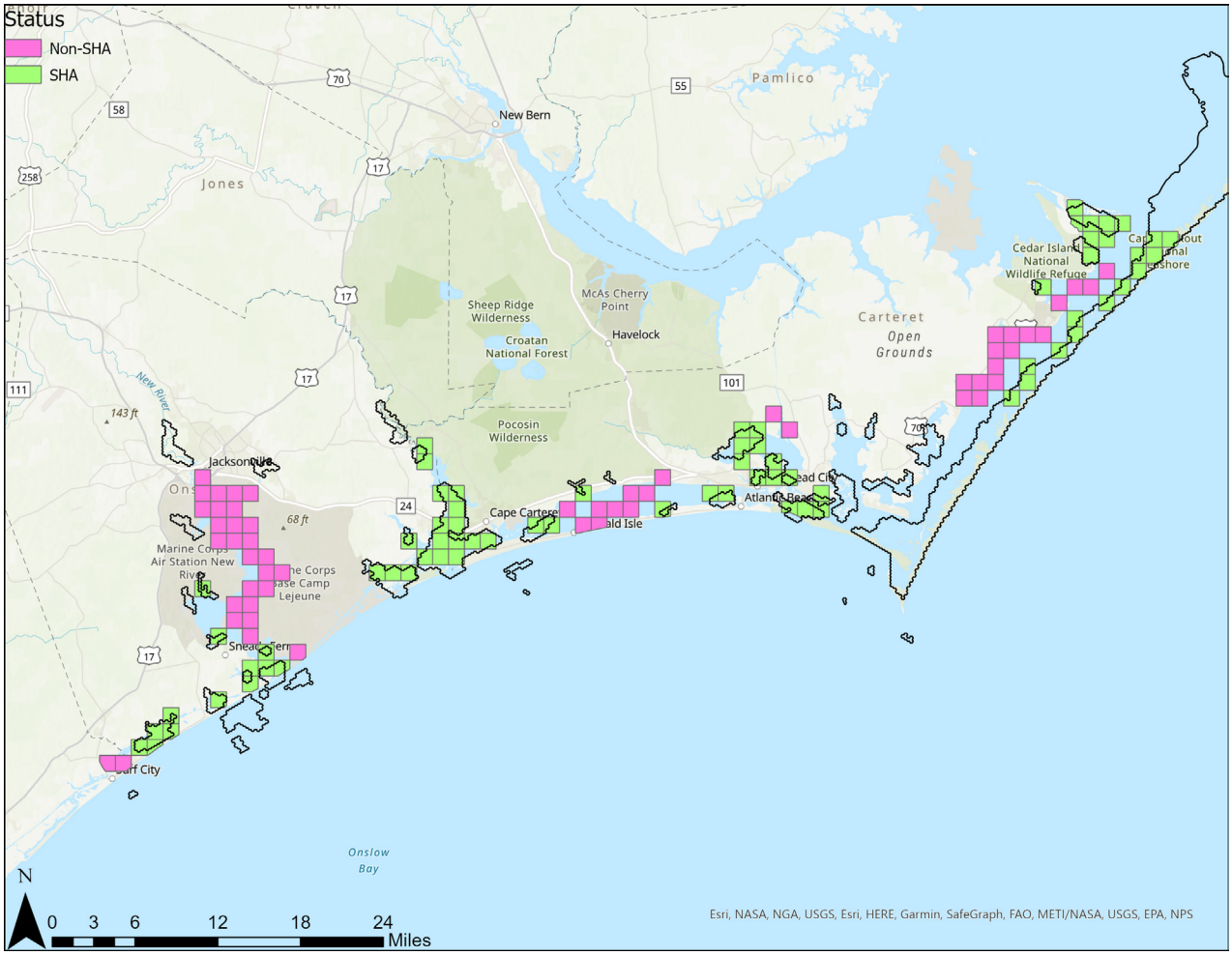

Figure 2. Region 3 Strategic Habitat Areas (SHAs) sampling area with one nautical mile (nmi) square grids stratified by SHA and Non-SHA. SHA polygons outlined in black.

Project Status/Work Accomplished:

After two full seasons of sampling in SHA Region 3 (Figure 2), a deviation from the original scope of work along with a no-cost extension was requested and approved in June 2019. This allowed for expansion of one year of sampling into an additional SHA region (Cape Fear River Basin, Region 4; Figure 3). In early 2021, a no-cost extension was approved to conduct a second year of sampling in Region 4 to complete field verification. The sampling schedule for both regions is shown in Table 1. As part of these extensions, we will also provide recommendations on any methodology changes needed to field verify Regions 1 and 2 and suggest if/how the sampling protocol could be used or modified to evaluate nursery areas.

Table 1. Revised grant timeline, with no-cost extensions, July 2017- June 2022.

Six month period	Six month period	Task
	7/1/2017-12/30/2017	Planned; bought gear

1/1/2018-6/30/2018	7/1/2018-12/30/2018	Sample R3, Year 1
1/1/2019-6/30/2019	7/1/2019-12/30/2019	Sample R3, Year 2
1/1/2020-6/30/2020	7/1/2020-12/30/2020	Sample R4, Year 1
1/1/2021-6/30/2021	7/1/2021-12/30/2021	Sample R4, Year 2
1/1/2022-6/30/2022		Data entry, analysis, report writeup

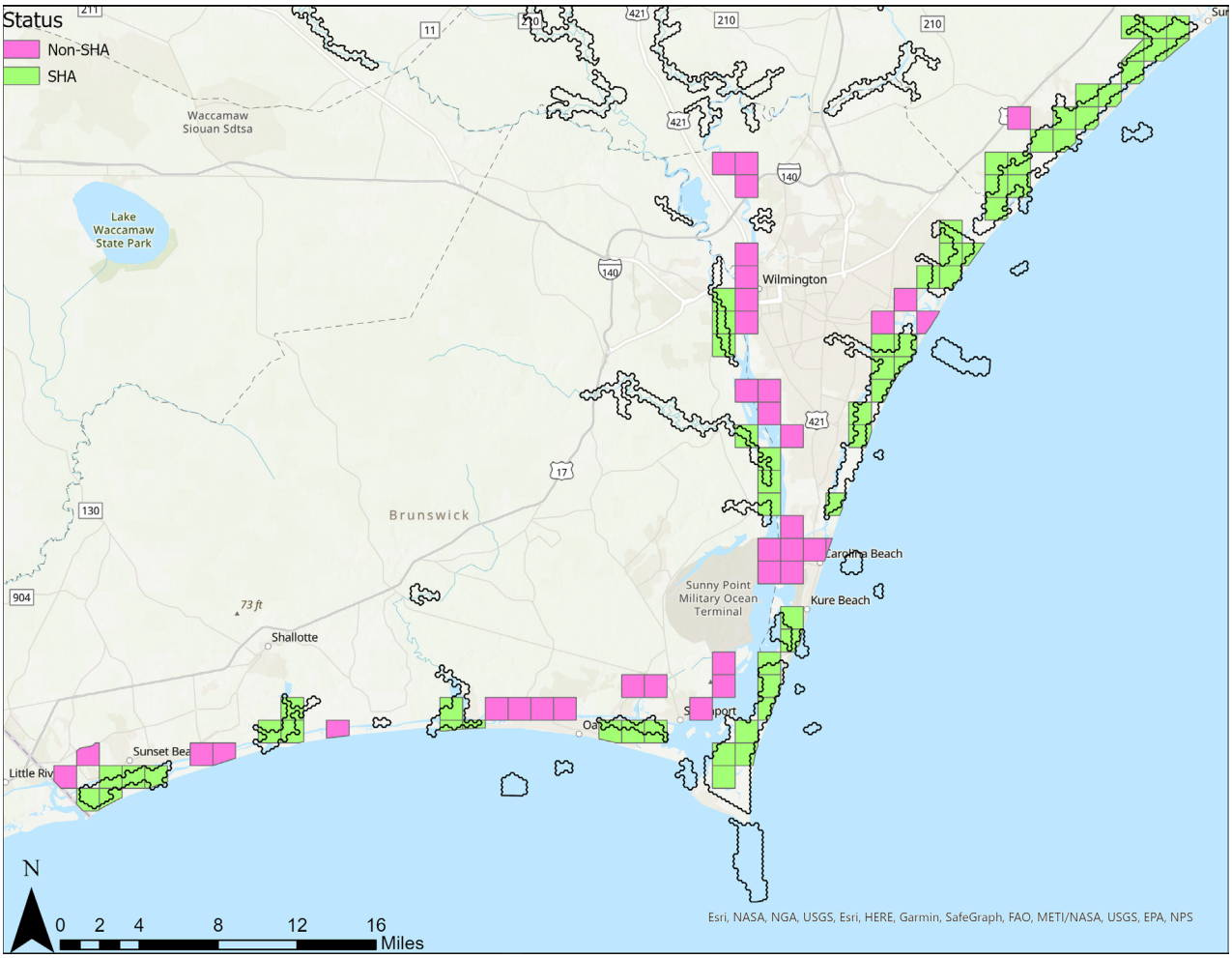

Figure 3. Region 4 sampling area with one nautical mile (nmi) square grids stratified by SHA and Non-SHA. SHA polygons outlined in black.

Study objectives

1) Conduct extensive field sampling of target fish species in three fish habitats inside and outside of SHAs to verify habitat condition and biological productivity
2) Develop indicator metrics for validating SHAs based on target species use and habitat metrics

3) Produce a standard operating procedure (SOP) for monitoring and potentially modifying SHAs in the future based on indicator performance

Objective 1: Field sample to verify habit condition and fish productivity

In both regions, ArcGIS was used to create the sampling universe. A stratified random sampling methodology was used with one nautical mile (nmi) square grid overlaid on the region sampling area. It was then modified according to accessibility and ability to sample. The ArcMap Sampling Design Tool with the grid layer for SHA Region 4 was then used to randomly select 16 proportionally allocated SHA and non-SHA sites (1.0 x 1.0 nmi^2 grids) for each of the nine monthly sampling periods (Figures 2 and 3). Because the grids were randomly selected, not all SHAs were sampled. Additionally, in Region 4, the sampling grid did not extend upstream of approximately Lyon Thorofare on the Cape Fear River and Cowpen Branch on the Northeast Cape Fear River, excluding 16 SHAs due to difficulty in sampling with the different gears in that area.

From 2018-2019, 252 sites were sampled in Region 3, with 126 sites in SHAs, and 126 sites in non-SHAs (Table 2). September 2018 sampling was lower than other months due to Hurricane Florence. Other minor deviations were due to weather or staff limitations. Program documentation was developed and data entered into DMF's Biological Database (BDB) under Program 215: Assessing fish use in SHAs.

Table 2. The number of Strategic Habitat Areas Region 3 sites sampled (Strategic Habitat Areas (SHAs) and Non-SHAs) during the 2018 and 2019 sampling seasons.

	2018			2019			
Month	SHAs Sampled	Non-SHAs Sampled	Total Sampled	SHAs Sampled	Non-SHAs Sampled	Total Sampled	Grand Total Sampled
February	2	2	4	4	4	8	12
March	5	6	11	8	8	16	27
April	7	8	15	8	8	16	31
May	8	8	16	8	8	16	32
June	7	7	14	8	8	16	30
July	8	8	16	8	8	16	32
August	8	8	16	8	8	16	32
September	1	1	2	8	8	16	18
October	8	8	16	8	8	16	32
November	0	0	0	4	4	8	8
Totals	54	54	108	72	72	144	252

Region 4 sampling occurred in 2020-2021, however due to the Covid-19 pandemic, sampling was modified. Sampling began on March 1, 2020, but was suspended from March 26th until June 2nd, 2020. Before sampling was suspended in March only ten of the proposed 16 sampling sites were completed and when sampling resumed in June only 14 of the proposed 16 sampling sites were completed. While sampling was suspended due to Covid-19, the

technicians wrote detailed sampling SOPs and completed further quality control of all project data in the Biological Database making corrections as needed. From July 1st through November 15th, 2020 sampling was completed, meeting the 16 sites/month goal. The 2021 sampling season began on February 15th, 2021 continuing to meet the 16 sites/month sampling goal during this reporting period, except in July due to staff vacancies. From 2020-2021, 244 sites were sampled in Region 4, with 147 sites in SHAs, and 97 sites in non-SHAs (Table 3).

Table 3. The number of Strategic Habitat Areas Region 4 sites sampled (Strategic Habitat Areas (SHAs) and Non-SHAs) during the 2020 and 2021 sampling seasons.

	2020			2021			
Month	SHAs Sampled	Non-SHAs Sampled	Total Sampled	SHAs Sampled	Non-SHAs Sampled	Total Sampled	Grand Total Sampled
February	0	0	0	5	3	8	8
March	5	5	10	10	6	16	26
April	0	0	0	10	6	16	16
May	0	0	0	10	6	16	16
June	7	7	14	10	6	16	30
July	8	8	16	8	3	11	27
August	8	8	16	10	6	16	32
September	10	6	16	11	6	17	33
October	10	6	16	10	6	16	32
November	10	6	16	5	3	8	24
Totals	58	46	104	89	51	140	244

At each site, fish sampling was done using breder traps, gill nets and bottom trawls. Where intertidal wetlands, oyster reef, and shallow SAV are present within a grid, four breder traps are set in each habitat type, alternating perpendicular and parallel orientation to the habitat edge. Four gill nets (2", 3", 4", 5" stretched mesh) are set within 100 ft of shore where water depth is roughly three ft at MLW. Breder traps and gill nets are set at low tide and soak for at least three and four hours, respectively. For both traps and gill nets, the collected fish are identified to species and counted. Target species are measured and weighed, and total biomass of all fish will be recorded. Trawling is done on a separate day or at the end of the sampling day on the falling tide.

Habitat metrics were collected at low tide (Table 4) while traps and gill nets are soaking using quadrat sampling. Wetland metrics include habitat type (fringe or isolated), connectivity to other habitats, observable erosion, plant species, shoot count, maximum and average shoot height, and other fauna present. Oyster reef metrics include reef type (fringe or isolated), connectivity to other habitats, shellfish species present, percent cover shell, total number of live oysters, length of 30 oysters, rugosity, and other fauna present. SAV metrics

include habitat type (fringe or isolated), connectivity to other habitats, SAV species present, percent cover, shoot density, maximum and average shoot height. Overall habitat condition metrics include water quality, extend of hardened shoreline and eroded edge, and presence of shoreline basins, marinas and/or boat ramps, rock or wood structures perpendicular to shore, low profile (riprap) or wood structure parallel to shore, and vertical structures (i.e. bulkheads), and the presence of shell bottom, marsh, and SAV.

Table 4. Habitat metrics collected at each site where the habitat existed.

Wetlands	Oyster reef	SAV
Habitat type (fringe or isolated)	Habitat type (fringe or isolated)	Habitat type (fringe or isolated)
Connectivity to other habitats	Connectivity to other habitats	Connectivity to other habitats
Plant species present	Shellfish species present	SAV species present
Percent cover	Percent cover	Percent cover
Plant height	Abundance and size frequency live oysters	shoot density
Fauna present	Fauna present	Plant height
Visible erosion	Rugosity	

All data were coded, submitted, and quality controlled. All sampling data for Region 3 and 4 have been submitted for inclusion in the BDB (n=2,195 collections).

Habitat

Analysis of the Region 3 and 4 habitat data confirm greater overall extent (# of sites and acres) of the habitats investigated in this study (marsh, shell bottom, and SAV) in the SHA grids compared to the non-SHA grids (Table 5, Figures 4-9). SHAs compared to non-SHAs also had much greater acreage of habitat complexes (two or more structured habitats rather than one habitat only. In both regions, non-SHAs had a higher number of sites and acres with wetlands only. Regions 3 and 4 had no sites with only shell. Region 3 SHAs and non-SHAs had similar numbers of sites/acres with SAV, while Region 4 had none. These results verify that the GIS analysis accurately selected areas with an abundance of diverse habitats.

Table 5. Total acreage of structured habitats (wetlands, shell bottom, SAV) within SHA and non-SHAs and mean acreage in SHA and non-SHA grids.

Area	Total Structured Habitat Area (acres)	Mean Area (acres/grid)
Region 3 SHA	1681.2	10.2
Region 3 Non-SHA	690.0	18.5

Region 4 SHA	1926.0	30.1
Region 4 Non-SHA	502.0	13.2

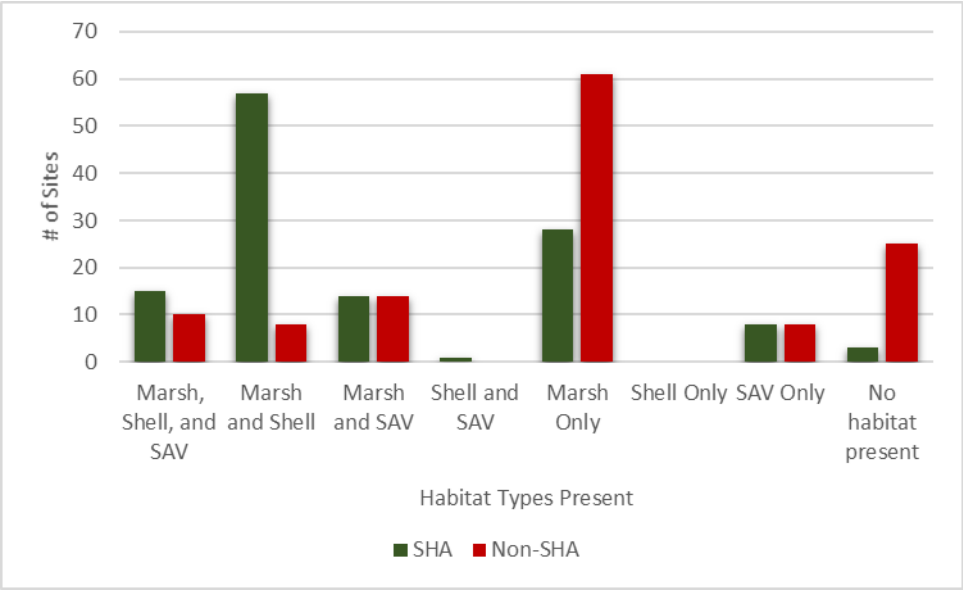

Figure 4. Number of sites with different habitat combinations present within the SHA and non-SHA sampling grids in Region 3, 2018-2019.

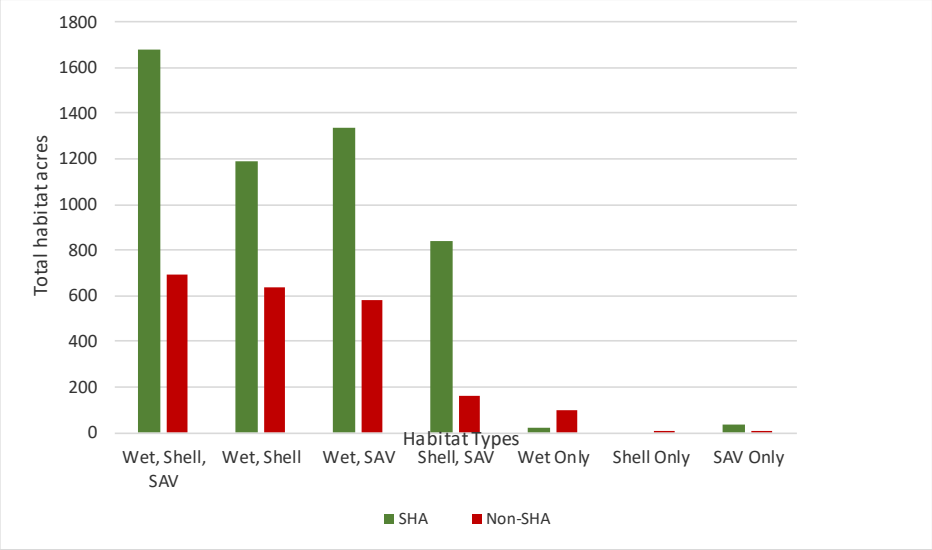

Figure 5. Acres of habitats present within SHA and non-SHA sampling grids in Region 3, 2018-2019.

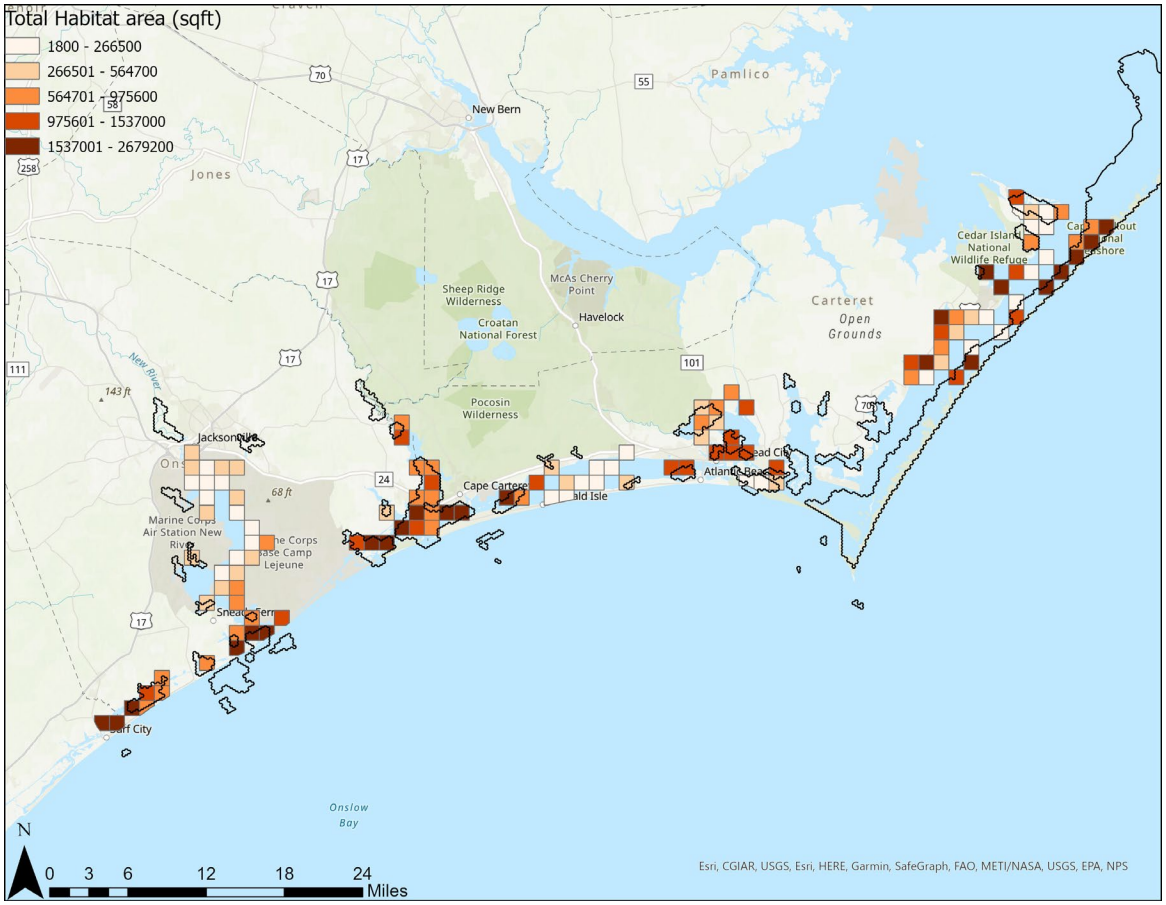

Figure 6. Acres of mapped wetlands, SAV, and shell bottom in Region 3 sampling grids.

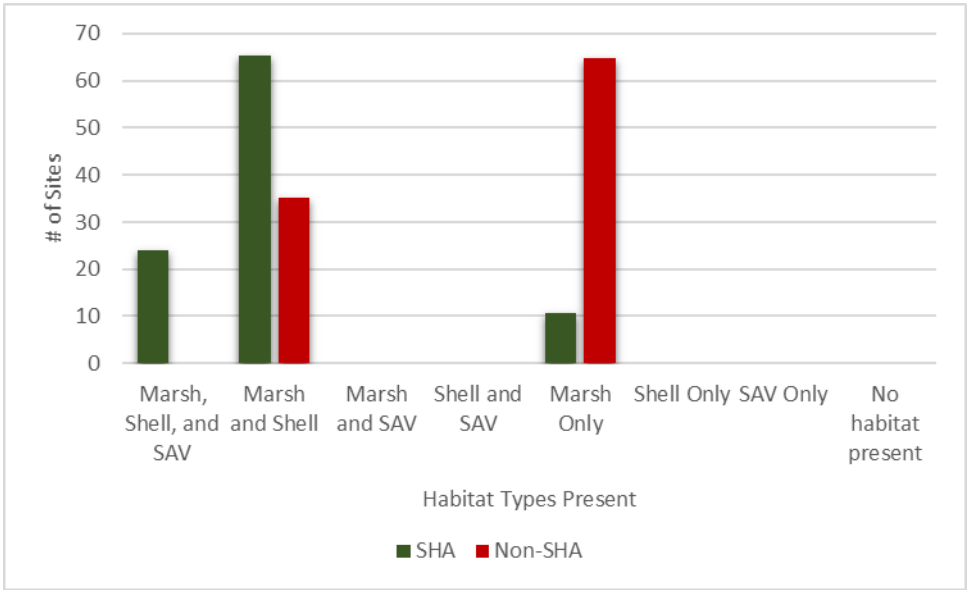

Figure 7. In Region 4, number of sites with different habitat combinations present within SHA and non-SHA sampling grids, 2020-2021.

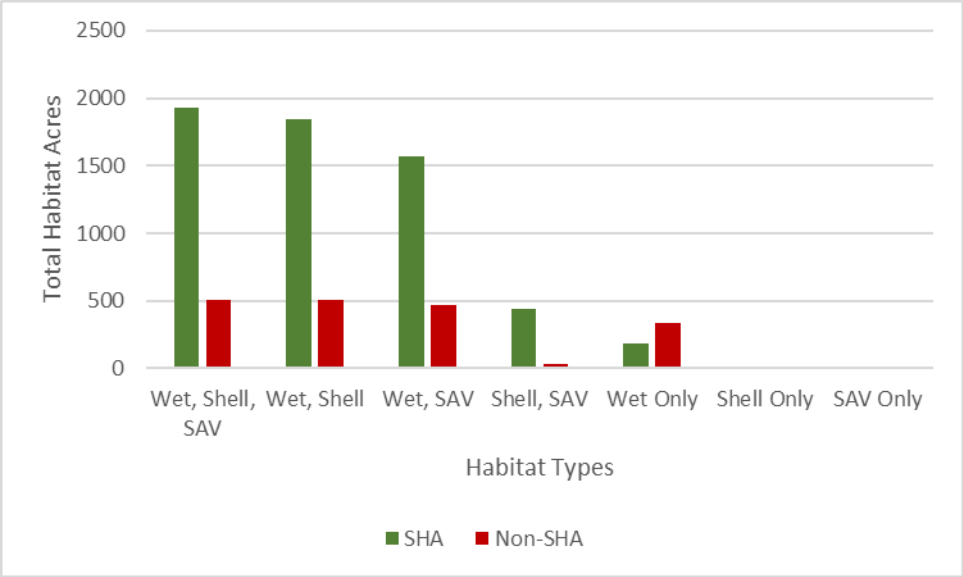

Figure 8. In Region 4, acres of habitats present within SHA and non-SHA sampling grids, 2020-2021.

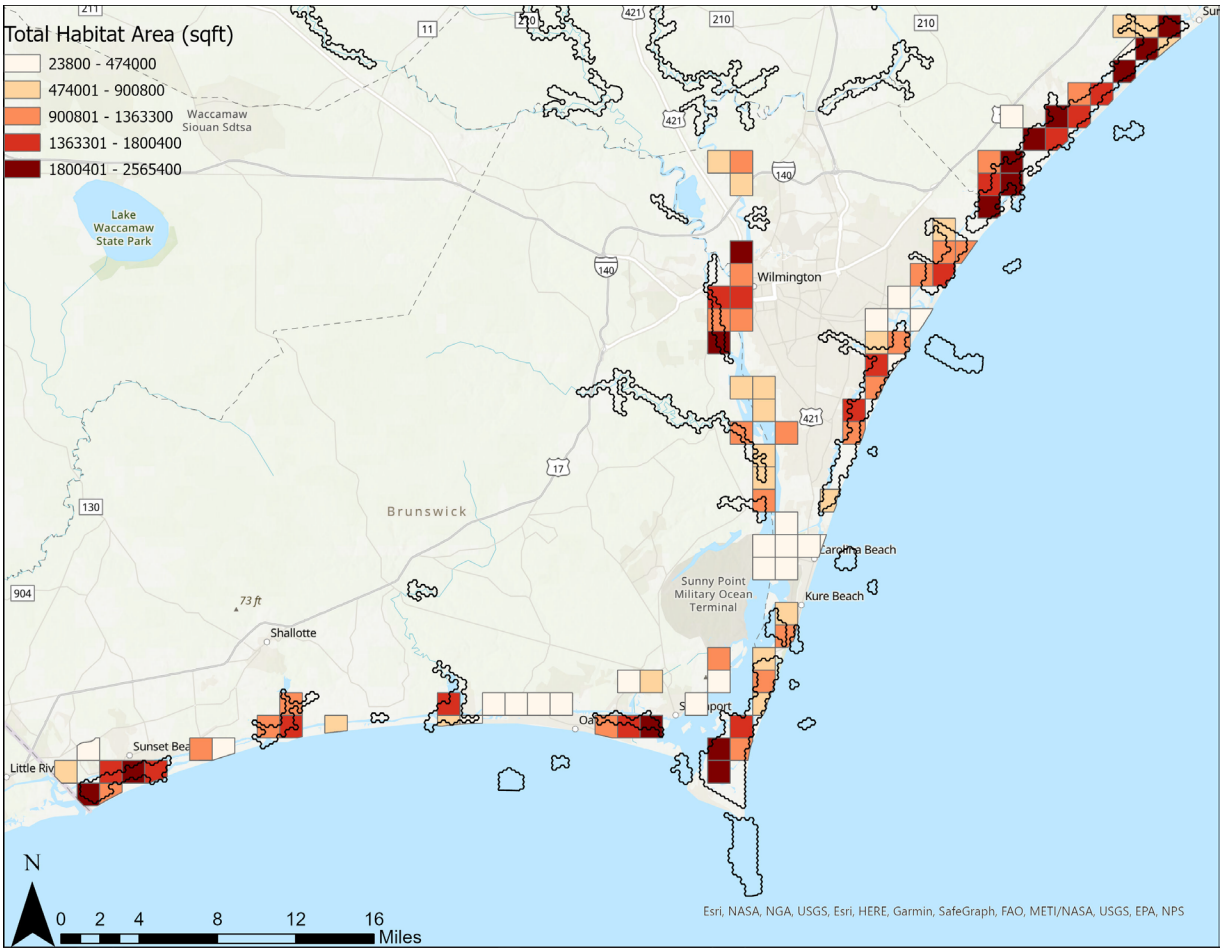

Figure 9. Acres of mapped wetlands, SAV, and shell bottom in Region 4 sampling grids.

Shoreline alterations

In Region 3, the extent of the eroded edge and percent hardened shoreline (Figures 10 and 11) was greater in non-SHAs than SHAs. This is the expected response to disturbed or altered habitat (Table 10). There were more SHA sites with 0-25% eroded edge than non-SHA sites, and there were more non-SHA sites with 26-100% eroded edge. In terms of shoreline hardening, SHA sites had more sites than non-SHA sites with low amounts of hardening ranging from 0-50%, whereas non-SHAs had more sites than SHAs with hardening 51-100%. There was mixed or small difference between SHAs and non-SHA shorelines modified with docking facilities or shoreline stabilization (Figure 12).

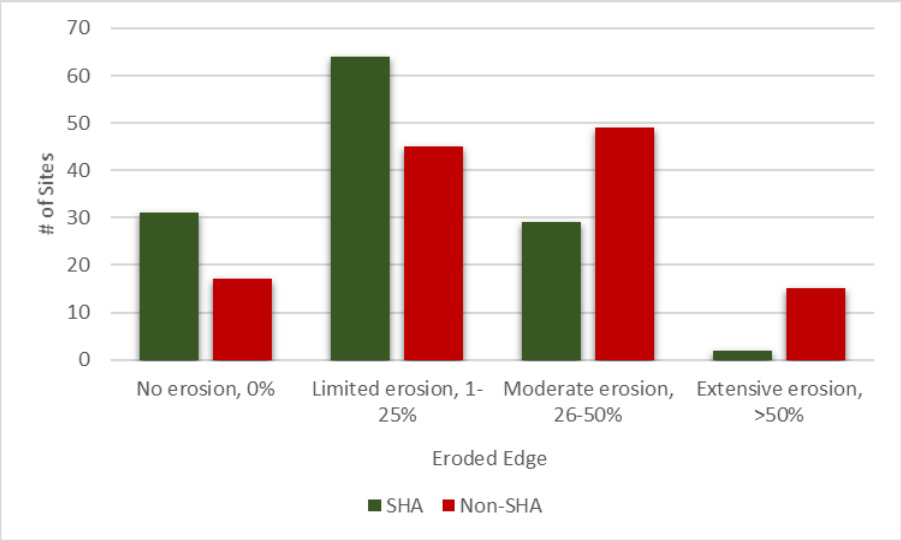

Figure 10. In Region 3, number of sites with varying extent of eroded edge within SHA and non-SHA sampling grids, 2018-2019.

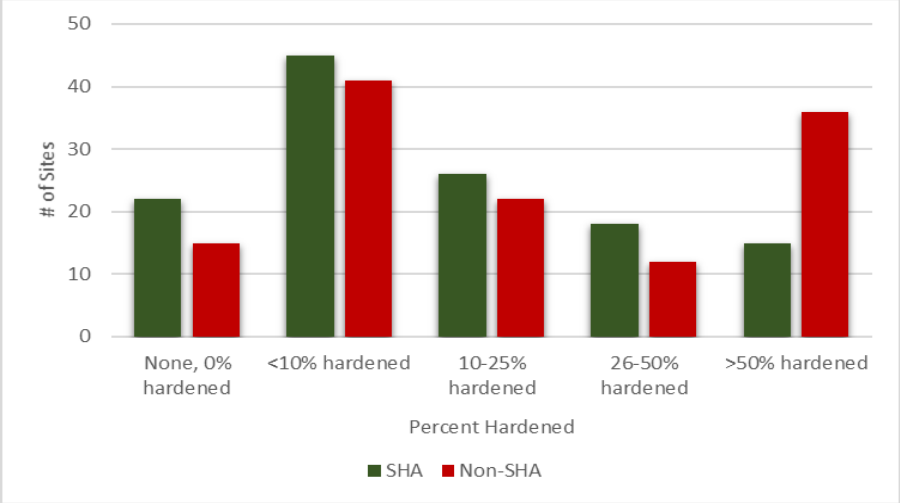

Figure 11. In Region 3, number of sites with varying extent of hardened shoreline or shoreline with engineered structures (eg. bulkheads, riprap) within SHA and non-SHA sampling grids, 2018-2019.

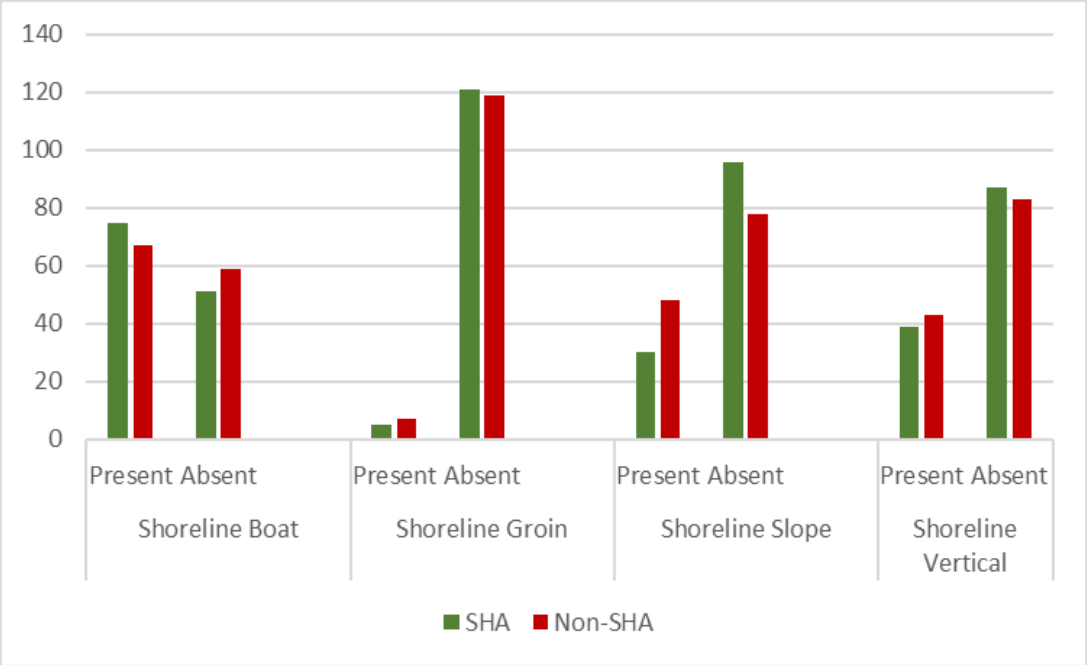

Figure 12. In Region 3, number of sites with varying types of shoreline alterations within SHA and non-SHA sampling grids, 2018-2019. Boat = marinas, channels, docking facilities; Groin = shore perpendicular structures; Slope = non-vertical shoreline stabilization structures such as riprap; Vertical = vertical shoreline stabilization structures such as bulkheads.

In Region 4, a similar number of SHA and non-SHA sites had no visible erosion (Figure 13). SHAs had a slightly greater number of sites with limited eroded edge (1-25%), and fewer sites with moderate (26-50%) and extensive (>50%) eroded edge. Except for "no eroded edge", this is consistent with the expected response. There was minimal difference in the percent of shoreline hardening between SHAs and non-SHAs where less than 10%. Sites with 10-25% were more common in SHAs than non-SHAs. Non-SHA sites had a larger proportion of sites with more extensive hardened shoreline (25-100%) than SHAs (Figure 14).

There was an inconsistent relationship between SHA status and types of engineered shoreline (Figure 15). Docking facilities, groins, and bulkheads occurred to slightly greater extent in SHAs than non-SHAs, but sloped shorelines occurred more in non-SHAs. This is not consistent with what was expected, however the differences were not great. The results suggest that SHAs in Region 4 were more developed and thus altered than SHAs in Region 3 and not significantly different from non-SHAs in Region 4.

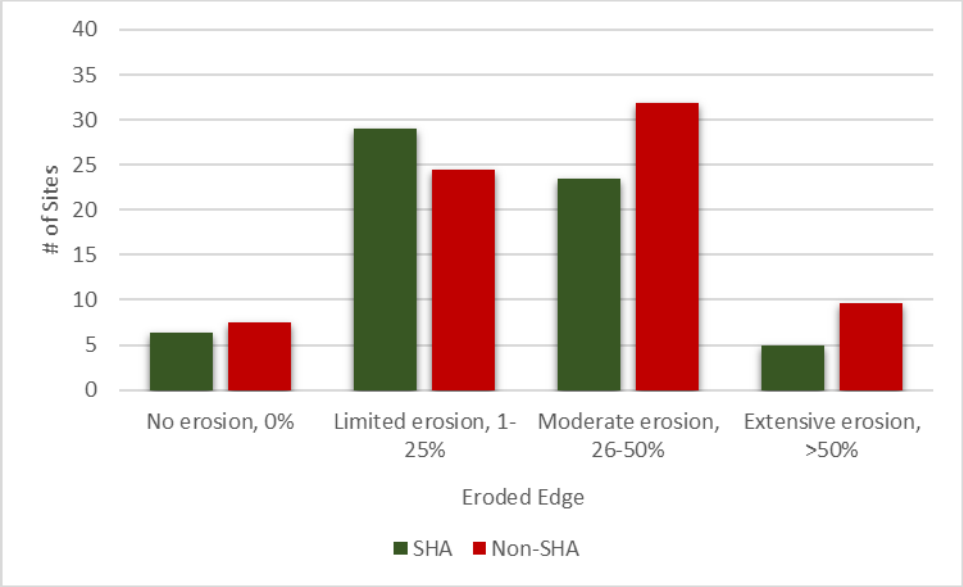

Figure 13. In Region 4, number of sites with varying extent of eroded edge within SHA and non-SHA sampling grids, 2020-2021.

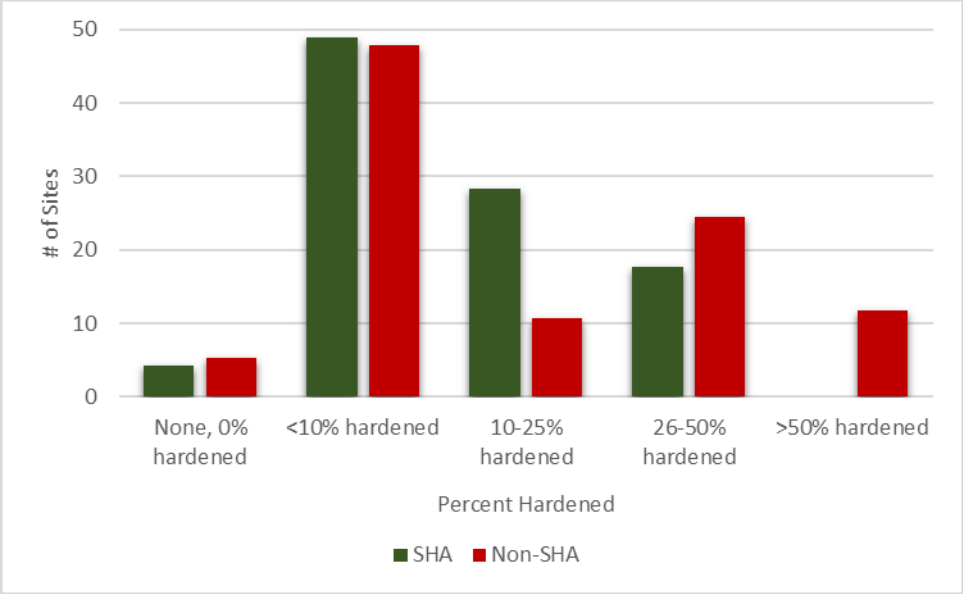

Figure 14. In Region 4, number of sites with varying extent of hardened shoreline or shoreline with engineered structures (eg. bulkheads, riprap) within SHA and non-SHA sampling grids, 2020-2021.

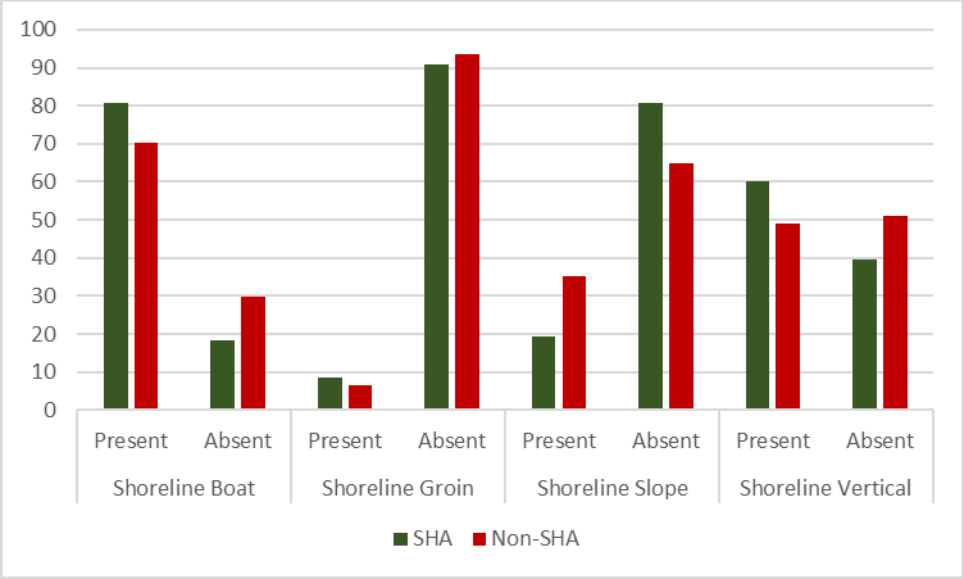

Figure 15. In Region 4, number of sites with varying types of shoreline alterations within SHA and non-SHA sampling grids, 2020-2021. Boat = marinas, channels, docking facilities; Groin = shore perpendicular structures; Slope = non-vertical shoreline stabilization structures such as riprap; Vertical = vertical shoreline stabilization structures such as bulkheads.

Fish Community

Several metrics were calculated to assess and compare fish community structure in SHAs and non-SHAs. Table 6 summarizes by gear type, whereas Table 7 combines gears. Multigear mean standardization or mean standardized catch (MSC) was calculated to allow standardized catch per unit effort data from different sampling gears to be combined (Gibson-Reinemer et al. 2016).

Trawl nets had the highest total number of species and total number of individuals per stratum relative to other sampling gear used (Table 6). Gill nets had the highest total biomass. Despite the differences, using three gear types provided a more complete characterization of fish use in an area since the gears target fish with different life history stages and habitat preferences. For example in Region 3, 36% of the species caught in trawls, 47% of the species caught in gill nets, and 24% of the species caught in Breder traps were only caught in that one gear. In Region 4, 65% of species caught in trawls, 48% caught in gill nets, and 33% caught in Breder traps were only caught in that one gear. Using multiple sampling gears is therefore necessary to accurately assess the diversity of the fish community at different life stages. A complete list of species collected in Regions 3 and 4 is provided in Appendices A and B.

Table 6. Total number of collected species, individuals per stratum, and biomass per stratum by region and SHA status.

		Region 3		Region 4	
Sample Gear	Metric	SHA	Non-SHA	SHA	Non-SHA
Breder trap	# of species	50	42	46	37
	# individuals per stratum	6,376	3,486	9,108	2,609
	Biomass per stratum (kg)	9.0	3.1	23.2	8.0
Trawl net	# of species	87	55	82	53
	# individuals per stratum	17,059	19,373	15,160	6,335
	Biomass per stratum (kg)	72.1	72.9	65.1	33.6
Gill net	# of species	59	62	58	40
	# individuals per stratum	1,645	2,804	1,333	658
	Biomass per stratum (kg)	330.3	447.8	454.4	235.6

Table 7. Number of species caught in only one gear type, by region.

	Region 3			Region 4		
Sample Gear	# of species collected	# of spp unique to single gear	% species unique	# of species collected	# spp unique to single gear	% species unique
Trawl Net	99	36	36	93	60	65
Gill Net	79	37	47	69	33	48
Breder Trap	63	15	24	52	17	33
Total	156	88	56	146	110	75

Looking at results with gears combined, Region 3 results were as expected from literature on fish community assessments. SHAs had greater richness, abundance (MSC), and slightly greater evenness than non-SHAs (Table 8). The three diversity indices used all found greater diversity in SHAs than non-SHAs, although differing in extent. The formulas give different weight to rare species, with the Hill-Shannon diversity index being intermediate between Shannon and Hill-Simpson. The Hill-Shannon diversity index may therefore be the best overall diversity index. Simpson Dominance is a measure of dominance of a few species in contrast to evenness in a population. Region 3 non-SHAs had a slightly greater dominance index.

Table 8. Preliminary analysis of P215 Strategic Habitat Area Region 3 (2018-2019) and 4 (2020-2021) sampling data for fish community diversity indices. Expected response is what is expected in the literature with decreasing habitat suitability.

Diversity Index	Region 3		Region 4		Expected Response
	SHA	Non-SHA	SHA	Non-SHA	
Richness	130	108	126	84	↓
Evenness	0.57	0.56	0.56	0.68	↓
Total MSC[1]	161.39	147.61	190.86	71.14	↓
Shannon Diversity	2.79	2.63	2.72	3.00	↓
Hill-Shannon Diversity	16.27	13.82	15.21	20.12	↓
Hill-Simpson Diversity	8.12	7.97	7.53	12.24	↓
Simpson Dominance	0.12	0.13	0.13	0.08	↑

[1] MSC = Mean Standardized Catch, added across all gears

In Region 4, results were mixed (Tables 6, 7, 8). The SHAs had much higher MSC and richness than non-SHAs, especially when compared to the differences observed in Region 3. However evenness, and the three diversity indices were lower in the SHAs. To determine if the higher diversity in non-SHAs was being driven by the environmental variability within the Cape Fear River, data was rerun with river grids excluded. Results found that the non-SHAs still had higher diversity indices and the SHAs still had higher abundance and more dominant species structure (less even).

In Region 4, MSC in SHAs was over 2.5 times greater than in non-SHAs, and species richness was 50% greater in SHAs than non-SHAs (Table 8). Because that much greater MSC in Region 4 SHAs was not distributed evenly among species, Region 4 SHAs were less even, which resulted in lower scores than Region 4 non-SHAs on the diversity indexes that weight for evenness. The large differences in MSC and species richness indicate that the Region 4 SHAs are providing disproportionate benefits to fish despite scoring lower than non-SHAs on diversity indexes.

Species abundance (mean standardized catch) for the top 25 species in SHAs for both regions is shown in Table 9. In Regions 3 and 4 SHAs, 90% of the top ten species occurred in both regions, including Pinfish, Spot, Atlantic Menhaden, Atlantic Croaker, and Blue Crab. Silver Perch, Brown and White Shrimp, Southern Flounder, and Bluefish were within the top 20 species in both regions. In comparing species abundance in SHAs and non-SHAs, most species in SHAs had higher abundance than in non-SHAs.

Table 9. Total MSC in Regions 3 and 4, ranked by MSC (top 25 species).

Region 3				Region 4			
Scientific name	Common Name	SHA MSC	Non-SHA MSC	Scientific name	Common Name	SHA MSC	Non-SHA MSC
Lagodon rhomboides	Pinfish	41.9	17.9	Leiostomus xanthurus	Spot	59.0	12.3
Leiostomus xanthurus	Spot	31.3	36.1	Lagodon rhomboides	Pinfish	21.7	3.0
Palaemonetes spp.	Grass Shrimps	10.1	7.6	Anchoa spp.	Anchovies	14.0	9.9
Brevoortia tyrannus	Atlantic Menhaden	9.2	24.0	Palaemonetes spp.	Grass Shrimps	12.5	7.8
Anchoa spp.	Anchovies	9.2	18.3	Micropogonias undulatus	Atlantic Croaker	12.2	6.0
Fundulus heteroclitus	Mummichog	8.5	2.8	Fundulus heteroclitus	Mummichog	11.7	4.1
Micropogonias undulatus	Atlantic Croaker	5.6	7.2	Nassarius spp.	Black Mud Snails	10.7	0.5
Callinectes sapidus	Blue Crab	5.4	6.0	Brevoortia tyrannus	Atlantic Menhaden	6.7	3.5
Nassarius spp.	Mudsnails	3.4	2.2	Bairdiella chrysoura	Silver Perch	6.0	1.6
Farfantepenaeus aztecus	Brown Shrimp	3.3	2.5	Callinectes sapidus	Blue Crab	3.5	2.4
Pomatomus saltatrix	Bluefish	3.0	4.6	Paralichthys lethostigma	Southern Flounder	2.7	0.9
Eucinostomus argenteus	Spotfin Mojarra	2.6	0.5	Rhizoprionodon terraenovae	Atlantic Sharpnose Shark	2.1	0.8
Carcharhinus limbatus	Blacktip Shark	2.6	1.0	Pogonias cromis	Black Drum	2.1	0.8
Cyprinodon variegatus	Sheepshead Minnow	2.5	0.0	Sciaenops ocellatus	Red Drum	1.9	1.5
Bairdiella chrysoura	Silver Perch	2.2	1.4	Mugil cephalus	Striped Mullet	1.8	2.4
Opisthonema oglinum	Atlantic Thread Herring	1.9	0.7	Farfantepenaeus aztecus	Brown Shrimp	1.8	1.6
Penaeus spp.	Penaeus Shrimps	1.9	0.0	Lepisosteus osseus	Longnose Gar	1.6	1.6
Paralichthys lethostigma	Southern Flounder	1.4	1.0	Cynoscion nebulosus	Spotted Sea Trout	1.5	0.8
Orthopristis chrysoptera	Pigfish	1.2	0.4	Litopenaeus setiferus	White Shrimp	1.4	1.6
Litopenaeus setiferus	White Shrimp	1.0	0.8	Pomatomus saltatrix	Bluefish	1.3	1.1
Elops saurus	Ladyfish	0.8	0.7	Synodus foetens	Inshore Lizardfish	1.0	0.2
Synodus foetens	Inshore Lizardfish	0.6	0.3	Citharichthys spilopterus	Bay Whiff	1.0	0.2
Gastropoda	Gasstropods	0.6	0.1	Eucinostomus argenteus	Spotfin Mojarra	0.9	1.0
Sciaenops ocellatus	Red Drum	0.6	0.3	Elops saurus	Ladyfish	0.8	0.5
Tozeuma carolinense	Arrow Shrimp	0.5	0.1	Orthopristis chrysoptera	Pigfish	0.8	0.4

Abundance and diversity indices within individual grids in Regions 3 and 4 are shown in Figures 16-19. While this can be useful to visually assess fish community spatially within the region and verify productivity in and outside of SHAs, sampling was not stratified by waterbody or season, so individual grids were not resampled over time, and values may be misleading. At a glance, SHAs appear to have equal or higher values in most areas. One exception is in Region 3, in the upper New River (Northeast Creek vicinity). This area was not selected as a SHA but had high abundance and diversity values. Structured habitat area was not predictive of abundance, richness, diversity, or evenness (very small R-squared values), though given the lack of seasonal controls in the study design, that result is unsurprising. Additional analysis of the collected habitat data (eg. marsh, oyster, and SAV density) or landscape characteristics could provide further indication of in-situ conditions.

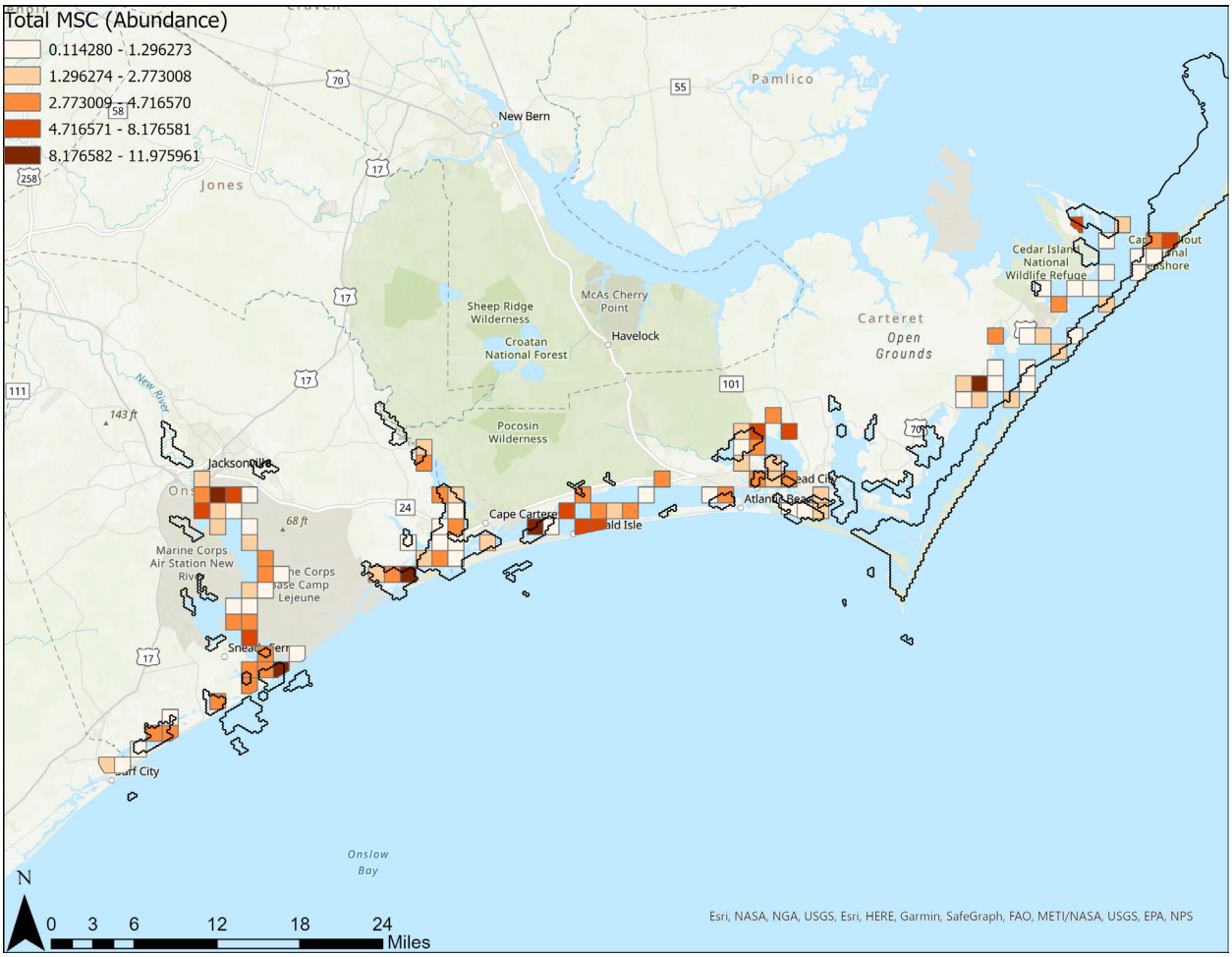

Figure 16. Mean Standardized Catch in Region 3 sampling grids.

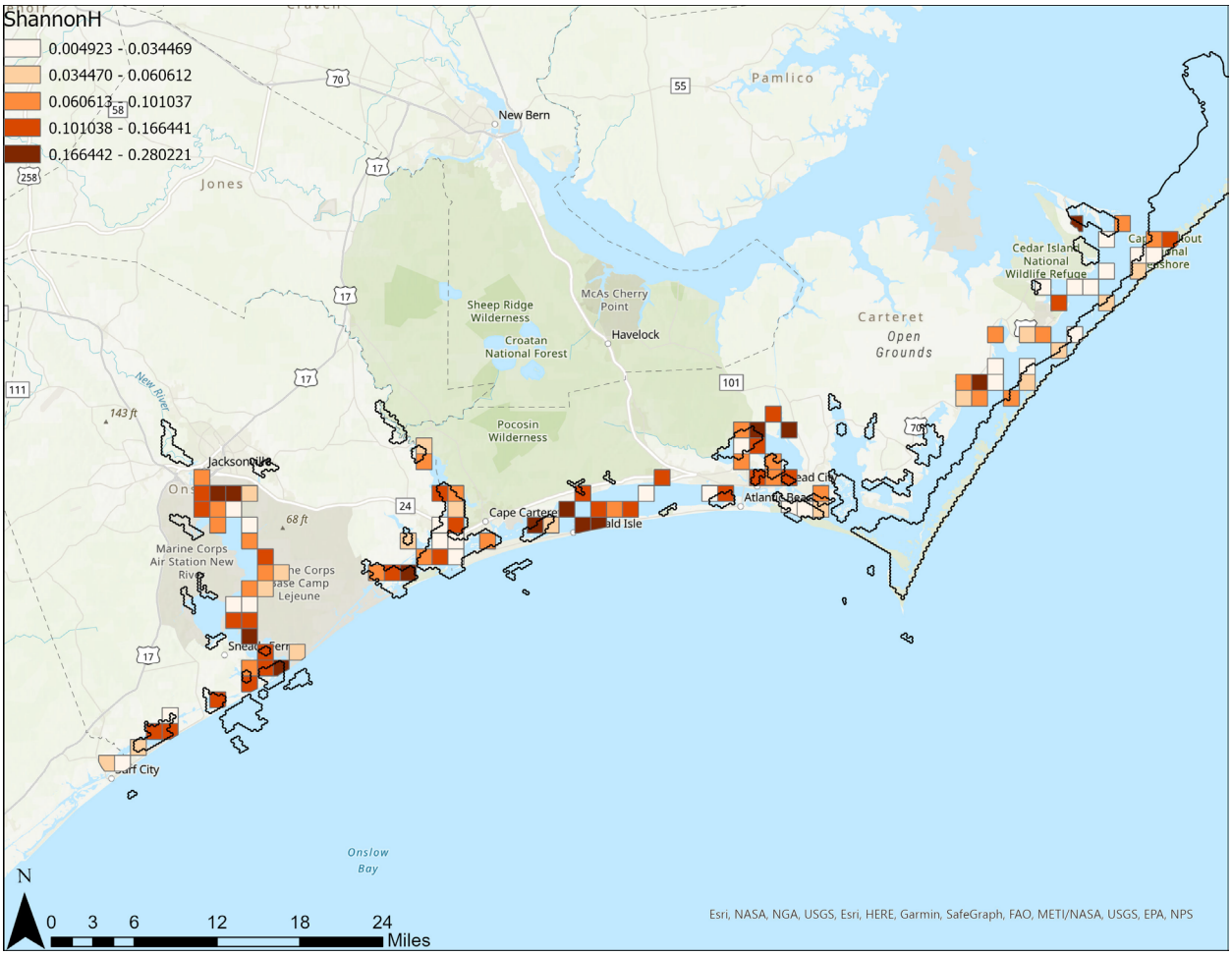

Figure 17. Shannon Diversity Indices in Region 3 sampling grids.

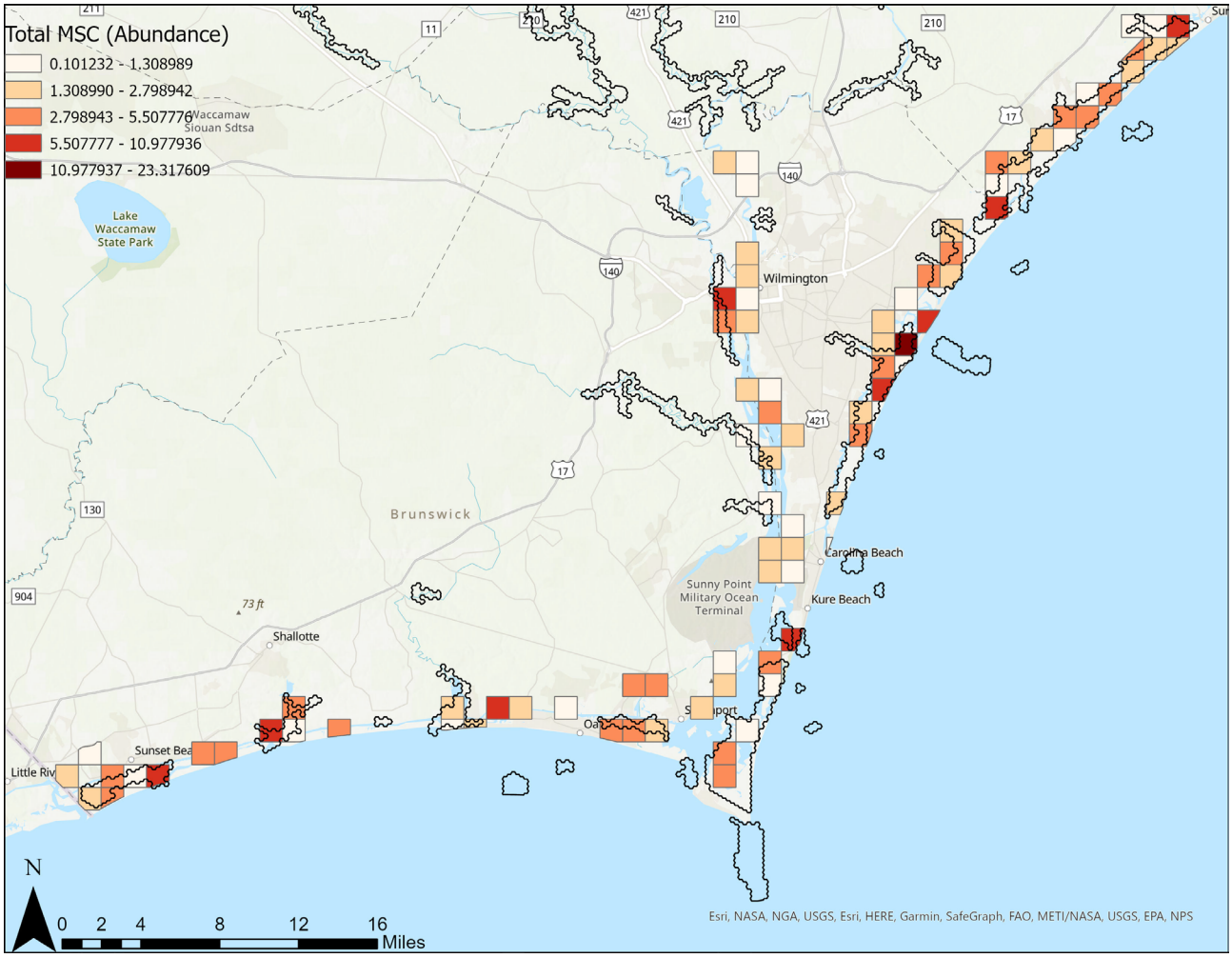

Figure 18. Mean Standardized Catch in Region 4sampling grids.

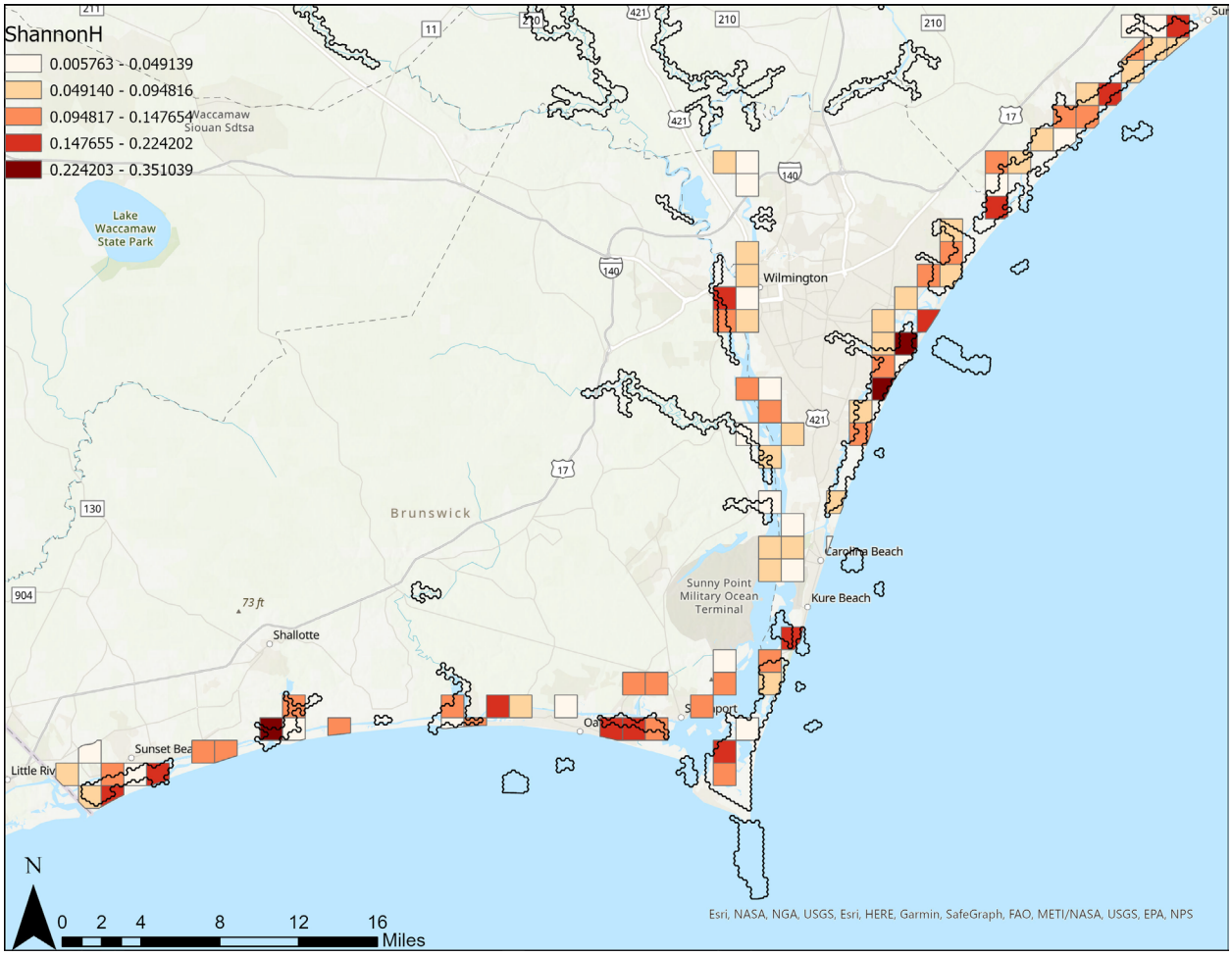

Figure 19. Shannon Diversity Indices in Region 4 sampling grids.

A rank abundance curve is another means of comparing community structure in SHAs and non-SHAs, where the x-axis is the rank of species abundance (1 having the highest abundance), and the Y-axis is the species abundance (mean standardized catch). The high MSC in the Region 4 SHA was due to an extremely high catch of spot. Removing spot from the data reduced the magnitude of difference in diversity indices and dominance between SHAs and non-SHAs in Region 4, although non-SHAs still scored higher on diversity indices and lower on the dominance index. All strata exhibited low evenness, as noted by the steep slope.

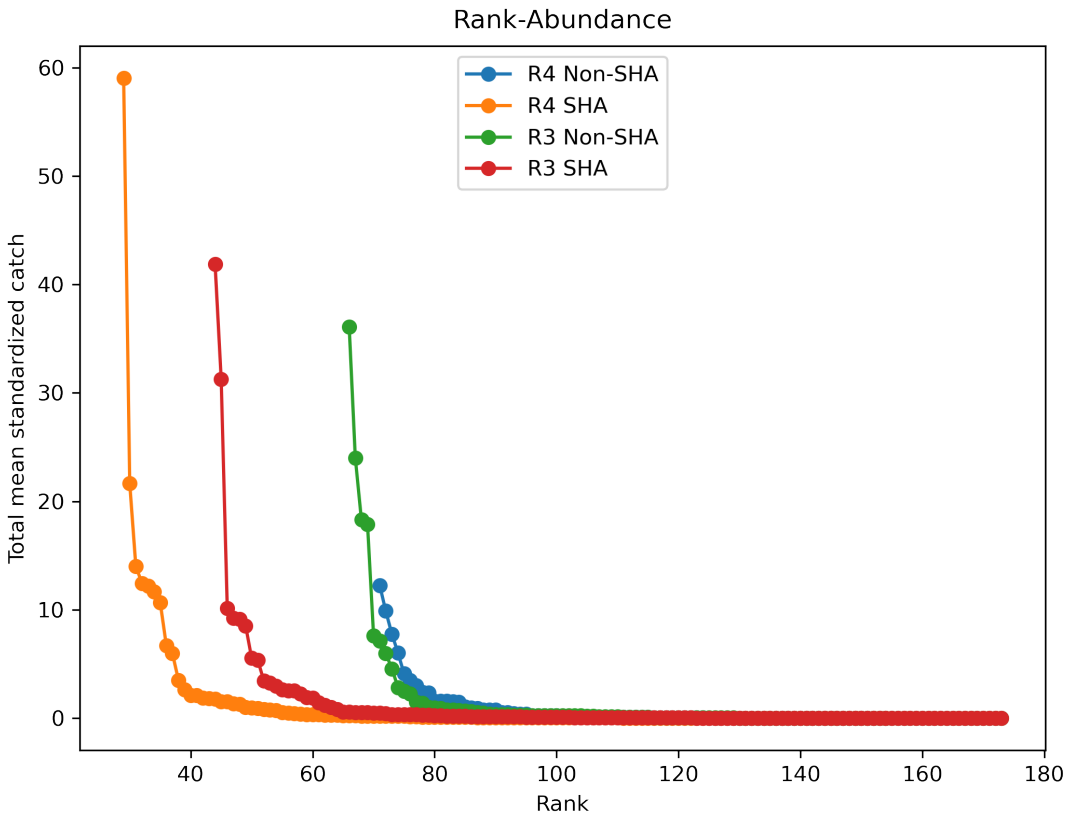

Figure 20. Difference in rank-abundance by region and SHA status.

Overall, with two years of sampling per region, SHAs in both Regions 3 and 4 supported more fish (greater total abundance) and more species (richness) than the non-SHAs. Region 3 SHAs had greater diversity indices than non-SHAs, but a reverse pattern was observed in Region 4, likely because of the much greater abundance in Region 4 SHAs. However the difference in diversity between the SHAs and non-SHAs was not extremely large. In conclusion, SHAs in Regions 3 and 4 were highly productive and supported a greater number of less common species, indicating that SHAs function largely as expected.

Objective 2: Develop fish and habitat indicator metrics

Individual ecological indicators that appear useful based on this project include:

- A measure of total abundance (mean standardized catch, CPUE)
- Richness
- Evenness
- Hill-Shannon Diversity
- Acreage of structured habitat within a system
- Eroded edge
- Shoreline hardened (possibly)
- Mean alteration score (an index of alterations)

The multimetric index, which takes into account both fish and habitat metrics, has been extensively developed and applied to assess ecological status and is considered more accurate and comprehensive than any single metric index such as those discussed above (Pérez-Domínguez et al. 2012; Smoliński and Całkiewicz 2015). With assistance from DMF's stock analyst, the Region 3 data were used to develop an SOP for a multi-metric index of habitat condition (Smolnski and Calkiewicz 2015). Development of the multimetric index includes five steps in general: (1) determining a list of candidate metrics; (2) selecting metrics by reducing redundancy among candidate metrics and identifying the metrics that show a significant response to a pre-defined proxy of human disturbance; (3) defining the scoring system for each selected metric; (4) defining the combination rule that produces the final multimetric index; and (5) validating the multimetric index.

The set of candidate metrics and the potential direction of each metric responding to the overall human disturbance was determined on a basis of expert opinions. The list contained 21 metrics that inform the overall fish community (global metrics) and habitat conditions including the metrics previously discussed, as well as feeding guilds of fish species (Table 10). The selection of metrics involves reducing the redundancy among candidate metrics and modeling of each metric. A total of nine metrics were selected by the modeling exercise and expert opinion (Table 10). A five-grade scoring system ranging from 1 (the worst ecological status) to 5 (the best ecological status) was defined for each selected metric, and a score was assigned to each observation based on this scoring system of the metric (Delpech et al. 2010; Smoliński and Całkiewicz 2015).

The final multimetric index was calculated for each observation by combining the scores of all selected metrics, in which scores of all metrics were summed and divided by the maximal potential score (five times the number of selected metrics; Delpech et al. 2010; Smoliński and Całkiewicz 2015). The final multimetric index ranges between 0 and 1, with a value of 0 for the worst ecological status and a value of 1 for the best ecological status. A fitted GLM model was used to predict the metric values in three disturbance levels based on alteration scores calculated during the SHA GIS-based analysis (SHA final reports, Figures 24 and 25). The multimetric index effectively validated most of the nominated SHAs in CHPP Region 3 and 4, with higher index values in SHAs than the non-SHAs. These results suggest the multimetric index can perform as an effective indicator for human disturbance. For additional information, see Appendix B. After reviewing all data, some modifications appear needed to the Region 3 analysis and for the Region 4 analysis. Because the multimetric index is designed to incorporate both fish and habitat data, at least one global metric should be included, such as abundance or a diversity measure. Presence of riprap and vertical structures is duplicative of extent of hardened shoreline and therefore should be excluded. Presence of shoreline boating facilities should be excluded since it did not appear to have a consistent effect on SHAs.

Development of the multimetric index could continue with modifications for Region 3 and 4. The same method, with minor modification could be applied to other SHA regions or the evaluation of other nominations or designations once sampling has been conducted. However, to be comparable across regions, similar metrics should most likely be used.

Table 10. List of candidate metrics and their expected response to increasing human disturbance. Bolded metrics = nine selected for multi-metric index.

	Candidate metric	Variable type	Expected response	Model Selected
Global				
1	Total abundance	Count	↓	No
2	Total number of species (richness)	Count	↓	No
3	Shannon's diversity	Continuous	↓	No
4	Evenness	Continuous	↓	No
5	Simpson's dominance	Continuous	↑	No
Habitat conditions				
6	Water clarity	Continuous	↓	No
7	**Presence of shoreline basins, marinas and/or boat ramps**	Binary	↑ (present)	**Yes**
8	Presence of rock or wood structures perpendicular to shore	Binary	↑ (present)	No
9	**Presence of low profile rock (riprap) or wood structure parallel to shore**	Binary	↑ (present)	**Yes**
10	**Presence of vertical structures (i.e. bulkheads)**	Binary	↑ (present)	**Yes**
11	**Presence of shell habitat**	Binary	↓(present)	**Yes**
12	**Presence of marsh habitat**	Binary	↓(present)	**Yes**
13	**Presence of submerged aquatic vegetation**	Binary	↓(present)	**Yes**
14	**Extent of hardened shoreline**	Categorical	↑	**Yes**
15	**Extent of eroded edge**	Categorical	↑	**Yes**
Feeding guilds				
16	Abundance of piscivorous species	Count	↓	No
17	Number of piscivorous species	Count	↓	No
18	**Abundance of invertivorous species**	Count	↓	**Yes**
19	Number of invertivorous species	Count	↓	No
20	Abundance of omnivorous species	Count	↑	No
21	Number of omnivorous species	Count	↑	No

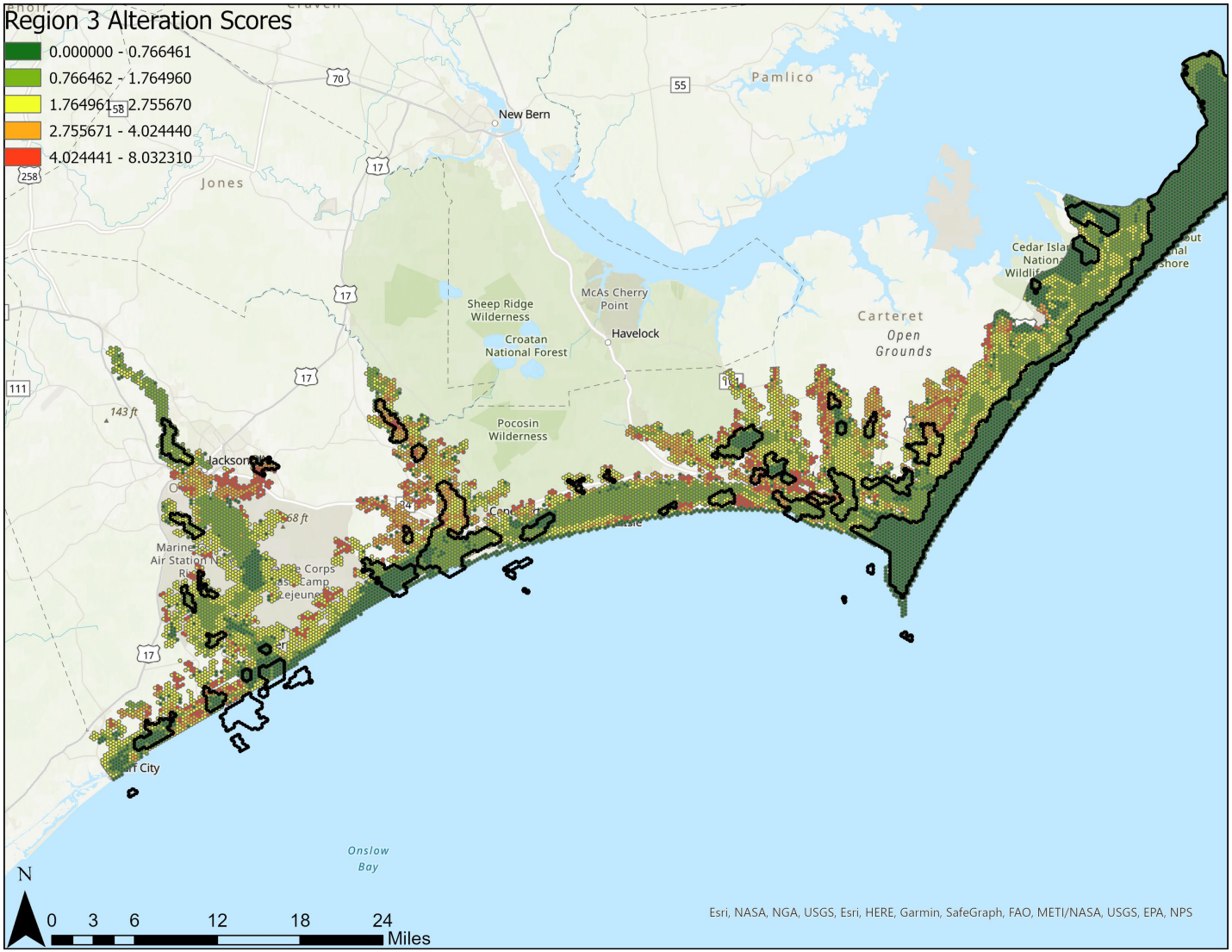

Figure 24. Alteration scores within Region 3 SHAs, with lowest scores (green) representing least alteration and highest priority for protection.

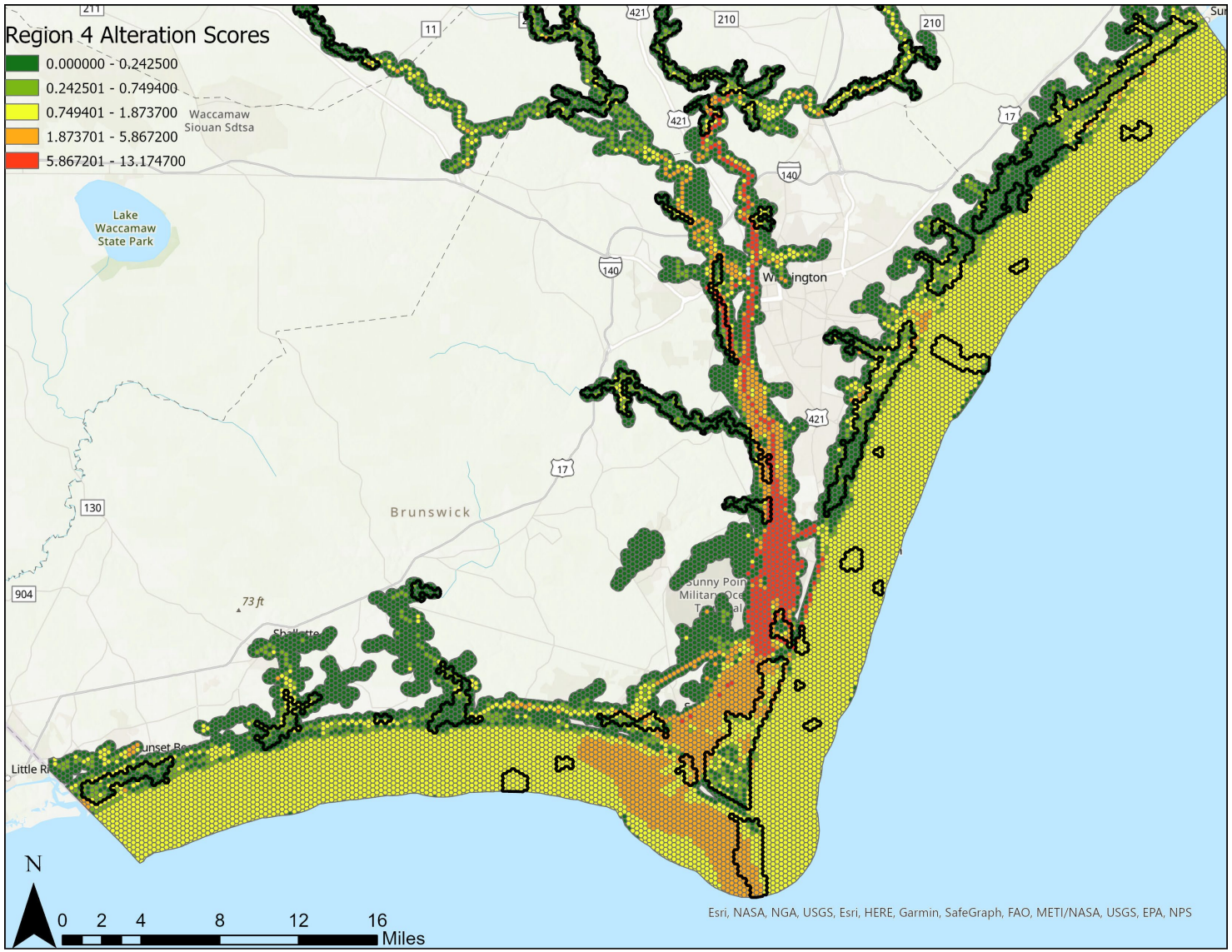

Figure 25. Alteration scores within Region 4 SHAs, with lowest scores (green) representing least alteration and highest priority for protection

Objective 3: Produce SOP for future monitoring and possible modification of SHA nominations based on indicator performance

Program documentation was completed for this project to provide direction for future sampling. It was approved and is located in the FIMSS folder on the DMF Lan. Specific SOPs are also complete and available.

Sampling in the Cape Fear River (Region 4) has been beneficial as it revealed the need to adjust some monitoring methods in riverine systems due to the different shoreline profiles and wetland types. Due to these differences, upstream riverine grids were excluded from the sampling universe. In regions dominated by this habitat type additional methodologies and gears will need to be considered. For example, there was generally not a shallow area to set Breder traps, and logs in the river made trawling difficult. Fyke nets would be able to capture fish leaving the wetlands, but require more labor and time to set. While the gear type can vary between areas, it should be effective and appropriate for the site conditions and at least two different gear types to capture different life stages of a variety of species.

In Regions 1 and 2, that are dominated by large sounds and rivers and where existing fish sampling occurs almost year-round, we recommend that fish data collected from existing programs substitute for the fish sampling conducted in Regions 3 and 4, but be augmented with sampling in closer proximity to structured habitats, particularly during periods of recruitment. This could consist of Breder traps or seine nets. Additionally, habitat metrics collected during this project should be added. This will require sampling in or near structured habitats. Sampling in habitat areas that already receive robust protection from fishing and development, and water quality impacts should be of secondary importance since data are not likely to result in any additional improvements.

Region 1

In Region 1, existing and future fish data from Programs 100, 135, and 150 could potentially be used, with supplemental collection and analysis of habitat metrics. These programs rely on trawls, gill nets, and seines. In addition to habitat presence that can be determined from mapping efforts and regularly collected environmental parameters, data could be collected on eroded edge, percent hardened shoreline, wetland characteristics, and water clarity. All of the Roanoke and Chowan river systems were nominated as SHAs due to the understanding that protecting only pieces of the rivers will be inadequate in systems where connectivity is critical for adults migrating upstream to spawn and resulting larvae and juveniles migrating downstream. Because of this, sampling could exclude the rivers and focus on the mouths of those two rivers mouths and the remaining portion of Region 1. Since there are no SHAs within the center of Albermarle Sound, the grid system could exclude that area.

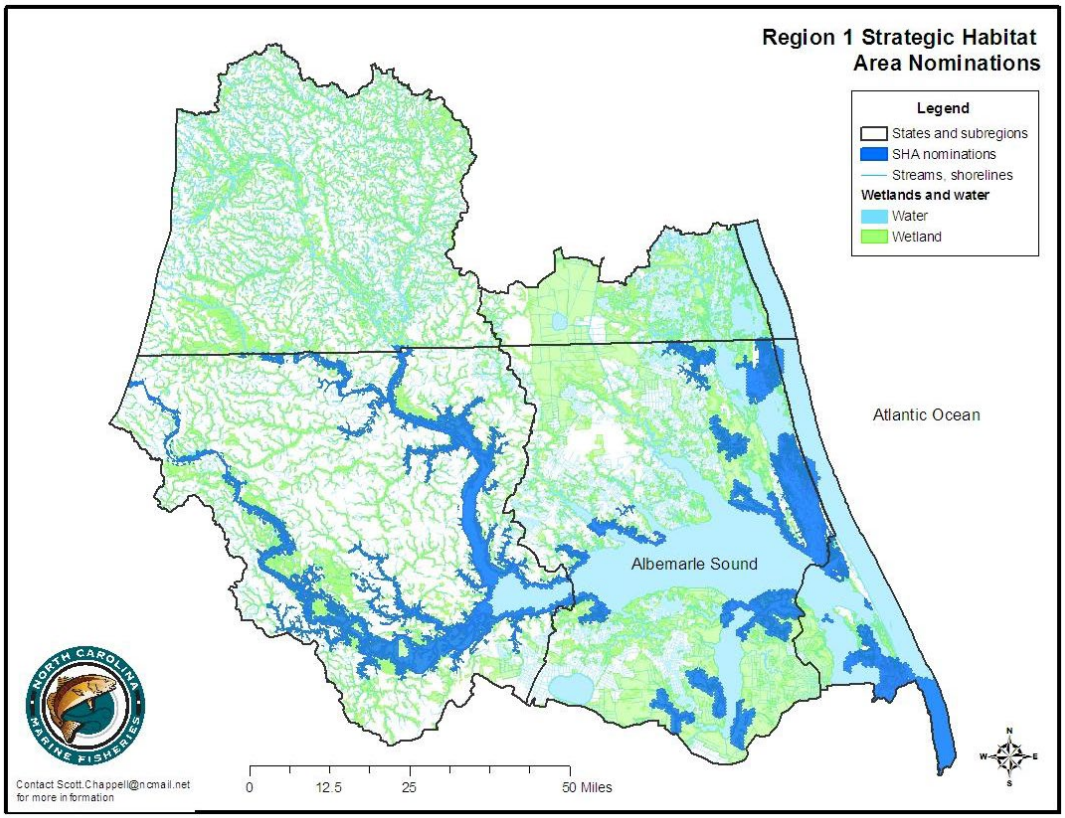

Figure 26: Region 1 Strategic Habitat Area nominations.

Region 2

Existing and future fish data from Programs 120, 915, 610, 611, and 195 could potentially be used for the multimetric index. Because Program 195 only samples twice a year in the open waters of Pamlico Sound, Neuse and Pamlico rivers, and there are minimal SHAs within these open waters, it may not be needed for SHA analysis. For programs 120 and 915, in addition to habitat presence that can be determined from mapping efforts, and regularly collected environmental parameters, data could be collected on eroded edge, percent hardened shoreline, wetland characteristics, and water clarity. SHAs around the perimeter of the sound primarily consist of subtidal natural and restored oyster reefs (cultch planting and oyster sanctuaries). Sampling metrics and frequency could be reviewed and modified if necessary to obtain adequate fish and oyster habitat metrics. Additional subtidal reefs that were not nominated as SHAs will also need to be sampled. Supplemental collection and analysis of habitat metrics will be needed.

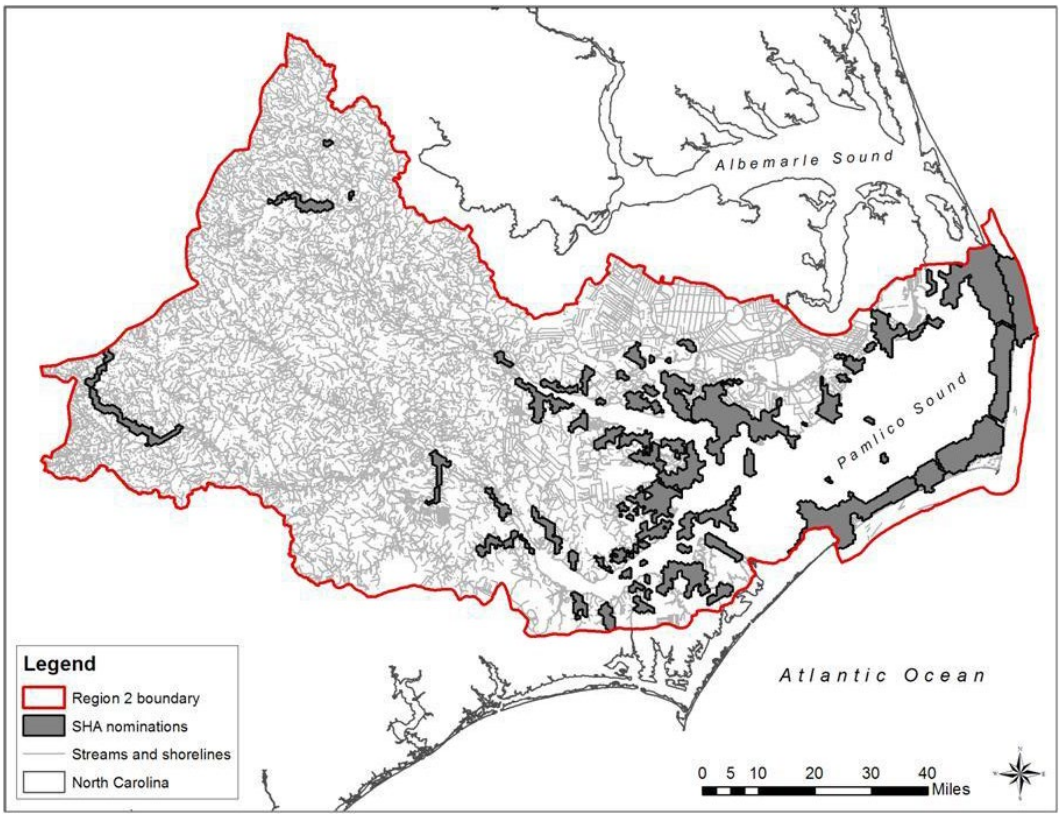

Figure 27: Region 2 Strategic Habitat Area nominations.

Deviations:

In 2022, a No-cost Extension was requested and approved due to staff turn over, with final report due June 30, 2023. Due to loss of stock assessment staff that began the multi-metric analysis, we are not able to complete that portion of the project. However, because the analysis requires collecting all the initial data and that data had informative trends, we recommend not pursuing completion of the multi-metric analysis at this time. Additionally, we did not include recommendations for sampling to determine nursery function of Pamlico Sound, as this would best be determined by a DMF group, considering these results as well as other fishery management information regarding nursery area evaluations.

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APPENDIX A. Species collected by region and gear

Table A.1. Species collected in Region 3, by gear 2018-2019.

Species	Common name	Gear
Alosa aestivalis	blueback herring	G
Alosa mediocris	hickory shad	T,G
Alosa sapidissima	American shad	G
Alpheidae	snapping shrimps - family	T
Alpheus heterochaelis	bigclaw snapping shrimp	T
Ameiurus nebulosus	brown bullhead	T,G
Amphipoda	amphipods	T,B
Anchoa spp.	anchovies	B
Ancylopsetta ommata(=quadrocellata)	ocellated flounder	G
Anguilla rostrata	American eel	B
Anomura paguridae	hermit crabs	T,G,B
Archosargus probatocephalus	sheepshead	T,G
Armases(=Sesarma) cinereum	squareback marsh crab	B
Ascidicea	tunicates	T,G
Aurelia aurita	moon jellyfish	T
Bairdiella chrysoura	silver perch	T,G,B
Brevoortia tyrannus	Atlantic menhaden	T,G
Bryozoa, ectoprocta	bryozoans	T
Busycon carica	knobbed whelk	G
Busycon spp.	whelks (Busycon)	G
Callinectes sapidus	blue crab	T,G,B
Callinectes similis	lesser blue crab	T,B
Caranx hippos	crevalle jack	T,G,B
Carcharhinus acronotus	blacknose shark	G
Carcharhinus isodon	finetooth shark {w}	G
Carcharhinus limbatus	blacktip shark	G
Centropristis striata	black sea bass	T
Chasmodes bosquianus	striped blenny	B
Chilomycterus schoepfii	striped burrfish	T,G
Chione cancellata	cross-barred venus	T
Citharichthys spilopterus	bay whiff	T
Cnidaria	jellyfish	T,G
Crassostrea virginica	eastern oyster	T
Ctenogobius boleosoma	darter goby	B
Ctenogobius shufeldti	freshwater goby	T,B
Ctenophora	comb jellies	T,B
Cynoscion nebulosus	spotted seatrout	G,B
Cynoscion regalis	weakfish	T,G

Cynoscion spp.	seatrouts	G
Cyprinidae	minnows	B

Table A.1. Species collected in Region 3, by gear 2018-2019, continued.

Species	Common name	Gear
Cyprinodon variegatus	sheepshead minnow	B
Dasyatidae	stingrays	G
Dasyatis americana	southern stingray	G
Dasyatis sabina	Atlantic stingray	G
Diapterus auratus	Irish pompano {w}	T,B
Diplodus holbrookii	spottail pinfish	G
Dorosoma cepedianum	gizzard shad	G
Dorosoma petenense	threadfin shad	T,G
Echinodermata	Enchinoderms	T
Echinoidea	sea urchins & sand dollar	T
Elopmorpha ang. anguilloidei	eels	T
Elops saurus	ladyfish	G
Ensis directus	Atlantic jackknife	T
Etropus crossotus	fringed flounder	T
Eucinostomus argenteus	spotfin mojarra	T,B
Eucinostomus spp.	Eucinostomus mojarras	B
Farfantepenaeus aztecus	brown shrimp	T,G,B
Farfantepenaeus duorarum	pink shrimp	T,B
Fundulus heteroclitus	mummichog	B
Fundulus majalis	striped killifish	B
Gambusia holbrooki	eastern mosquitofish	B
Gastropoda	gastropods	T
Glyceridae	bristleworm	T,B
Gobiidae	gobies	T,B
Gobiosoma bosc	naked goby	T,B
Halichoeres bivittatus	slippery dick	T
Hippocampus erectus	lined seahorse	G
Hydrozoa	Hydrozoa	T
Hypsoblennius hentz	feather blenny	T,B
Ictalurus punctatus	channel catfish	T,G
Lagodon rhomboides	pinfish	T,G,B
Leiostomus xanthurus	spot	T,G,B
Lepisosteus osseus	longnose gar	G
Lepomis cyanellus	green sunfish	B
Lepomis macrochirus	bluegill	T,B
Limulus polyphemus	horseshoe crab	G
Litopenaeus setiferus	white shrimp	T,G,B

Littorina spp.	periwinkles	T,B
Lobotes surinamensis	Atlantic tripletail	G
Loligo pealeii	longfin squid	T
Lolliguncula brevis	Atlantic brief squid	T

Table A.1. Species collected in Region 3, by gear 2018-2019, continued.

Species	**Common name**	**Gear**
Lucania parva	rainwater killifish	B
Lutjanus griseus	gray snapper	T,B
Majidae	spider crabs	T,G
Malaclemys terrapin	diamondback turtle	G
Menidia beryllina	inland silverside	T,B
Menidia menidia	Atlantic silverside	T,B
Menidia spp.	Menidia silversides	B
Menippe mercenaria	Florida stone crab	T
Menticirrhus americanus	southern kingfish	G
Menticirrhus saxatilis	northern kingfish	G
Mercenaria spp.	quahogs	T
Microgobius thalassinus	green goby	T
Micropogonias undulatus	Atlantic croaker	T,G,B
Micropterus salmoides	largemouth bass	B
Morone saxatilis	striped bass	G
Mugil cephalus	striped mullet	G,B
Mugil curema	white mullet	T,G,B
Mugil spp.	mullets	G,B
Mustelus canis	smooth dogfish	G
Mycteroperca microlepis	gag	T,G
Mycteroperca spp.	Mycteroperca groupers	T
Myrophis punctatus	speckled worm snake eel	T,B
Mytilidae	Mussels (Mytilidae)	T
Nassarius spp.	mudsnails	T,B
Nudibranchia	sea slugs (Nudibranchs)	T,B
Oligoplites saurus	leatherjack	G
Opisthonema oglinum	Atlantic thread herring	T,G
Opsanus tau	oyster toadfish	T,B
Orthopristis chrysoptera	pigfish	T,G,B
Ovalipes ocellatus	lady crab	G,B
Palaemonetes spp.	grass shrimps-Palaemonete	T,B
Paralichthys albigutta	Gulf flounder	T,G,B
Paralichthys dentatus	summer flounder	T,G,B
Paralichthys lethostigma	southern flounder	T,G,B
Penaeus spp.	prawn shrimps	T,B

Peprilus paru	harvestfish	T
Peprilus triacanthus	butterfish	T,G,B
Periclimenaeus schmitti	Tortugas bigclaw shrimp	T
Phalacrocorax auritus	double-crested cormorant	G
Pleuronectiformes Pleuronectoidei	flounders	T,G
Pogonias cromis	black drum	G

Table A.1. Species collected in Region 3, by gear 2018-2019, continued.

Species	**Common name**	**Gear**
Pomatomus saltatrix	bluefish	T,G
Prionotus carolinus	northern searobin	T,G
Prionotus evolans	striped searobin	T
Prionotus spp.	Prionotus searobins	G
Prionotus tribulus	bighead searobin	T,G
Rachycentron canadum	cobia	G
Rhinoptera bonasus	cownose ray	G
Rhizoprionodon terraenovae	Atlantic sharpnose shark	G
Sciaenops ocellatus	red drum	G
Scomberomorus maculatus	Spanish mackerel	G
Selene vomer	lookdown	T
Sessilia	barnacle	T
Sphoeroides maculatus	northern puffer	T
Sphyraena borealis	northern sennet	T
Sphyrna tiburo	bonnethead hammerhead	G
Squilla empusa	mantis shrimp	T
Stellifer lanceolatus	star drum	T
Stephanolepis hispidus	planehead filefish {u}	T,G,B
Stephanolepis hispidus	planehead filefish {w}	T,G,B
Stomolophus meleagris	cannonball jellyfish	G
Symphurus plagiusa	blackcheek tonguefish	T,B
Symphurus urospilus	spottail	T
Syngnathus fuscus	northern pipefish	T,B
Synodus foetens	inshore lizardfish	T,G
Synodus spp.	Synodus lizardfishes	T,G
Tozeuma carolinense	arrow cleaner shrimp	T
Trachinotus carolinus	Florida pompano	G
Trachinotus falcatus	permit	G,B
Trachypenaeus constrictus	roughneck shrimp	T
Trichiurus lepturus	Atlantic cutlassfish	T
Trinectes maculatus	hogchoker	T,G
Tylosurus crocodilus	houndfish	G
Urosalpinx cinerea	Atlantic oyster drill	T,B

Xanthidae	mud crabs	T,B

Table A.2. Species collected in Region 4, by gear 2020-2021.

Species	Common name	Gear
A. mandibulata crustacea	crustaceans	T
Acanthilia(=Iliacantha) intermedia	granulose purse crab	T
Alosa mediocris	hickory shad	G
Alpheus heterochaelis	bigclaw snapping shrimp	T,B
Amia calva	bowfin	G
Anchoa spp.	anchovies	T,B
Anguilla rostrata	American eel	T
Anomura paguridae	hermit crabs	T,G,B
Arbacia punctulata	Atlantic purple sea urchi	G
Archosargus probatocephalus	sheepshead	T,G,B
Armases(=Sesarma) cinereum	squareback marsh crab	B
Ascidicea	tunicates	T
Astroscopus guttatus	northern stargazer	T
Bairdiella chrysoura	silver perch	T,G,B
Bivalvia veneroida	clams (Veneroida)	T
Brevoortia tyrannus	Atlantic menhaden	T,G,B
Bryozoa, ectoprocta	bryozoans	T
Busycotypus canaliculatus	channeled whelk	G
Callinectes sapidus	blue crab	T,G,B
Cancer spp.	Cancer rock crabs	T
Cancridae	rock crabs	T
Carangoides(=Caranx) ruber	bar jack	T
Caranx hippos	crevalle jack	T,G
Caranx latus	horse-eye jack	G
Carcharhinus acronotus	blacknose shark	G
Carcharhinus limbatus	blacktip shark	G
Centropristis striata	black sea bass	G
Chaetodipterus faber	Atlantic spadefish	G
Chasmodes bosquianus	striped blenny	B
Chelonia mydas	green sea turtle	G
Chilomycterus schoepfii	striped burrfish	T,G
Chloroscombrus chrysurus	Atlantic bumper	T
Citharichthys spilopterus	bay whiff	T,G,B

Cnidaria	jellyfish	T
Crassostrea virginica	eastern oyster	T
Ctenogobius boleosoma	darter goby	T,B
Ctenogobius shufeldti	freshwater goby	T,B
Ctenophora	comb jellies	T
Cynoscion nebulosus	spotted seatrout	T,G,B
Cynoscion nothus	silver seatrout	T,G
Cynoscion regalis	weakfish	G
Cyprinodon variegatus	sheepshead minnow	B
Dactyloscopus spp.	sand stargazers	T

Table A.2. Species collected in Region 4, by gear 2020-2021, continued.

Species	**Common name**	**Gear**
Dasyatis americana	southern stingray	G
Dasyatis sabina	Atlantic stingray	G
Dorosoma cepedianum	gizzard shad	G
Echinacea	sea urchins	G
Elopiformes	tarpons - order	T
Elopmorpha ang. anguilloidei	eels	T
Elops saurus	ladyfish	T,G
Enneacanthus gloriosus	bluespotted sunfish	T
Esox niger	chain pickerel	T
Etropus spp.	Etropus flounders	T
Eucinostomus argenteus	spotfin mojarra	T,B
Eucinostomus lefroyi	mottled mojarra	B
Evorthodus lyricus	lyre goby	B
Farfantepenaeus aztecus	brown shrimp	T,B
Farfantepenaeus duorarum	pink shrimp	T
Fundulus heteroclitus	mummichog	B
Fundulus majalis	striped killifish	B
Gambusia holbrooki	eastern mosquitofish	B
Gastropoda	gastropods	T
Glyceridae	bristleworm	T
Gobiidae	gobies	B
Gobiosoma bosc	naked goby	T,B
Gymnura micrura	smooth butterfly ray	G
Hippocampus erectus	lined seahorse	T
Hydrozoa	Hydrozoa	T
Hypsoblennius hentz	feather blenny	B
Ictalurus furcatus	blue catfish	T,G
Isopoda	isopods	T
Lagodon rhomboides	pinfish	T,G,B
Leiostomus xanthurus	spot	T,G,B
Lepisosteus osseus	longnose gar	T,G

Lepomis macrochirus	bluegill	T,G,B
Limulus polyphemus	horseshoe crab	G
Litopenaeus setiferus	white shrimp	T,B
Littorina spp.	periwinkles	B
Lobotes surinamensis	Atlantic tripletail	G
Lolliguncula brevis	Atlantic brief squid	T
Lutjanus griseus	gray snapper	B
Macrobrachium spp.	river shrimps	T,B
Majidae	spider crabs	T,G
Menidia beryllina	inland silverside	B
Menidia menidia	Atlantic silverside	T,B
Menippe mercenaria	Florida stone crab	T,G

Table A.2. Species collected in Region 4, by gear 2020-2021, continued.

Species	**Common name**	**Gear**
Menticirrhus americanus	southern kingfish	T,G
Menticirrhus littoralis	Gulf kingfish	G
Menticirrhus saxatilis	northern kingfish	G
Mercenaria spp.	quahogs	T
Micropogonias undulatus	Atlantic croaker	T,G,B
Micropterus salmoides	largemouth bass	G
Morone americana	white perch	G
Morone saxatilis	striped bass	T,G
Mugil cephalus	striped mullet	T,G,B
Mugil curema	white mullet	G,B
Myrophis punctatus	speckled worm snake eel	T
Nassarius spp.	mudsnails	T,B
Nudibranchia	sea slugs (Nudibranchs)	T
Ophiothricidae	Ophiothricidae B. stars	T
Opisthonema oglinum	Atlantic thread herring	T,G
Opsanus tau	oyster toadfish	T,G
Orthopristis chrysoptera	pigfish	T,G,B
Palaemonetes spp.	grass shrimps-Palaemonete	T,B
Paralichthys albigutta	Gulf flounder	G
Paralichthys dentatus	summer flounder	T,G
Paralichthys lethostigma	southern flounder	T,G,B
Parthenopidae	elbow crabs	T
Penaeidae	penaeid shrimps	T
Persephona spp.	Persephona purse crabs	T
Pleuroploca gigantea	horse conch	G
Poecilia latipinna	sailfin molly	B
Pogonias cromis	black drum	G
Pomatomus saltatrix	bluefish	G
Porcellanidae	porcellain crabs - family	T

Porifera	sponges	T
Portunus spinimanus	blotched swimming crab	T
Portunus spp.	Portunus swimming crabs	T,B
Prionotus carolinus	northern searobin	T
Prionotus scitulus	leopard searobin	G
Prionotus spp.	Prionotus searobins	T
Prionotus tribulus	bighead searobin	T,G,B
Rachycentron canadum	cobia	G
Rhizoprionodon terraenovae	Atlantic sharpnose shark	G
Sciaenidae	drums	T
Sciaenops ocellatus	red drum	T,G
Scomberomorus maculatus	Spanish mackerel	G
Selene vomer	lookdown	T
Sphoeroides maculatus	northern puffer	T,G

Table A.2. Species collected in Region 4, by gear 2020-2021, continued.

Species	**Common name**	**Gear**
Sphyraena barracuda	great barracuda	G
Sphyrna tiburo	bonnethead hammerhead	G
Stephanolepis hispidus	planehead filefish {u}	G,B
Stephanolepis hispidus	planehead filefish {w}	T,G,B
Stomolophus meleagris	cannonball jellyfish	T
Symphurus plagiusa	blackcheek tonguefish	T,B
Syngnathus fuscus	northern pipefish	T,B
Syngnathus louisianae	chain pipefish	B
Synodus foetens	inshore lizardfish	T,G
Trachemys(=Chrysemys) scripta scri	yellowbelly turtle	T
Trachinotus carolinus	Florida pompano	G,B
Trachinotus falcatus	permit	B
Trichiurus lepturus	Atlantic cutlassfish	G
Trinectes maculatus	hogchoker	T,G
Uca spp.	Uca fiddler crabs	B
Urophycis regia	spotted hake	T
Xanthidae	mud crabs	T,B

APPENDIX B: A multimetric index for assessing the ecological status of North Carolina coastal waters and validating nominations for Strategic Habitat Areas

Prepared by: Yan Li, Stock Assessment Scientist, Morehead City

1. Objectives

Strategic Habitat Areas (SHAs) are defined as specific locations of individual fish habitats or systems of habitats that have been identified to provide exceptional habitat functions or that are particularly at risk due to imminent threats, vulnerability, or rarity. Extensive field sampling of target fish species in three fish habitats inside and outside of SHAs has been conducted through fishery-independent survey programs operated by the North Carolina Division of Marine Fisheries. The SHAs have been nominated using the GIS MARXAN analysis that is primarily based on habitat information (Deaton et al. 2006; Jensen et al. 2014). The multimetric index based on both fish and habitat metrics has been extensively developed and applied to assess ecological status and has been deemed more accurate and comprehensive than any single metric index (e.g., Pérez-Domínguez et al. 2012; Smoliński and Całkiewicz 2015). The objectives of this study are to (1) develop a multmetric index for assessing ecological status of the Coastal Habitat Protection Plan (CHPP) Region 3; (2) validate the SHA nominations from the MARXAN analysis using this multimetric index. The ultimate goal is to help produce a standard operating procedure (SOP) for monitoring and potentially modifying SHAs in the future based on the multimetric index.

2. Methods

2.1 Data

Data collected from Program 215 were used for the multimetric index development. Sampling was conducted in CHPP Region 3 in 2018 and 2019 from February 15–November 15. The sampling region was divided into one nautical mile by one nautical mile grids. Grids were identified as SHAs or Non-SHAs based on the amount of SHA within the gird. Grids were excluded to create a buffer to account for any edge effect of the SHAs, to avoid known areas of high turtle interactions (Management Area D1), and areas where sampling was determined to be unsafe/unattainable. A stratified random sample of 16 grids (eight SHA and eight non-SHA) was randomly selected each month. Weather and mechanical issues resulted in not completing all

samples during some months. Variables associated with environment, habitat and fish were collected. In this analysis, a total of 255 observations (or grids) and 33 variables (including environmental variables and potential metrics) were initially considered.

2.2 Multimetric index development

Development of the multimetric index includes five steps in general: (1) determining a list of candidate metrics; (2) selecting metrics by reducing redundancy among candidate metrics and identifying the metrics that show a significant response to a pre-defined proxy of human disturbance; (3) defining the scoring system for each selected metric; (4) defining the combination rule that produces the final multimetric index; (5) validating the multimetric index.

2.2.1 A list of candidate metrics

In this study, the set of candidate metrics and the potential direction of each metric responding to the overall human disturbance was determined on a basis of expert opinions. The list contained 21 metrics that inform the overall fish community (global metrics), habitat conditions and feeding guilds of fish species (Table 1). These metrics fall into three types: the numerical metrics (the metrics with count, e.g., INVEA, or continuous values, e.g., CLAR), the categorical metrics (the metrics with multiple categorized levels, e.g., HARD and EROD) and the binary metrics (the metrics with presence or absence, e.g., SAV).

2.2.2 Selection of metrics

Selection of metrics involves reducing the redundancy among candidate metrics and modeling of each metric. In this study, we used correlation analysis to exclude the redundant numerical metrics. The Spearman correlation was calculated among all candidate numerical metrics. The pair of metrics that had a correlation coefficient ≥ 0.8 were identified for high inter-correlation (Smoliński and Całkiewicz 2015). Between the pair of metrics with a high correlation, we rejected the metric that had poorer data quality, had more limited information (with a larger number of missing data), or showed weaker response to human disturbance according to the expert opinions or the metric modeling.

The metric modeling was applied to numerical and binary metrics. We used the generalized linear model (GLM) to examine the relationship between a metric and the human disturbance

along with environmental variables. A total of eight environmental variables were included in this study as essential variables that affect sampling protocol (e.g., sampling season) and fish community (e.g., salinity; Table 2). The mean alteration score (MAS) was used as a proxy of human disturbance. The MAS was calculated for each sampling grid during the GIS SHA nomination process and a higher score indicates a more altered condition and more human disturbance (Deaton et al. 2006). Both Poisson and negative binomial GLMs were initially considered for the metrics with count data (e.g., TA and TR). The negative binomial GLM was used when the Poisson GLM exhibited over-dispersion (Zuur et al. 2009, 2012). The Gaussian GLM was applied to the metrics with continuous data (e.g., DOMI and CLAR). Data of the metrics were log-transformed before fitting the GLM. In the case of data having zero observations, a small positive value (0.001) was added to the observations before log-transformation. The logistic GLM was applied to the metrics with binary data (e.g., SHRBT and SAV), and the zero-inflated GLM (ZIF; Zuur et al. 2012) was applied to the metrics with excess zeros (e.g., PISCR with 80% zero observations). In the ZIF, a Poisson or negative binomial GLM sub-model was used to model the positive count data and a logistic GLM sub-model was used to model the presence or absence of an observation.

A stepwise forward selection procedure was used to select the variables from the environmental variables and MAS that had significant impact on a metric (Li et al. 2016). The selection procedure started with a null model including only the intercept. The significant variables were identified and added to the null model based on Akaike Information Criterion (AIC) and Chi-square test (Akaike 1974; Burnham and Anderson 2002). At each step, the variable that most reduced the AIC value (i.e., the decrease in AIC was more than three) or had a *p*-value less than the significance level of 0.05 was added to the null model. This process was repeated until inclusion of an additional covariate would not substantially improve model performance. Those metrics that had MAS selected as a significant variable in the model were identified showing a significant response to MAS and were thus included in the final mulitmetric index (Smoliński and Całkiewicz 2015).

Two categorical metrics were examined in this study, i.e., the extent of harderned shoreline (HARD) and the extent of eroded edge (EROD). These two metrics were determined to be

important in response to human disturbance based on expert judgement; thus, they were included in the final multimetric index.

2.2.3 Scoring system for each selected metric

A five-grade scoring system ranging from 1 (the worst ecological status) to 5 (the best ecological status) was defined for each selected metric, and a score was assigned to each observation based on this scoring system of the metric (Delpech et al. 2010; Smoliński and Całkiewicz 2015). For a numerical metric, the previously fitted GLM model was used to predict the metric values given three disturbance levels: low disturbance (minimal MAS value = 0.0002), medium disturbance (mean of minimal and maximal MAS values = 2.1431) and high disturbance (maximal MAS value = 4.2859); thus, the least disturbed grids in the data were designated as the reference (Breine et al. 2007; Smoliński and Całkiewicz 2015). The environmental variables that were selected in the model were fixed at the mean (for continuous variables) or the mode (for categorical variables) of the variable, which helped reduce the impacts of these variables on the detection of the relationship between the metric and the MAS.

A nonparametric bootstrap was used to produce the prediction distribution under each disturbance level for the numerical metric (Delpech et al. 2010; Smoliński and Całkiewicz 2015). In this bootstrap procedure, a total of 5,000 datasets were generated by randomly sampling the original dataset with replacement, and the metric values were predicted under the three disturbance levels using the GLM fitted to each dataset. By examining the prediction distributions under the three disturbance levels for a metric, the discriminant ability of a metric for different disturbance levels can be evaluated and the score thresholds can be defined. In this study, the 10% and 90% quantile of a prediction distribution were calculated and used to define the score thresholds for a metric. Specifically, for a numerical metric, the 90% quantile of the prediction distribution for high disturbance level, the 10% and 90% quantile of the prediction distribution for medium disturbance level, and the 10% quantile of the prediction distribution for low disturbance level were defined as thresholds for assigning scores from 1 to 5.

For a categorical metric such as HARD and EROD, these two metrics have already been categorized into 5 and 4 levels in the data based on the percentage of hardened and eroded, respectively. Therefore, instead of using GLM modeling and bootstrap, their score thresholds can

be defined directly based on the levels recorded in the data (Cabrala et al. 2012). For a binary metric, a score of 1 and a score of 5 can be assigned to presence or absence, depending on the response of the metric to increasing human disturbance and the definition of the five-grade scoring system (Cabrala et al. 2012).

2.2.4 The final multimetric index: a combination of multiple metrics

The final multimetric index was calculated for each observation by combining the scores of all selected metrics, in which scores of all metrics were summed and divided by the maximal potential score (five times the number of selected metrics; Delpech et al. 2010; Smoliński and Całkiewicz 2015). The final multimetric index ranges between 0 and 1, with a value of 0 for the worst ecological status and a value of 1 for the best ecological status.

2.3 Validation of the multimetric index

A linear regression for the multimetric index scores against the MAS for all observations was conducted to validate the performance of the index. A strong negative relationship between the index scores and the MAS indicates the ability of the index for tracking the human disturbance. Additionally, we compared the index with the SHA nominations from the GIS MARXAN analysis for CHPP Region 3.

3. Results

Among the 21 candidate metrics initially evaluated, the Simpson's dominance (DOMI) was highly correlated with both Shannon's diversity (SHAN) and evenness (EVEN) with a correlation coefficient of -0.98 and -0.85 respectively. The metrics SHAN and EVEN were excluded because the information in both metrics were imbedded in the single metric DOMI. The abundance (PISCA) and richness (PISCR) of piscivorous species were also highly correlated with a correlation coefficient of 0.99. Although both metrics had a high percentage (around 80%) of zero observations, the positive observations of the metric PISCA were greatly skewed with extreme values (e.g., one observation of 1156 and the majority less than 100), and thus PISCA was excluded from further consideration.

According to metric modeling, six habitat related metrics ((i.e., SHRBT, SHRSL, SHRVT, SHELL, MARSH, SAV) and one feeding guilds related metric (i.e., INVEA) showed significant

response to the MAS, and thus were included in the final multimetric index (Table 3). Along with the two categorical metrics HARD and EROD that were pre-determined to be included, there were a total of nine metrics in the final multimetric index (Table 4).

Among the environmental variables, sampling season (SEA), location (LON and LAT), and water depth (DEPTH) were often selected in the GLM models as significant variables, suggesting the high importance of sampling protocol. Salinity was a significant variable in the models for the metric describing the abundance of invertivorous species (INVEA) and for most habitat related metrics (Table 3).

For the numerical metric INVEA that was included in the final multimetric index, the prediction distribution for the medium disturbance level substantially overlapped at the tails with those for low and high disturbance levels. This limited discrimination power between three disturbance levels made assigning five scores using these thresholds less feasible (Figure 1). Especially, the 90% quantile of the prediction distribution for high disturbance level was so close to the 10% quantile for the medium disturbance level that thresholds set between these two values would not be discriminative enough for assigning a score. Therefore, instead of assigning five scores, we dropped the prediction distribution for the medium disturbance level and set thresholds for assigning three scores based on the 90% and 10% quantiles of the prediction distributions for the high and low disturbance levels, respectively (Table 4; Figure 2).

The score thresholds for the six binary metrics and the two categorical metrics (HARD and EROD) were defined based on the levels recorded in the data. After assigning thresholds for a five-grade scoring system, the final multimetric index value for each observation was calculated.

The regression between the final multimetric index and MAS showed a significant negative relationship, with a p-value ≤ 0.001 (Figure 3). The multimetric index also effectively tracked the nominated SHAs in CHPP Region 3 by GIS MARXAN. The median value of the multimetric index for the nominated SHA grids (median = 0.7) was approximately 16.7% higher than the one for non-SHA grids (median = 0.6). The 95% confidence interval of the multimetric index values for the SHA grids did not overlap with the one for non-SHA grids, suggesting their difference was significant (Figure 4). These results suggest the multimetric index can perform as an effective indicator for human disturbance.

4. Discussion

The framework established in this study provides a useful and universal tool for developing a multimetric index for fish habitat evaluation. It shows an effective way to summarize complex information about habitat quality and to communicate with stakeholders and managers (Smoliński and Całkiewicz 2015). Although the multimetric index was developed for a specific region (i.e., the CHPP Region 3) in the current study, this framework is flexible and can be improved by including other important metrics when data become available for this region or can be adopted to other regions by adjusting the list of candidate metrics. For the CHPP Region 3 that was tested in this study, ongoing effort is warranted to refine the list of candidate metrics, for example, to explore more fish-based metrics such as the total abundance of certain commercially important species or certain species that are sensitive to pollution.

Pérez-Domínguez et al. (2012) reviewed 20 studies and found most multimetric indices included 9–10 metrics with a maximum of 16 (Franco et al. 2009) and a minimum of 4 (Delpech et al. 2010). A large number of metrics may raise concerns over overfitting problems (Pérez-Domínguez et al. 2012). The multimetric index developed in this study included a total of nine metrics, which falls within a reasonable range across studies.

The final set of metrics included in the multimetric index in this study is not in good balance with the habitat-related metrics dominating the multimetric index and no global fish metrics being selected. This result may be explained by the way MAS was developed. Information on habitat alteration was heavily used in the calculation of the MAS, along with the information on human activity. The final multimetric index can be improved by either choosing an alternative proxy of human disturbance that better focuses on human activity or refining global fish metrics to include metrics that describe abundance and richness of certain species of interest, e.g., the species of economic importance or the species sensitive to pollution.

In this study, we tested including TA in the final multimetric index because it is essential to include a global fish metric based on expert judgement, and the metric TA showed marginal significance to the MAS (p-value = 0.08); however, the discriminative power of TA was not good enough to provide score thresholds, with prediction distributions for all three disturbance levels overlapping with each other. We also tested assigning four scores instead of three scores

as applied in this study for the metric INVEA. To assign four scores, we used the prediction distributions for all three disturbance levels and only dropped the 10% quantile for the medium disturbance level that was very close to the 90% quantile of the prediction distribution for high disturbance level (Figure 1). The resulting multimetric index was similar to the one with three scores for INVEA.

The GLM analysis is usually restricted to the pool of variables for selection, and this pool of variables is subjective and is based on expert opinions. In the cases when the environmental variables are relatively more important in explaining the variance in the metric, the proxy of human disturbance may not be selected in the GLM model. When the pool of variables for selection changes, especially when including different environmental variables and alternative disturbance proxy, the sets of metrics selected in the final multimetric index could change dramatically; thus, expert judgement is essential in this framework.

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Tables

Table 1. List of candidate metrics and their expected response to increasing human disturbance.

	Candidate metric	Abbreviation	Variable type	Expected response
Global				
1	Total abundance	TA	Count	↓
2	Total number of species (richness)	TR	Count	↓
3	Shannon's diversity	SHAN	Continuous	↓
4	Evenness	EVEN	Continuous	↓
5	Simpson's dominance	DOMI	Continuous	↑
Habitat conditions				
6	Water clarity	CLAR	Continuous	↓
7	Presence of shoreline basins, marinas and/or boat ramps	SHRBT	Binary	↑ (present)
8	Presence of rock or wood structures perpendicular to shore	SHRGR	Binary	↑ (present)
9	Presence of low profile rock (riprap) or wood structure parallel to shore	SHRSL	Binary	↑ (present)
10	Presence of vertical structures (i.e. bulkheads)	SHRVT	Binary	↑ (present)
11	Presence of shell habitat	SHELL	Binary	↓(present)
12	Presence of marsh habitat	MARSH	Binary	↓(present)
13	Presence of submerged aquatic vegetation	SAV	Binary	↓(present)
14	Extent of hardened shoreline	HARD	Categorical	↑
15	Extent of eroded edge	EROD	Categorical	↑
Feeding guilds				
16	Abundance of piscivorous species	PISCA	Count	↓
17	Number of piscivorous species	PISCR	Count	↓
18	Abundance of invertivorous species	INVEA	Count	↓
19	Number of invertivorous species	INVER	Count	↓
20	Abundance of omnivorous species	OMNIA	Count	↑
21	Number of omnivorous species	OMNIR	Count	↑

Table 2. List of environmental variables and the proxy of human disturbance for the generalized linear model (GLM) analysis.

Variable name	Abbreviation	Variable type
Environmental variable		
Sampling protocol related		
1 Season	SEA	Categorical
2 Latitude (º)	LAT	Continuous
3 Longitude (º)	LON	Continuous
4 Water depth (m)	DEPTH	Continuous
Affecting fish community		
5 Sediment size	SED	Categorical
6 Bottom water temperature (ºC)	TEMP	Continuous
7 Bottom water salinity (ppt)	SAL	Continuous
8 Bottom dissolved oxygen (mg/L)	DO	Continuous
Proxy of human disturbance		
1 Mean alteration score	MAS	Continuous

Table 3. Generalized linear model (GLM) analysis for metrics that showed a significant response to the mean alteration score (MAS).

Predictor variables selected in model	Df	AIC	Pr(Chi)
SHRBT (Logistic GLM)			
NULL		337.71	
MAS	**1**	**313.97**	**< 0.001**
SHRSL (Logistic GLM)			
NULL		308.56	
MAS	**1**	**301.78**	**0.003**
SHRVT (Logistic GLM)			
NULL		315.71	
MAS	**1**	**304.92**	**< 0.001**
SAL	1	295.24	0.001
LAT	1	292.65	0.03
SHELL (Logistic GLM)			
NULL		318.31	
SAL	1	288.02	< 0.001
LAT	1	275.29	< 0.001
MAS	**1**	**262.61**	**< 0.001**
SED	3	258.17	0.02
LON	1	255.96	0.04
MARSH (Logistic GLM)			
NULL		229.61	
MAS	**1**	**222.43**	**0.002**
DEPTH	1	215.96	0.004
SAV (Logistic GLM)			
NULL		293.3	
SAL	1	265.48	< 0.001
MAS	**1**	**247.54**	**< 0.001**
LON	1	245.18	0.04
LAT	1	235.38	0.001
SED	3	232.72	0.03

INVEA (Negative binomial GLM)			
NULL		3470.57	
SEA	3	3403.79	< 0.001
SAL	1	3381.35	< 0.001
DO	1	3377.04	0.01
DEPTH	1	3370.28	0.003
MAS	**1**	**3363.91**	**0.004**

Table 4. The metrics included in the final multimetric index and the scoring system for each metric.

	Scores				
Metrics	1 (worst ecological status)	2	3	4	5 (best ecological status)
SHRBT	Present				Absent
SHRSL	Present				Absent
SHRVT	Present				Absent
SHELL	Absent				Present
MARSH	Absent				Present
SAV	Absent				Present
HARD	>50% hardened	26–50% hardened	10–25% hardened	<10% hardened	0% hardened
EROD	>50% erosion	26–50% erosion		1–25% erosion	0% erosion
INVEA	< 181		181–581		> 581

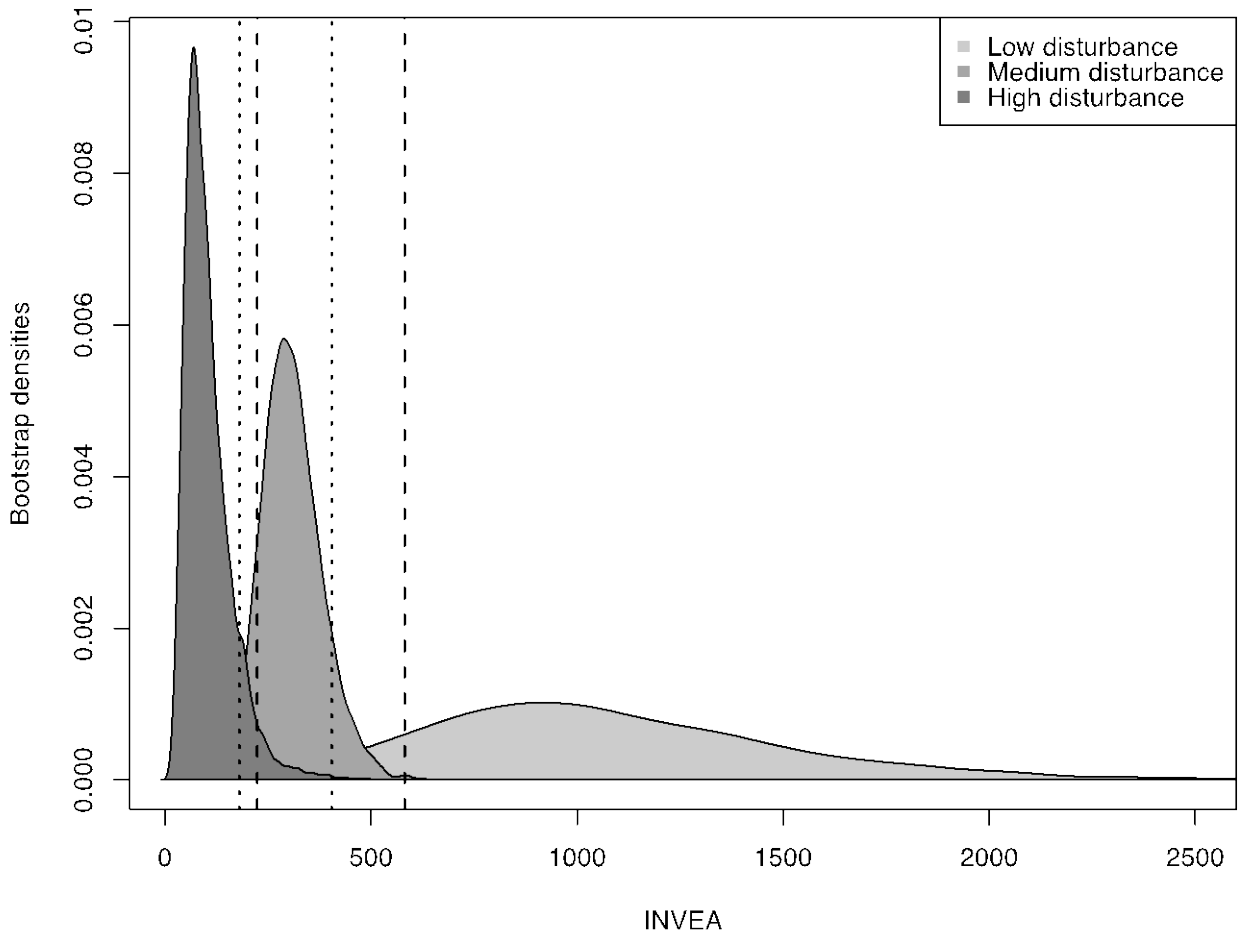


Figure 1. Prediction distributions of the abundance of invertivorous species (INVEA) under low, medium and high levels of the mean alteration score (MAS). The dash line is the 10% quantile and the dotted line is the 90% quantiles of the prediciton distributions.

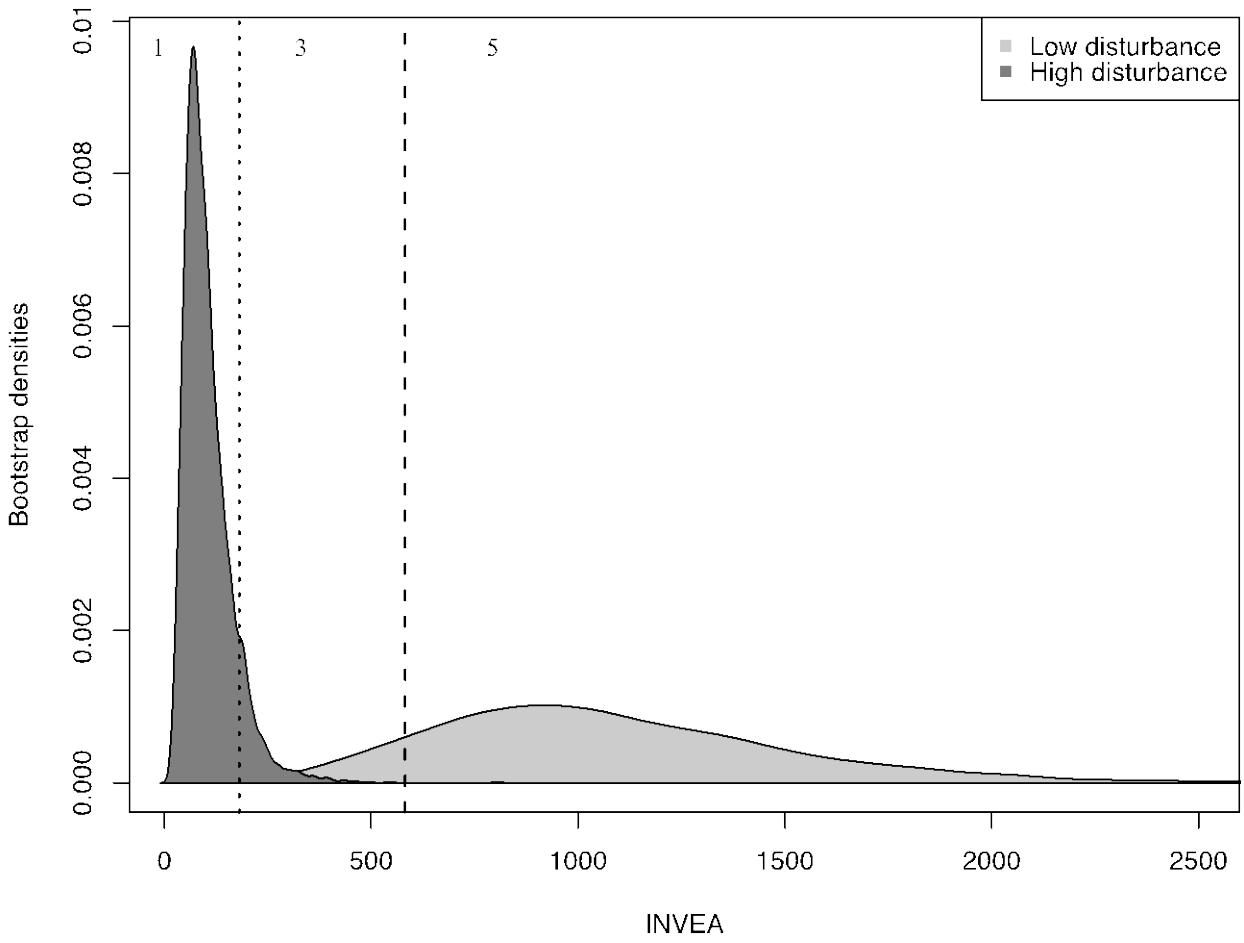


Figure 2. Prediction distributions of the abundance of invertivorous species (INVEA) under low and high levels of the mean alteration score (MAS). The dash line is the 10% quantile and the dotted line is the 90% quantiles of the prediciton distributions; these two lines mark the thresholds for assigning scores. The numbers are the assigned scores.

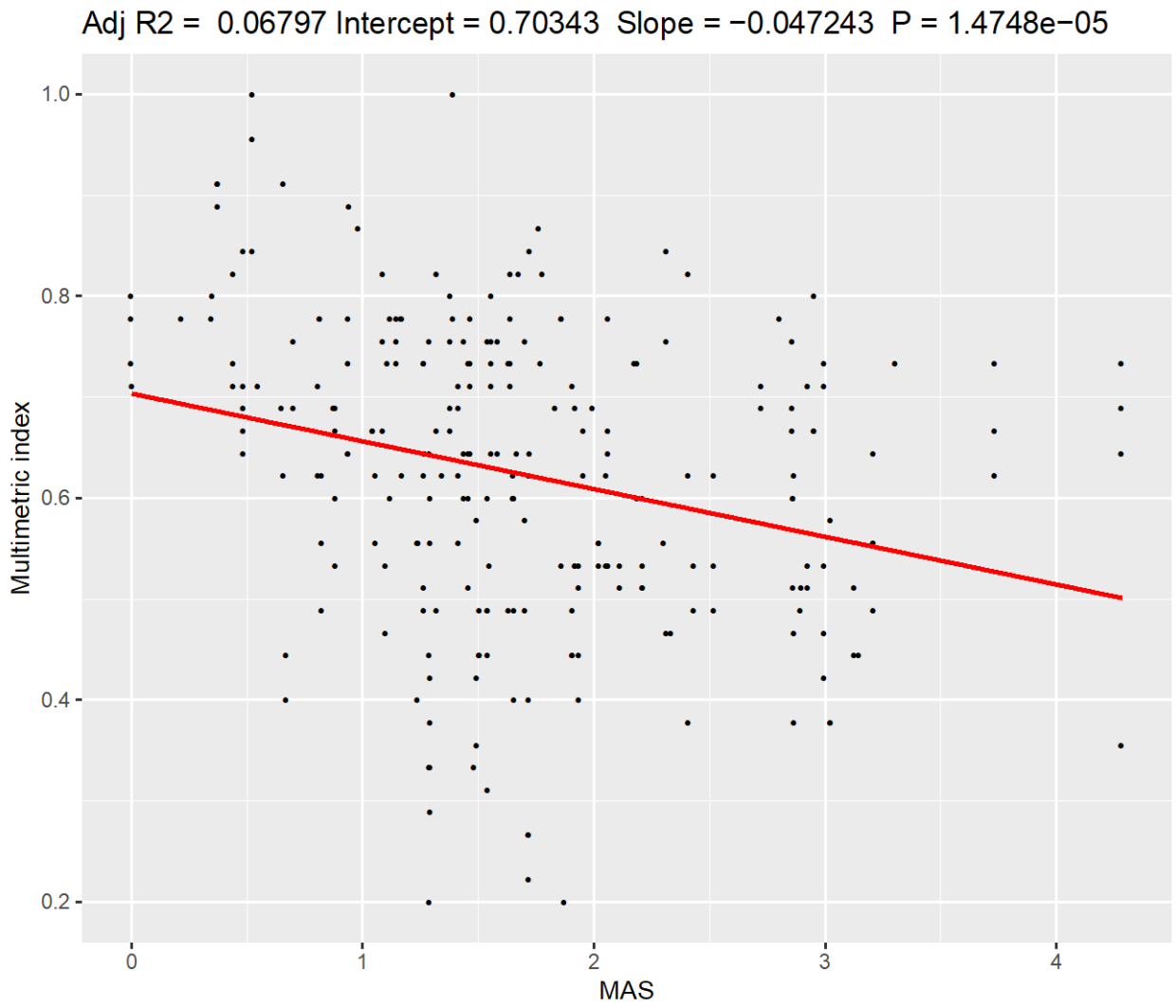


Figure 3. Linear regression of the multimetric index values against the mean alteration score (MAS). Dots are observations in the dataset; the solid line is the fitted values and the dash lines are the standard deviations.

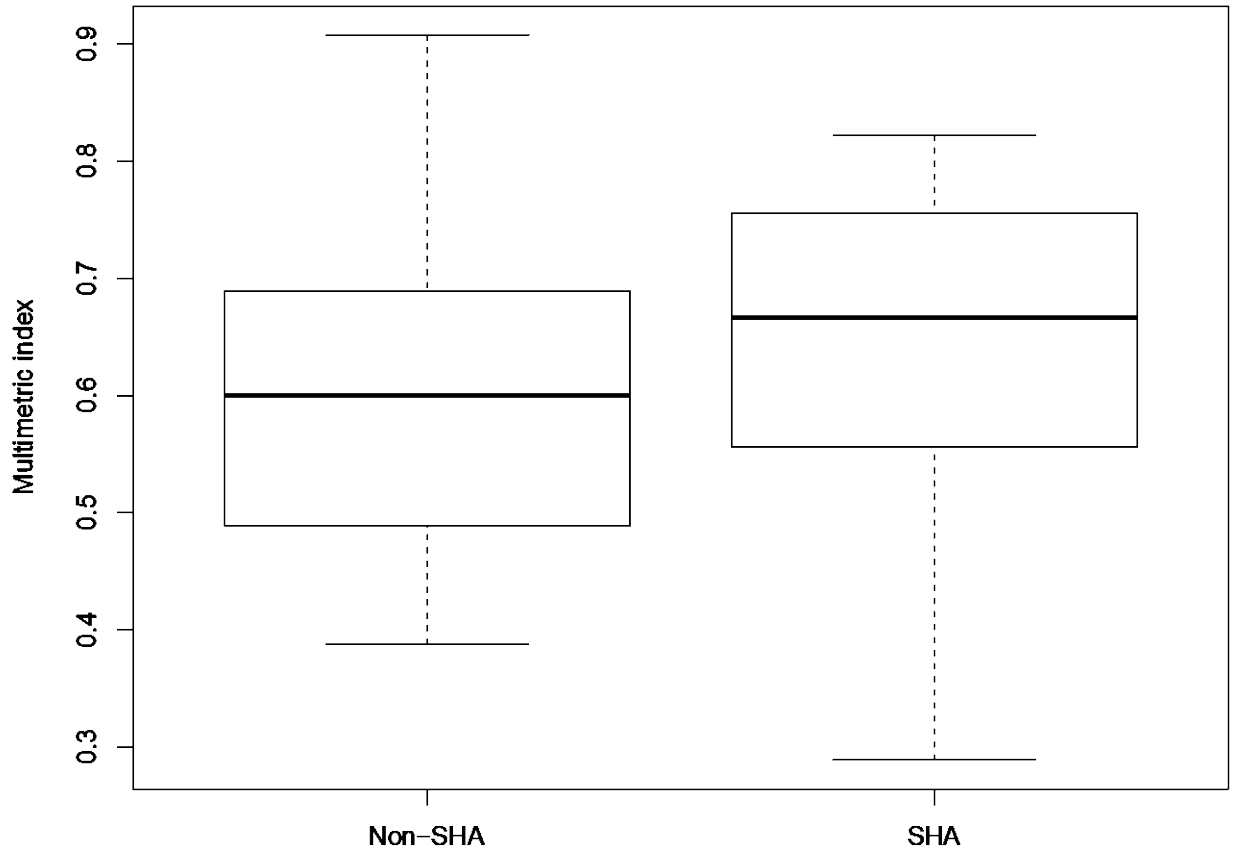


Figure 4. Multimetric index values for the Strategic Habitat Areas (SHAs) grids and the non-HAS grids based on the GIS MARXAN analysis represented as boxplots. The middle bolded line is the median; the upper and lower outlines of the box are the 75% and 25% quantiles respectively; the upper and lower bars are the 97.5% and the 2.5% quantiles respectively.

NC Marine Fisheries Commission

Fishery Management Plans

February 2024 Business Meeting

Jan. 26, 2024

MEMORANDUM

TO: N.C. Marine Fisheries Commission

FROM: Corrin Flora, Fishery Management Plan Coordinator
Fisheries Management Section

SUBJECT: Fishery Management Plan Update and Schedule Review

Issue

Update the N.C. Marine Fisheries Commission (MFC) on the status of 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 of the status of five North Carolina FMPs for the February 2024 MFC business meeting.

Striped Mullet FMP

The peer reviewed, benchmark stock assessment for striped mullet indicated the stock was overfished and experiencing overfishing in the terminal year of 2019. Due to overfishing concerns, the Secretary authorized the MFC to develop temporary management through a supplement. The MFC adopted Supplement A at its May 2023 business meeting. Supplement A management was implemented in November 2023.

Until new management is adopted, Striped Mullet are managed under the Striped Mullet FMP Amendment 1 and Supplement A to Amendment 1. At its November 2022 MFC business meeting, the MFC approved the Striped Mullet FMP Amendment 2 goal and objectives. Staff, with guidance from the Mullet Advisory Committee, completed drafting Amendment 2 and at its November 2024 business meeting, the MFC voted to send Amendment 2 for public and MFC advisory committees' review. This review occurred December 18, 2023 – January 17, 2024. Division staff will give an overview of advisory committees and division recommendations as well as public comment. The MFC will have the opportunity to select its preferred management for Amendment 2. Preferred management will then be reviewed by the DEQ Secretary and appropriate legislative committees

for comment. The current timeline would have Amendment 2 adopted at the May 2024 business meeting.

Spotted Seatrout FMP
The peer reviewed, benchmark stock assessment for spotted seatrout indicated the stock is not overfished but is experiencing overfishing. The DMF held scoping for the Spotted Seatrout FMP Amendment 1 from March 13-24, 2023. At its May 2023 business meeting, the MFC approved the Amendment 1 Goal and Objectives. Staff are working on drafting Amendment 1. The division will seek applications for the Spotted Seatrout FMP Advisory Committee January 22 – February 9, 2024 for review and appointment of an advisory committee by the MFC Chair. The division will work with the Spotted Seatrout FMP Advisory Committee during a workshop in spring 2024 to further develop Amendment 1.

Eastern Oyster and Hard Clam FMPs
The 2022 FMP Schedule includes reviews of the Eastern Oyster and Hard Clam FMPs. The Division Plan Development Team is identifying available data sources to assess the needs of the wild fisheries of North Carolina. Scoping was held September 11-22, 2023. The public had opportunities to participate through written comment, two online questionnaires, and four meetings, one of which was available virtually. Due to limited participation, staff are working on additional ways to obtain the public perspective on potential management. At its November business meeting, the MFC provided input on management strategies to consider while drafting the plans and approved the Eastern Oyster FMP Amendment 5 and Hard Clam Amendment 3 Goal and Objectives. The division is currently drafting the two amendments and will hold a workshop later in 2024 with the Oyster-Clam FMPs Advisory Committee for further development.

Blue Crab and Southern Flounder FMPs
The Blue Crab FMP Amendment 3 and Southern Flounder FMP Amendment 3 adaptive management frameworks included an update to the stock assessment at least once between full reviews of the FMP. Both stock assessments indicated the stocks were overfished and overfishing was occurring in the terminal year. Implemented management in these plans addressed the stock status.

The blue crab stock assessment update has been completed with data through 2022. Staff are working to analyze the results and complete the 2023 stock assessment update report. The southern flounder stock assessment is still underway, with a timeline to have a completed report in the spring. Completed reports will be presented to the MFC and, if necessary, adaptive management is available to address the stock status of each.

DECISION DOCUMENT

Striped Mullet Fishery Management Plan

Amendment 2

This document was developed to help the MFC track previous activity and prepare for upcoming actions for Striped Mullet FMP Amendment 2.

February 2, 2024

Background

The 2022 stock assessment indicated the striped mullet stock is overfished and overfishing is occurring. The North Carolina Fishery Reform Act of 1997 requires the State to implement management to end overfishing and to achieve a sustainable harvest within a 10-year time period. To achieve sustainable harvest within this time frame management measures estimated to achieve a 20—33% reduction in total removals from 2019 landings are required.

Amendment 2 to the Striped Mullet Fishery Management Plan is being developed to address the overfished status of the North Carolina striped mullet stock. The recently adopted Supplement A to Amendment 1 to the Striped Mullet FMP implemented management measures to end overfishing with a season closure. Amendment 2 will contain additional management measures that will replace the supplemental management.

Review of Supplement A to Amendment 1 Decisions and Discussion

In September 2022, the DEQ Secretary determined it was in the long-term interest of the striped mullet stock to develop temporary management through a Supplement. The Division developed the Striped Mullet Fishery Management Plan Amendment 1 Supplement A to address the overfishing status of the stock while the Division works on comprehensive management to address sustainable harvest in Amendment 2. At its May 2023 business meeting, the Marine Fisheries Commission approved the following season closures:

Region	Closure Dates
North of the Highway 58 Bridge	November 7 – December 31
South of the Highway 58 Bridge	November 10 – December 31

The management adopted in Supplement A is temporary and will be replaced with management adopted in Amendment 2. While a season closure may still be part of long-term management for the species, other options will be explored and could be used in combination to achieve the necessary harvest reductions.

Sustainable harvest primarily focuses on reductions in the commercial fishery, where most striped mullet harvest occurs. In 2019, recreational striped mullet harvest accounted for 1.7% of total harvest while the commercial fishery accounted for 98.3% of the total harvest. Likewise, from 1994 to 2019 recreational striped mullet harvest accounted for 4.2% of total harvest. While management options are proposed for the recreational fishery to improve the status of the stock, recreational harvest reductions are not quantifiable due data limitations.

Several management tools are available to achieve sustainable harvest in the striped mullet fishery, including combinations of management measures. All are discussed fully in Appendix 2 and Appendix 3 of Amendment 2 to the Striped Mullet FMP. References to those documents are included in the discussion of the management options below.

Amendment Timing (Grey indicates a step is complete.)

September – October 2022	Division holds public scoping period
November 2022	MFC approves goal and objectives of FMP
November 2022 – May 2023	Supplemental Management (*Supplement A to Striped Mullet FMP Amendment 1 Adopted*)
November 2022 – June 2023	Division drafts FMP
July 2023	Division held workshop to review and further develop draft FMP with the Striped Mullet FMP Advisory Committee
August – October 2023	Division updates draft plan
November 2023	MFC Reviews draft and votes on sending draft FMP for public and AC review
December - January 2024	Public Comment Period and MFC Advisory Committees meet to review draft FMP
February 2024	**MFC selects preferred management options**
March-April 2024	DEQ Secretary and Legislative review of draft FMP
May 2024	MFC votes on final adoption of FMP
TBD	DMF and MFC implement management strategies

Developed Temporary Management

You Are Here

Goal and Objectives

The goal of Amendment 2 is to manage the striped mullet fishery to achieve a self-sustaining population that provides sustainable harvest using science-based decision-making processes. The following objectives will be used to achieve this goal.

Objectives:

- Implement management strategies within North Carolina that sustain and/or restore the striped mullet spawning stock with adequate age structure abundance to maintain recruitment potential and prevent overfishing.
- Promote the restoration, enhancement, and protection of critical habitat and environmental quality in a manner consistent with the Coastal Habitat Protection Plan, to maintain or increase growth, survival, and reproduction of the striped mullet stock.
- Use biological, social, economic, fishery, habitat, and environmental data to effectively monitor and manage the fishery and its ecosystem impacts.
- Advance stewardship of the North Carolina striped mullet stock by promoting practices that minimize bycatch and discard mortality.

Management Options, Ordered by Issue

Sustainable Harvest

The intent of these management options is to allow for traditional use of striped mullet in the commercial fishery while meeting sustainable fishery requirements. They are predicted to reduce harvest of striped mullet in ways that are quantifiable using existing data. The data used to quantify harvest reductions are collected from commercial fishermen through the trip ticket and the Division's fish house sampling programs. Because they are quantifiable, they are used to meet the legal requirements of the Fisheries Reform Act to address overfishing and rebuild overfished stocks. Because harvest reductions from the recreational fishery are not quantifiable, sustainable harvest options are specific to the commercial fishery, where most striped mullet harvest occurs.

A 21.3 to 35.4% reduction in commercial harvest relative to commercial landings in 2019 is needed to rebuild the striped mullet spawning stock biomass to a sustainable level. Because of low recruitment observed in recent years (p.45 of FMP, Figure 2.1), the Division recommends a harvest reduction closer to the upper end of the reduction range to increase the probability of rebuilding success.

Option 1: Size Limit Options (Striped Mullet FMP Amendment 2, p. 48)
On its own, implementation of a striped mullet minimum size limit set at the L50, or the length at which 50% of the population are mature, would be unlikely to meet sustainability objectives and would eliminate the bait fishery for finger mullet. A maximum size limit, focused on the spawning season (October-December), would have a more direct impact on the spawning stock; however, it would negatively affect the roe fishery, the most valuable portion of the commercial striped mullet fishery. Slot limits should not be considered because it would exclude harvest of both "finger mullet" for bait as well as large roe mullet. Implementing a minimum or maximum size limit would need to be accompanied by corresponding changes to minimum or maximum mesh sizes used in gill nets to reduce dead discards. This would likely impact other small mesh gill net fisheries targeting other species. To read full discussion of size limits, see p. 48 in draft Amendment 2.

a. *Status Quo – Manage fishery without minimum or maximum size limits (0% Reduction)*

b. *Minimum Size Limit and 3.25 ISM Minimum Gill Net Mesh Size*

Example Size Limit Options (Inches FL)	
Minimum	Percent Reduction
13.5	27.2
14.0	37.2

c. Maximum Size Limit and 3.75 or 4.0 ISM Maximum Gill Net Mesh Size

Example Size Limit Options (Inches FL)	
Maximum	Percent Reduction
15.0	39.8
15.5	28.4

d. Seasonal Maximum Size Limit and 3.75 or 4.0 ISM Maximum Gill Net Mesh Size

Example Size Limit Options (Inches FL)	
Oct-Dec Maximum	Percent Reduction
14.5	51.4
15.0	27.0

Option 2. Season Closure Options (Striped Mullet FMP Amendment 2, p. 55)
Season closures, specifically end of year season closures, are considered an effective and efficient management option to end overfishing of the striped mullet stock and rebuild SSB. To read full discussion of seasonal closures see p.55 in Amendment 2.

2.a No Season Closure (0% Reduction)

	Season Closure	Reduction
2.b*	October 29 - December 31	33.7
2.c	November 7 - December 31	22.1

*Adding one more closure day exceeds the minimum 35.4% reduction necessary to reach the SSB Target.

	Season Closure		
	North	South	Reduction
2.d	Oct. 28-Dec. 31	Oct. 30-Dec.31	35.6
2.e	Nov. 7-Dec. 31	Nov. 10-Dec. 31	21.7

Option 3: Trip limits (Striped Mullet FMP Amendment 2, p. 57)
Unless otherwise specified all trip limit options are daily trip limits and applied to a commercial fishing operation regardless of the number of persons, license holders, or vessels involved. Yardage limits on runaround gill nets in tandem with trip limits could be helpful in minimizing discards but would affect other fisheries. To read full discussion of trip limits see p.57 in Amendment 2.

Table 2.10. Percent harvest reduction from 2019 commercial landings based on various daily trip limits and time periods.

	Reduction (%)		
Trip Limit (lb)	Jan-Sept, Dec	Oct-Nov	Total
50	33.1	50.4	83.4
75	30.3	47.8	78.1
100	27.9	45.5	73.5
150	24.3	41.7	66.0
200	21.3	38.5	59.8
300	16.8	33.3	50.2
400	13.6	29.4	42.9
500	11.0	26.1	37.2
600	9.0	23.4	32.4
1,000	3.8	15.5	19.3
1,100	3.0	14.1	17.1
1,250	2.1	12.3	14.4
1,500	1.2	10.0	11.2
1,750	0.7	8.2	9.0
2,000	0.4	6.8	7.2
2,500	0.1	4.8	4.9

Option 4: Day of week closures (Striped Mullet FMP Amendment 2, p. 59)
To read full discussion of day of week closures see p.59 in Amendment 2.

Table 2.11. Percent of harvest by day of week or combination of days, 2019 and 2017-2021.

Day(s) of Week	2019 Landings	Landings (%)	2017-2021 Landings	Landings (%)
Sunday	162,709	11.9	780,061	10.4
Monday	209,707	15.4	1,201,290	16.1
Tuesday	247,756	18.2	1,273,991	17.0
Wednesday	190,343	14.0	1,148,997	15.4
Thursday	191,313	14.0	1,038,243	13.9
Friday	173,090	12.7	1,048,743	14.0
Saturday	187,294	13.7	984,763	13.2
Saturday-Sunday	350,003	25.7	1,764,823	23.6
Friday-Sunday	523,093	38.4	2,813,566	37.6
Saturday-Monday	559,710	41.1	2,966,113	39.7
Friday-Monday	732,800	53.8	4,014,856	53.7

Table 2.12. Percent of commercial landings by day of week for each month, 2017-2021.

Month	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
January	8.5	18.2	18.7	16.4	15.2	13.5	9.5
February	8.6	14.7	20.6	13.8	15.2	14.1	13.1
March	9.7	20.2	15.8	15.8	17.1	14.2	7.1
April	11.0	13.7	15.1	17.6	16.2	12.0	14.4
May	11.7	10.4	17.4	19.0	14.0	13.1	14.3
June	10.9	16.3	15.4	14.4	12.8	17.0	13.2
July	10.1	16.0	15.5	15.9	16.8	15.3	10.4
August	9.1	19.6	14.4	13.4	15.4	17.4	10.7
September	14.3	14.3	14.2	15.1	13.2	12.5	16.4
October	10.8	16.7	19.1	15.0	11.4	11.4	15.5
November	9.7	14.7	17.9	16.0	15.1	15.3	11.4
December	10.2	18.1	10.0	14.8	15.2	19.3	12.5

Option 5: Combination of Measures (Striped Mullet FMP Amendment 2, p. 60)

Table 2.13. Management measure combinations to end overfishing and achieve sustainable harvest, compared to 2019 commercial landings. Unless otherwise specified all options for day of week closures or day of week reduced trip limits are applied year-round. All trip limit options are daily trip limits and applied to a commercial fishing operation regardless of the number of persons, license holders, or vessels involved.

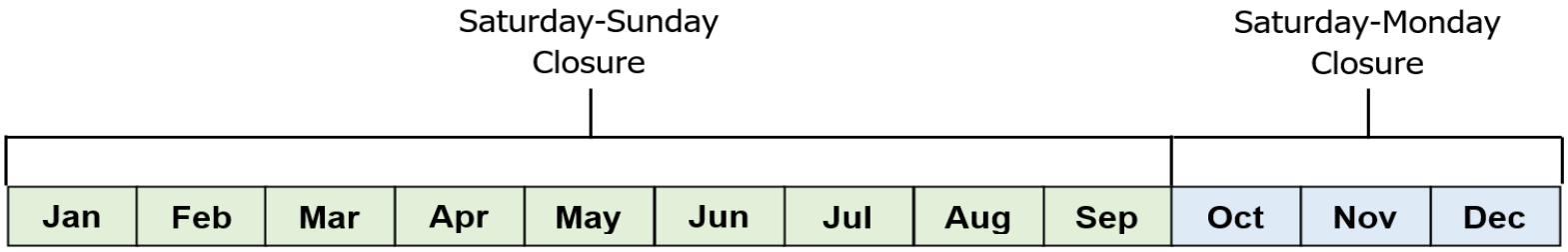
Option	Season Closure	Daily Trip Limit (lb.)	Day of Week Closure	% Reduction	% Reduction with 30k Stop Net Cap
5.a*	.	.	Sat-Sun	25.7	24.0
5.b	Dec 1-Dec 31	Jan-Sep 1,000; Sat-Sun 50 lb	.	28.1	26.4
5.c*	.	Jan-Sep 1,000	Sat-Sun	28.5	26.9
5.d	Dec 1-Dec 31	Jan-Oct 15 1,000; Sat-Sun 50 lb	.	28.9	27.3
5.e	Nov 12-Dec 31	1,000	.	29.1	27.5
5.f*	.	Jan-Oct 15 1,000 lb	Sat-Sun	29.3	27.7
5.g			Jan-Oct Sat-Sun; Nov-Dec Sat-Mon	30.0	28.5
5.h		Jan-Oct 15 and Dec 500; Sat-Sun 50 lb		31.3	29.8
5.i	Dec 1-Dec 31	Jan-Sep 1,000	Sat-Sun	31.8	30.2
5.j		Jan and Dec 100 lb; Feb-Sep 500 lb; Sat-Sun 50 lb		32.4	30.9
5.k	Dec 1-Dec 31	Jan-Oct 15 1,000	Sat-Sun	32.6	31.1
5.l	Nov 8-Dec 31	1,000	.	34.6	33.1
5.m	.	Jan and Dec 50 lb; Sat-Sun 50 lb; Feb-Oct 15 500 lb	.	34.6	33.2
5.n+			Jan-Sept Sat-Sun; Oct-Dec Sat-Mon	34.9	33.4
5.o		Jan-Oct 15 and Dec 500	Sat-Sun	35.4	33.9
5.p		Jan1-31 and Nov16-Dec31 50 lb., Sat-Sun 50 lb, Feb1-Oct15 500lb		36.9	35.5
5.q	.	Jan and Dec 100 lb; Feb-Sep 500 lb	Sat-Sun	36.5	36.0
5.r	Nov 12-Dec 31	1,000	Sat	38.6	37.2

*Endorsed by Striped Mullet FMP AC

+DMF Recommendation

DMF Recommendation

Visual Representation of Option 5.n



DMF Recommendation

Option 6: Stop Net Fishery Management (Striped Mullet FMP Amendment 2, p. 63)

a. Status Quo – DMF recommends managing the stop net fishery with the same management measures applied to the rest of the fishery. Further, DMF recommends the stop net season open annually no sooner than October 15 and close no later than December 31. All other stop net and associated gill net regulations will be set by proclamation consistent with, but not limited to, previous management (see proclamations M-17-2020, M-18-2020, M-20-2021, M-21-2021, M-22-2022, and M-23-2022).

b. Stop Net Specific Catch Cap

Option 7: Seasonal Catch Limit (Striped Mullet FMP Amendment 2, p. 64)

a. Status Quo – Manage fishery without Seasonal Catch Limit

b. Implement Statewide Seasonal Catch Limit

c. Implement Regional (North/South) Seasonal Catch Limit

Option 8: Area Closures (Striped Mullet FMP Amendment 2, p. 68)

Option 9: Limited Entry (Striped Mullet FMP Amendment 2, p. 69)

DMF Recommendation

Option 10: Adaptive Management Framework (Striped Mullet FMP Amendment 2, p. 72)
If adaptive management is adopted as part of Amendment 2, the specifications would apply to the commercial and recreational fisheries for mullet. Parts 1-3 are explicitly tied to a stock assessment update. Part 4 allows for adjustment of management to ensure compliance with and effectiveness of management strategies and would be a tool to respond to concerns with stock conditions and fishery trends.

1) Update the stock assessment at least once in between full reviews of the FMP, timing at discretion of the division.

   a. If current management is not projected to meet management targets (management targets are minimum SSB remaining between $SSB_{Threshold}$ and SSB_{Target}, and maximum F remaining between $F_{Threshold\ and}$ F_{Target}), then management measures shall be adjusted via an adaptive management update and implemented using the Fisheries Director's proclamation authority to reduce harvest to a level that is projected to meet the F_{Target} and SSB_{Target}.
   b. If management targets are being met, then new management measures would not be needed, or current management measures could possibly be relaxed provided projections still meet the management targets. When management targets are met, a striped mullet industry workgroup will be convened to discuss the possibility of "guard rail management" to maintain a sustainable harvest for the striped mullet stock.

2) Management measures that may be adjusted using adaptive management include:

a. Season closures
b. Day of week closures
c. Trip limits
d. Gill net yardage or mesh size restrictions in support of the measures listed in a-c

3) Use of the Director's proclamation authority for adaptive management to meet management targets is contingent on:
   a. Consultation with the Northern, Southern, and Finfish advisory committees
   b. Approval by the Marine Fisheries Commission.
4) Upon evaluation by the division, if a management measure adopted to achieve sustainable harvest (either through Amendment 2 or a subsequent revision) is not achieving its intended purpose, it may be revised or removed and replaced using the Director's proclamation authority; provided it conforms to part 2 above and provides similar protection to the striped mullet stock. If a revised management measure is anticipated to reduce or increase harvest compared to measures implemented through Amendment 2, it must comply with parts 2 and 3 above.

Recreational Fishery

The intent of these management options is to allow traditional use of striped mullet in the recreational fishery while supporting sustainability objectives. Due to recreational fishery data collection methods and recreational fishery practices it is not possible to calculate harvest reductions from the proposed management options. While recreational harvest currently accounts for only a small percentage of the striped mullet harvest, there is concern that the reduced availability of commercially harvested bait could lead to a significant shift in directed recreational harvest. The proposed options will reduce the potential for that type of shift and therefore support successfully meeting sustainability objectives.

Option 1. Recreational Vessel and Bag Limit (Striped Mullet FMP Amendment 2, p. 81)

a. Status Quo

b. Reduce Recreational Bag Limit (100 fish)

DMF Recommendation

c. Reduce Recreational Bag Limit (100 fish) and Implement Vessel Limit (400 fish)

d. Bag Limit (10, 15, 20, 25, etc.) for Fish Over 8-Inches

e. Seasonal (October-December) Bag Limit (10, 15, 20, 25, etc.) for Fish Over 8-Inches

Option 2. For Hire Vessel and Bag limit (Striped Mullet FMP Amendment 2, p. 83)

a. For Hire Vessel Limit (500 fish, etc.)

DMF Recommendation

b. Exception for For Hire Vessel Operations to Possess a Bag Limit for the Number of Anglers They are Licensed to Carry (Including in Advance of a Trip).

c. Exception for For Hire Vessel Operations to Possess a Bag Limit for the Number of Anglers Fishing Up to the 400-fish Maximum (Including in Advance of a Trip).

d. Mirror Option 1 management decision

Next Steps

The MFC approved draft Amendment 2 for public and MFC Advisory Committee review and comment. The review occurred from December 18, 2023-January 17, 2024 with participation through online questionnaire and at the Northern, Southern, and Finfish MFC Advisory Committees.

The outcome of the comment period and AC review will be presented to the MFC during the February business meeting. The MFC will review AC and DMF recommendations and public comment before selecting the preferred management options for Amendment 2.

Amendment 2, including MFC preferred management, will be reviewed by the DEQ Secretary and appropriate legislative bodies. At the May 2024 business meeting, the MFC will be presented any comments from the review and the MFC will adopt Amendment 2.

STRIPED MULLET FISHERY MANAGEMENT PLAN AMENDMENT 2

NC Division of Marine Fisheries 3441 Arendell St. P.O. Box 769 Morehead City, NC 28557

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Disclaimer: Data in this Fishery Management Plan may have changed since publication based on updates to source documents.

ACKNOWLEDGMENTS

Amendment 2 to the North Carolina Striped Mullet Fishery Management Plan was developed by the Department of Environmental Quality, Division of Marine Fisheries under the auspices of the Marine Fisheries Commission with the advice of the Striped Mullet Advisory Committee. Deserving special recognition are the members of the Striped Mullet Advisory Committee and the Division Plan Development Team who contributed their time and knowledge to this effort.

Striped Mullet Advisory Committee

Barry Hodawanic
Eric Bregman
Janet Nye
Joey Frost
Sammy Corbett
Steve Edens
Walter Rogers
Thomas Newman

Striped Mullet Development Team

Alan Bianchi
Amos Williams
Barbie Byrd
Brandi Salmon
Daniel Zapf (Mentor)
David Behringer
Jacob Tyler
Jason Parker
Jason Rock
Jason Walsh
Jeffrey Dobbs (Co-lead)
Kimberlee Harding
Laura Lee
Lee Paramore
Lucas Pensinger
Marc Hamric
Mclean Seward
Melinda Lambert
Morgan Paris
Nolen Vinay
Steve Poland
Jeffrey Moore
Vicky Thayer
Willow Patten (Co-lead)

The following division staff were also invaluable in assisting with the development of this document: Corrin Flora, Debbie Manley, Carter Witten, Casey Knight, Steve Poland, Tina Moore, and Catherine Blum.

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EXECUTIVE SUMMARY

This section will be completed after the MFC selects preferred management

INTRODUCTION

This is Amendment 2 to the Striped Mullet 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 (DMF) reviews each FMP annually and a comprehensive review is undertaken about once every five years. FMPs are the product that brings all information and management considerations for a species into one document. The DMF prepares FMPs for adoption by the North Carolina Marine Fisheries Commission (MFC) 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 striped mullet fishery is vested in the State of North Carolina. The MFC adopts rules and policies and implements management measures for the striped mullet fishery in Coastal Fishing Waters in accordance with G.S. 113-182.1. Until Amendment 2 is approved for management, striped mullet are managed under Supplement A to Amendment 1 to the Striped Mullet Fishery Management Plan (NCDMF 2023).

Results of the 2022 Striped Mullet Stock Assessment (NCDMF 2022) indicate striped mullet in North Carolina are overfished and that overfishing is occurring, the terminal year of the assessment was 2019. An external peer review panel and the DMF concluded the 2022 assessment model and results are suitable for providing management advice for at least the next five years and considers the current assessment to be a substantial improvement from previous assessments, representing the best scientific information available for the stock. For More information about previous and current management and results of previous stock assessments, see the original Striped Mullet FMP (NCDMF 2006), Amendment 1 to the Striped Mullet FMP (NCDMF 2015), Supplement A to Amendment 1 (NCDMF 2023) and previous stock assessments (NCDMF 2013, NCDMF 2018, NCDMF 2022). These are available on the North Carolina Division of Marine Fisheries Fishery Management Plan website.

Fishery Management Plan History

Original FMP Adoption:	April 2006
Amendments:	Amendment 1 (2015)
Revisions:	None
Supplements:	Supplement A to Amendment 1 (2023)
Information Updates:	None
Schedule Changes:	None
Comprehensive Review:	

Past versions of the Striped Mullet FMP (NCDMF 2006, NCDMF 2015, NCDMF 2023) are available on the DMF fishery management plan website.

Management Unit

The management unit of this FMP includes all striped mullet inhabiting North Carolina coastal and inland fishing waters.

Goal and Objectives

The goal of Amendment 2 is to manage the striped mullet fishery to achieve a self-sustaining population that provides sustainable harvest using science-based decision-making processes. The following objectives will be used to achieve this goal.

Objectives:

- Implement management strategies within North Carolina that sustain and/or restore the striped mullet spawning stock with adequate age structure abundance to maintain recruitment potential and prevent overfishing.
- Promote the restoration, enhancement, and protection of critical habitat and environmental quality in a manner consistent with the Coastal Habitat Protection Plan, to maintain or increase growth, survival, and reproduction of the striped mullet stock.
- Use biological, social, economic, fishery, habitat, and environmental data to effectively monitor and manage the fishery and its ecosystem impacts.
- Advance stewardship of the North Carolina striped mullet stock by promoting practices that minimize bycatch and discard mortality.

DESCRIPTION OF THE STOCK

Biological Profile

PHYSICAL DESCRIPTION

Striped Mullet (*Mugil cephalus*) have a long, rounded, silvery body, with a dark bluish green back, fading into silver sides and a white underside. Several dark, horizontal stripes run head to tail along the body. The mouth is small, and the snout is short and blunt.

DISTRIBUTION

Striped mullet occur in fresh, brackish, and marine waters in tropical and subtropical latitudes worldwide. In the western Atlantic, striped mullet have been documented from Nova Scotia to Brazil (Able and Fahay 1998) with striped mullet occurring year-round from North Carolina southward (Bacheler, Wong and Buckel 2005). Their widespread distribution results in them being known by many names: jumping mullet, black mullet, grey mullet, popeye mullet, whirligig mullet, common mullet, molly, callifavor, menille, liza, and lisa (Ibanez Aguirre, Gallardo Cabello and Sanchez Rueda 1995, Leard, et al. 1995). Striped mullet are used as food and bait, supporting commercial and recreational fisheries worldwide. In North Carolina, striped mullet are distributed coastwide and are found in most coastal habitats including rivers, estuaries, marshes, and the ocean. Tagging studies in North Carolina suggest a residential adult stock (Wong 2001; Bacheler et al. 2005) since most (98.2%) striped mullet dart-tagged in North Carolina between 1997 and 2001 were recovered in state waters (Wong 2001). In general, striped mullet tagging studies reveal a small mark-recapture distance and a general southward spawning migration along the South Atlantic Bight (SAB; Mahmoudi et al. 2001; McDonough 2001; Wong 2001). A northward movement pattern during and after the spawning period suggests adults return to North Carolina estuarine habitats (Bacheler et al. 2005).

SPECIES

Three Mugilid species exist in North Carolina: striped mullet, white mullet (*Mugil curema)*, and mountain mullet (*Agonostomus monticola*). Striped mullet and white mullet sometimes overlap spatially but can be distinguished by the presence of longitudinal stripes in striped mullet, anal fin

ray counts, or pectoral fin measurements (Figure 1, Figure 2) (M. R. Collins 1985a, M. R. Collins 1985b). As juveniles, both striped and white mullet cohabitate in estuarine waters making differentiation difficult (Martin and Drewry 1978); however, adult white mullet (age 1 +) rarely occur north of Florida and therefore are not associated with the commercial "roe" mullet fishery in North Carolina (Able and Fahay 1998). The mountain mullet is rare in North Carolina; known only from one specimen noted in Brunswick County, North Carolina (Rohde 1976).

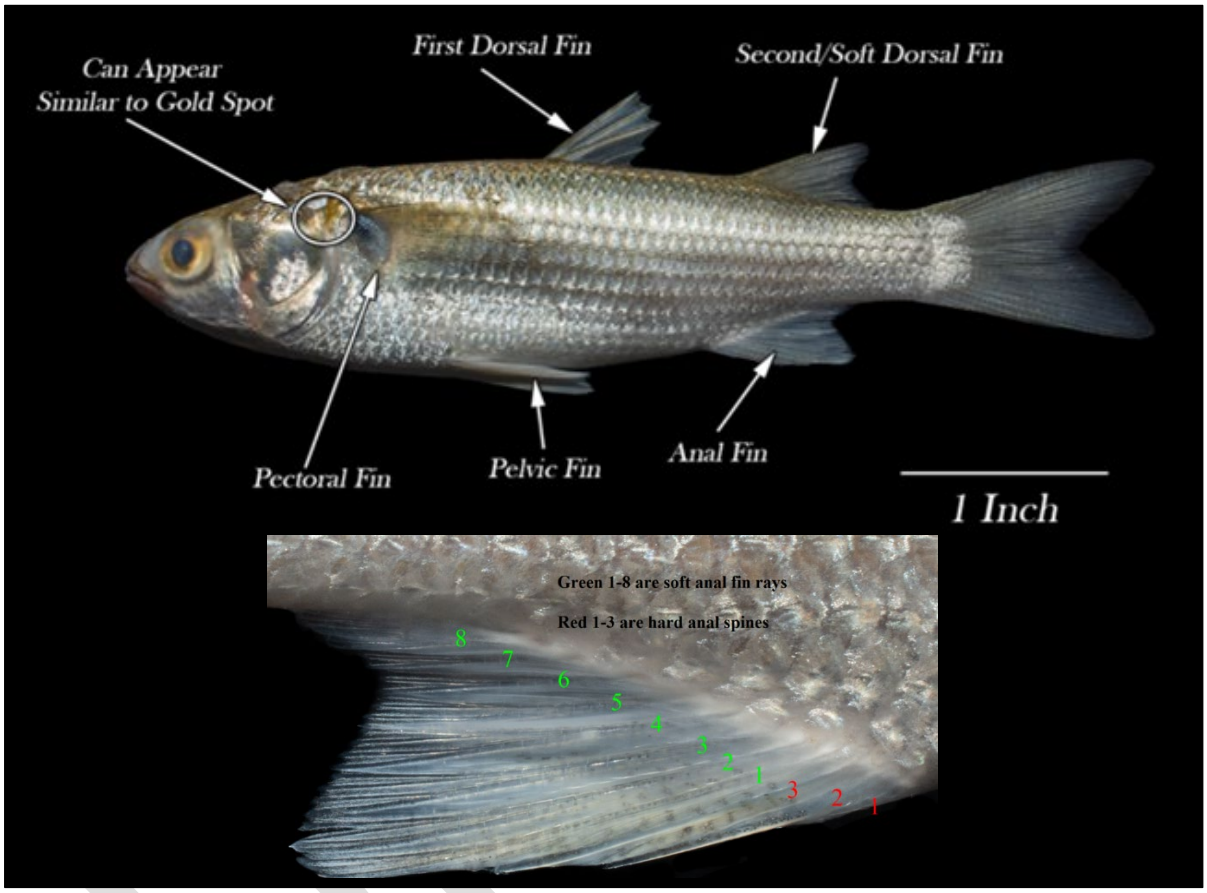

Figure 1. Identifying features for striped mullet. Striped mullet have eight soft anal fin rays and do not have a gold spot on the opercle that white mullet sometimes have. Photo By Scott Smith.

AGE AND GROWTH

Large variability in size at age has been observed for striped mullet in North Carolina (Figure 3), South Carolina, and Georgia (Charmichael and Gregory 2001, Foster 2001, C. J. McDonough 2001). Male and female fish tend to reach similar lengths at early ages (before age 2), after which, females grow larger and live longer (Mahmoudi, et al. 2001). Adult striped mullet grow at a rate of 38 mm to 64 mm (1.5 to 2.5 inches) per year (Broadhead 1953, Wong 2001) and grow twice as fast during the spring and summer than during the winter (Broadhead 1953, Rivas 1980). Male and female maximum ages of 14 and 13 years respectively have been observed in striped mullet collected by the DMF, and one striped mullet of undetermined sex was observed at 15 years old in the Neuse River, making it the oldest ever to be recorded in North Carolina (NCDMF 2022). Maximum reported sizes have ranged from 698 mm (27.5 inches) TL in North Carolina (NCDMF 2022) to 914 mm (36 inches) TL in India (Gopalakrishnan 1971).

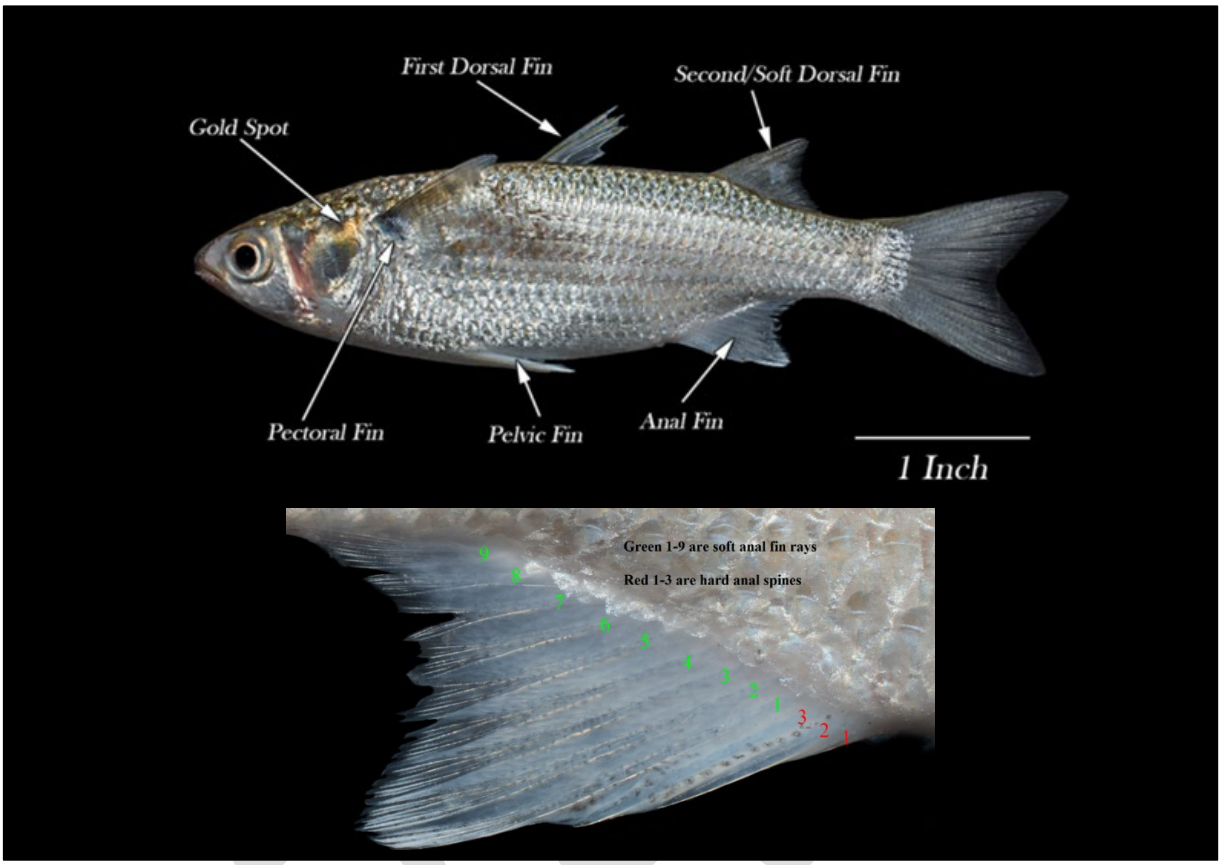

Figure 2. Identifying features for white mullet. White mullet have nine soft anal fin rays and a gold spot on the opercle. Photo By Scott Smith.

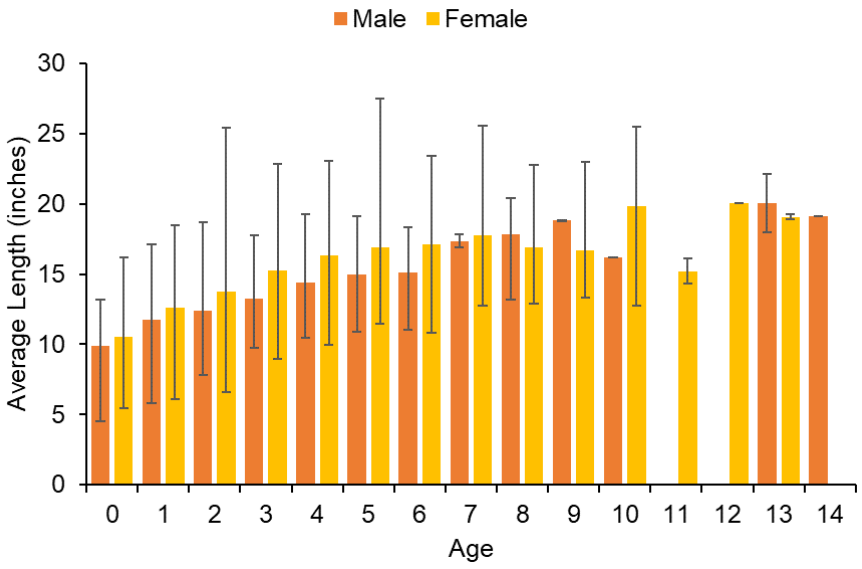

Figure 3. Average length at age for male and female striped mullet from DMF data. For some ages, only one sex or one specimen has been observed. Error bars show the range of lengths observed at each age by sex.

LIFE CYCLE

Larval and juvenile striped mullet begin their lives offshore, eventually moving inshore into a range of estuarine and shallow-water habitats as they reach adulthood (Anderson 1958, Leard, et al. 1995) where they remain from spring into summer (Leard, et al. 1995). In the southeast US, most adult movement occurs in the fall and winter months during the spawning migration from rivers and estuaries to ocean spawning grounds (M. R. Collins 1985a, Leard, et al. 1995, J. B. Bichy 2000). Increased migratory movement has been associated with north or northwest winds and cold fronts (Jacot 1920, Apekin and Vilenskaya 1979, Mahmoudi, et al. 2001) while hurricanes and unseasonably warm fall water temperatures may delay or disrupt the usual timing of spawning migrations (Thompson, et al. 1991).

REPRODUCTION

Striped mullet spawn once per year and may spawn many times throughout their lives. In North Carolina, striped mullet reach maturity at greater lengths compared to other regions, with males reaching maturity at 283 mm (J. B. Bichy 2004) and females reaching maturity at 319 mm (NCDMF 2021). It is estimated that 50% of striped mullet in North Carolina reach maturity at one year old for both males and females (J. B. Bichy 2000), one to two years earlier than in states south of North Carolina (Pafford 1983, Mahmoudi, et al. 2001). Maximum fecundity is reported to be from 0.5 to 4.2 million eggs per female, with fecundity being positively related to body size (larger fish produce more eggs) (Whitfield and Blaber 1978, Pafford 1983, J. B. Bichy 2000, Wenner 2001, Bichy and Taylor 2002, McDonough, Roumillat and Wenner 2003)

Striped mullet are catadromous, migrating in large schools from freshwater or brackish water habitats to marine spawning areas (Martin and Drewry 1978, M. R. Collins 1985a, S. M. Blaber 1987). The spawning location of North Carolina striped mullet is inferred largely based on indirect evidence, and likely occurs offshore, in and around the edge of the South Atlantic Bight (Broadhead 1953, Anderson 1958, Arnold and Thompson 1978, Martin and Drewry 1978, Powles 1981, Collins and Stender 1989, Ditty and Shaw 1996, Able and Fahay 1998). Spawning also likely occurs in nearshore coastal waters, lower estuarine areas, sounds, and (rarely) in freshwater (Jacot 1920, Breder 1940, Johnson and McClendon 1969, Shireman 1975, Martin and Drewry 1978, Collins and Stender 1989, Bettaso and Young 1999). Spawning is believed to occur at night near the surface (Anderson 1958, Arnold and Thompson 1978) and temporally around new and full moon spring tides (Greeley, Calder and Wallace 1987). The spawning season usually lasts from September to March in North Carolina, peaking in October and November (Jacot 1920, Bichy and Taylor 2002).

PREDATOR-PREY RELATIONSHIPS

Striped mullet act as an important ecological bridge among a wide range of trophic levels connecting base food chain items such as detritus, diatomaceous microalgae, phytoplankton, zooplankton, and marine snow (Odum 1968, Moore 1974, M. R. Collins 1985a, Larson and Shanks 1996, Cardona 2000, Torras, Cardona and Gisbert 2000), with top-level predators such as birds, sharks, and dolphins (Breuer 1957, J. M. Thompson 1963, M. R. Collins 1985a, Barros and Odell 1995, Fertl and Wilson 1997, Bacheler, Wong and Buckel 2005, Kiszka, et al. 2014). However, striped mullet likely contribute minimally to the diets of red drum (Facendola and Scharf 2012, Peacock 2014), striped bass (Rudershausen, et al. 2005) and other finfish species (Binion-Rock 2018). Carnivorous feeding on copepods, mosquito larvae, and microcrustaceans is common in striped mullet larvae and small juveniles (Desilva 1980, Harrington and Harrington 1961) followed by an increasing dependence on benthic and epiphytic detritus, microalgae, and microorganisms with increasing body size (DeSilva and Wijeyaratne 1977, Ajah and Udoh 2013, Bekova, et al. 2013). Adult striped mullet are primarily “interface feeders”, feeding on the water

surface, water bottom, or surfaces of objects, but will occasionally feed on mid-water polychaetas and live bait of anglers in non-interface areas (Bishop and Miglarese 1978).

HABITAT

Striped mullet live in both fresh and saline water (M. R. Collins 1985a, Hotos and Vlahos 1998) and can be found in rivers, estuaries, and ocean habitats. Adult striped mullet are found in almost all shallow marine and estuarine habitats including beaches, tidal flats, lagoons, bays, rivers, channels, marshes, and seagrass beds (Moore 1974, Pattillo, et al. 1999, Nordlie 2000). Striped mullet are highly mobile, allowing them to use a wide range of habitats (Baker, et al. 2013). Field specimens have been collected in salinities ranging from 0 to 75 parts per thousand (ppt); however, striped mullet prefer a salinity range of 20 ppt to 26 ppt (M. R. Collins 1985a, Leard, et al. 1995, Pattillo, et al. 1999). Young-of-the-year striped mullet are capable of full osmoregulation and can tolerate freshwater to full seawater salinities by 40 mm, when they are 7 to 8 months old (Nordlie 2000).

Striped mullet do not seem to live permanently in waters with temperatures below 16°C (M. R. Collins 1985a), but have been observed in waters colder than 2°C in low salinity habitats (<2 ppt) in North Carolina (NCDMF unpublished data). Smaller striped mullet (<50 mm) prefer higher water temperatures, 30.0°C to 32.4°C, while larger fish prefer cooler temperatures, 19.5°C to 29.0°C (Major 1977, M. R. Collins 1985a). Peak growth of juveniles of mixed *Mugil* species (striped mullet and white mullet) occurs at temperatures greater than 25°C in laboratory settings (Peterson, et al. 2000). Additionally, striped mullet can tolerate low levels of dissolved oxygen and can capture air from the surface to supplement their oxygen supply for respiration (Pattilo, et al. 1999). They live at depths ranging from a few centimeters to over 1,000 meters but are mostly observed within 40 meters of the surface. Once inshore, they prefer depths of 3 meters or less.

Unit Stock and Management Unit

Based on available movement, migration, and life history data, the unit stock and management unit for striped mullet are defined as all striped mullet inhabiting North Carolina coastal and inland fishing waters.

Assessment Methodology

The stock assessment used a model to estimate historical and current population sizes for striped mullet in North Carolina. Data used in the assessment were collected from 1950 to 2019, from fish within North Carolina coastal and inland fishing waters (the range of the assumed biological unit stock). Commercial harvest data used in the assessment were collected by the North Carolina Trip Ticket Program, and recreational harvest data were collected through the National Oceanic and Atmospheric Administration's (NOAA) Marine Recreational Information Program (MRIP). Biological samples and environmental data were collected by DMF as part of several fishery-independent and fishery-dependent data collection programs. Several environmental variables including salinity, dissolved oxygen, water temperature, and bottom composition were incorporated into calculation of abundance indices. Following completion of the stock assessment, an external peer review workshop was held in April 2022. The DMF and peer review panel both concluded that the assessment model and results are suitable for providing management advice for at least the next five years.

Stock assessments often use a measure of female spawning stock biomass (SSB) to determine the status of the population relative to the level that is adequate for the recruitment class of a fishery to replace the spawning class of the fishery. Female spawning stock biomass includes

female fish that are mature and capable of producing offspring. The fishing mortality rate (*F*) is a measure of how quickly fish are being removed from the population by commercial and recreational fisheries combined. Removals include those fish that are kept and those that die after being released or discarded.

The 2019 estimates for female SSB and *F* were compared to thresholds that are considered sustainable. Sustainable harvest is defined as the amount of fish that can be taken from a fishery on a continuing basis without reducing the stock biomass of the fishery or causing the fishery to become overfished (G.S. 113-129 14a). These levels are based on two types of established reference points: a target level and a threshold level. The threshold is the minimum level required to end overfishing or allow the stock to rebuild from an overfished status. The target is intended to provide a buffer that accounts for variable conditions that may impact the efficacy of management actions. Managing to the target may increase the probability of successfully limiting fishing mortality to a level that allows the fishery to achieve sustainable harvest levels. If female SSB is less than the SSB threshold the stock is overfished, meaning that the spawning stock biomass of the fishery is below the level that is adequate for the recruitment class of a fishery to replace the spawning class of the fishery (G.S. 113-129 12c). If *F* is above the *F* threshold the rate of removals is too high and overfishing is occurring. Overfishing is fishing that causes a level of mortality that prevents a fishery from producing a sustainable harvest (G.S. 113-129 12d).

The threshold and target fishing mortality and spawning stock biomass reference points used in stock assessments are selected to achieve a desired spawning potential ratio (SPR). SPR describes the expected reproductive output of an “average” individual fish over its lifetime when the population is fished, compared to what would be expected for that same individual in the absence of fishing. When choosing an SPR level for management decisions, the goal is to ensure the number of new fish (recruits) joining the spawning stock each year is not greatly decreased compared to what the stock would produce if it were not experiencing fishing pressure. Higher SPR levels do not necessarily result in more fish recruiting to the spawning stock because as more fish are added to the population, they compete for resources such as food and habitat, and survival decreases. Alternatively, when SPR drops too low, not enough new fish are produced and recruitment to the adult population declines, eventually resulting in a stock that is overfished. The appropriate SPR for a given stock is dependent on life history characteristics of the species and how associated fisheries operate. An SPR level of 20-50% is usually appropriate (Caddy and Mahon 1995). A greater SPR level is used when a more conservative management strategy is desired for the fishery.

For more details about assessment methodology, please refer to the 2022 Striped Mullet Stock Assessment (NCDMF 2022).

Stock Status

The North Carolina striped mullet stock is overfished, and overfishing is occurring in 2019, the terminal year of the 2022 stock assessment (NCDMF 2022). The observed data and model predictions suggest a decreased presence of larger, older striped mullet in the population. The model estimates declining trends in age-0 recruitment and SSB over the last several decades (Figure 4). Model results also indicate consistent overestimation of biomass and the greatest risk for overfishing.

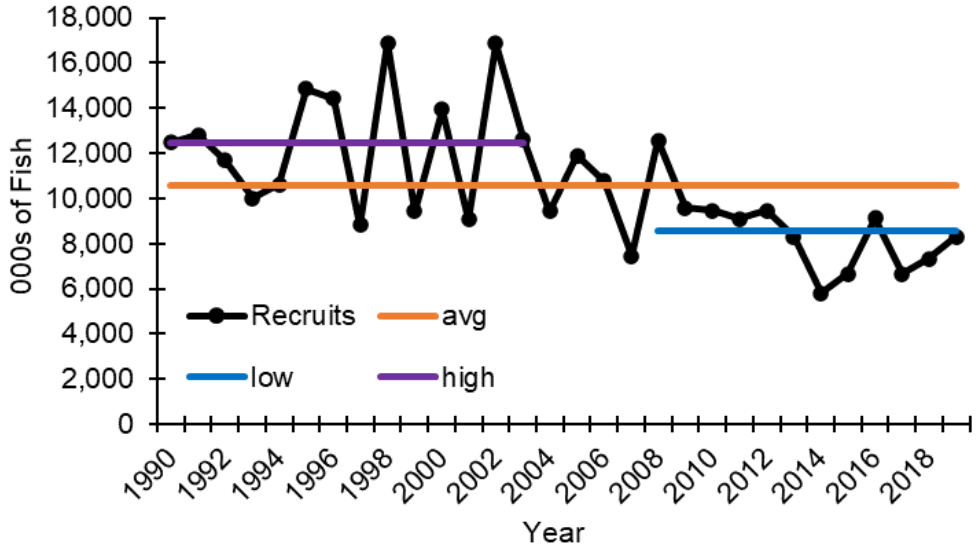

Figure 4. Estimates of striped mullet recruitment from the 2022 striped mullet stock assessment (NCDMF 2022). Average recruitment is the average number of recruits from 1990 to 2019, high recruitment is the average number of recruits from 1990 to 2003, and low recruitment is the average number of recruits from 2008 to 2019.

The stock assessment model estimated a value of 0.37 for the $F_{25\%}$ threshold and a value of 0.26 for the $F_{35\%}$ target. In 2019, the terminal year of the assessment, F was 0.42, greater than the $F_{25\%}$ threshold, indicating overfishing is occurring (Figure 5). The probability that the stock is undergoing overfishing is 80%. The model estimated a value of 1,364,895 pounds for the $SSB_{25\%}$ threshold and a value of 2,238,075 pounds for the $SSB_{35\%}$ target. Female SSB in 2019 was estimated at 579,915 pounds, lower than the $SSB_{25\%}$ threshold, indicating the stock is overfished (Figure 6). The probability that the stock is overfished is 95%

PROJECTIONS

Please refer to the 2022 stock assessment (NCDMF 2022) and the Achieving Sustainable Harvest in the North Carolina Striped Mullet Fishery Issue Paper (Appendix 2) for more information about stock projections and reductions necessary to end overfishing and achieve sustainable harvest for the North Carolina striped mullet stock.

DESCRIPTION OF THE FISHERY

Additional in-depth analyses and discussion of North Carolina's historical commercial and recreational striped mullet fisheries can be found in earlier versions of the Striped Mullet FMP (NCDMF 2006, NCDMF 2015). Commercial and recreational landings can be found in the License and Statistics Annual Report (NCDMF 2022) on the DMF Fisheries Statistics website.

Discussion of socio-economic information describes the fishery as of 2021 and is not intended to be used to predict potential impacts from management changes. This and other information pertaining to the FMPs are included to help inform decision-making regarding the long-term viability of the state's commercially and recreationally significant species and fisheries. For a

detailed explanation of the methodology used to estimate economic impacts, please refer to the DMF License and Statistics Section Annual Report (NCDMF 2022).

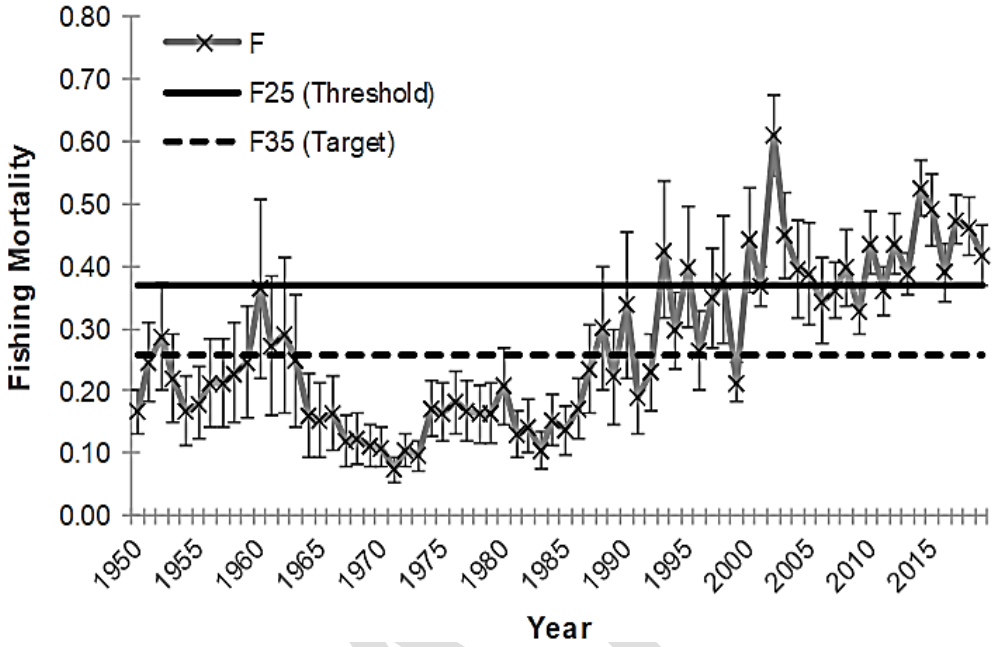

Figure 5. Comparison of annual estimates of fishing mortality (numbers weighted, ages 1-5) to the fishing mortality target (F35%) and threshold (F25%). Error bars represent plus or minus 2 standard deviations.

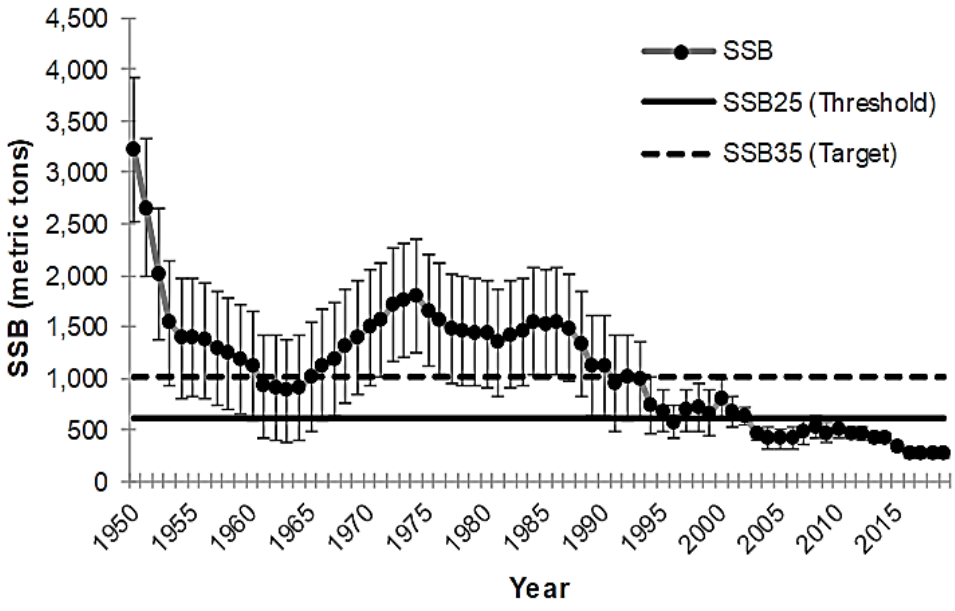

Figure 6. Comparison of annual estimates of female spawning stock biomass (SSB) to the SSB target (SSB35%) and threshold (SSB25%). Error bars represent plus or minus 2 standard deviations.

Commercial Fishery

COLLECTION OF COMMERCIAL HARVEST DATA

DMF instituted a mandatory, dealer-based, trip-level, reporting system known as the North Carolina Trip Ticket Program (NCTTP) for all commercial species in 1994. All seafood landed in North Carolina and sold by licensed commercial fishermen must be reported on a trip ticket by a licensed seafood dealer. For more information about licensing requirements for purchasing and selling seafood in North Carolina and how commercial fishing data were collected prior to 1994, please refer to the DMF License and Statistics Section Annual Report (NCDMF 2022). In 2021, 148 seafood dealers reported striped mullet on trip tickets, landed by 664 fishery participants during 11,432 fishing trips (Figure 7).

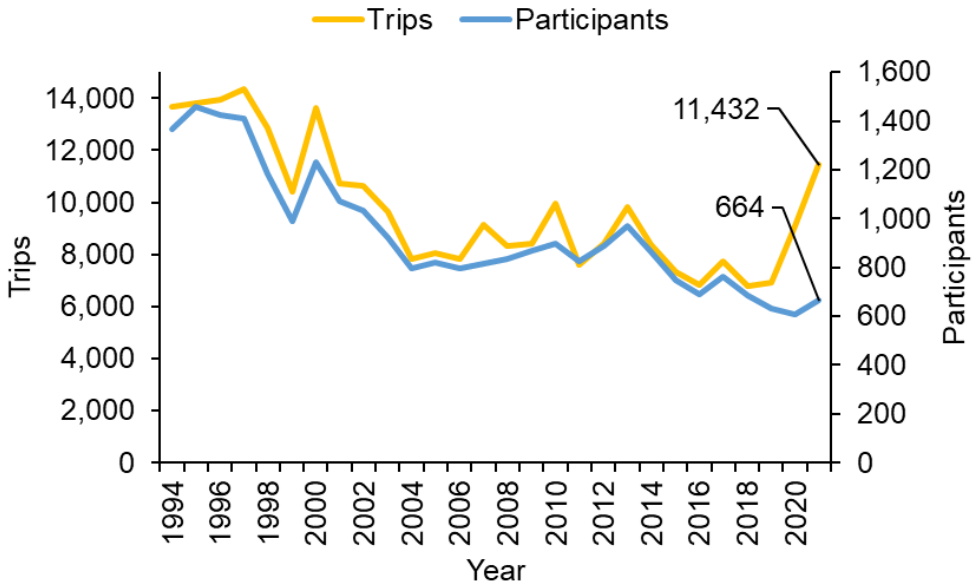

Figure 7. Annual number of trips and participants for the North Carolina striped mullet commercial fishery from 1994 to 2021.

HISTORICAL LANDINGS AND VALUE

The historic striped mullet fishery had a prominent role in the early development of the North Carolina commercial fishing industry and striped mullet were ranked as the most abundant and important saltwater fish of North Carolina in the early 1900s (Smith 1907). The fishery's historical importance is illustrated by the colloquial name of the Atlantic and North Carolina Railway, known as the 'Old Mullet Line', which connected coastal and piedmont North Carolina from the 1850s to 1950s (Little 2012). The mullet fishery operated at over 3 million pounds annually during the late 1800s (Figure 8) (Chestnut and Davis 1975) and enormous catches of greater than 1 million pounds of striped mullet landed in a single day were not an uncommon event during fall spawning migrations (Smith 1907). The greatest recorded annual landings of over 6.7 million pounds and 5.1 million pounds were harvested in 1902 and 1908, respectively (Figure 8) (Chestnut and Davis 1975).

The fishery and market for striped mullet changed markedly in the late 1980s. Strong demand from Asia for striped mullet roe and competing roe-exporting companies combined to create a highly profitable roe fishery in NC in 1988; that year landings exceeded 3 million pounds for the first time in 28 years. Value of the fishery increased even more noticeably than landings during

the late 1980s. From 1987 to 1988, landings increased by 18%, yet value grew by 150% (Figure 9). A depressed Asian economy in the late 1990s may have led to a decline in roe demand.

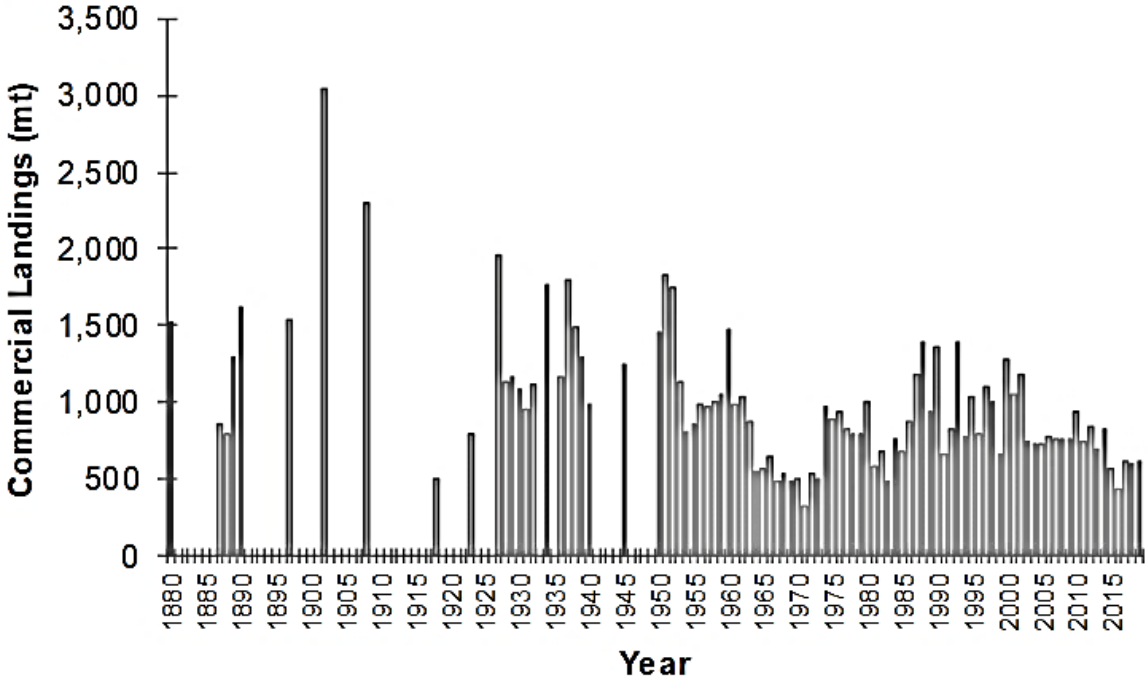

Figure 8. Historical striped mullet landings in the North Carolina commercial striped mullet fishery, for 1880 to 2021.

From 2000 to 2021, the price per pound for striped mullet has been variable, ranging from a low of $0.40 per pound in 2008 to $0.91 per pound in 2013. Since the early 2000s, landings in the striped mullet fishery have stabilized to around 1.5 to 2.0 million pounds annually, except for 2016, when total landings dipped to just under 1 million pounds (Figure 9). Because the commercial fishery primarily targets striped mullet roe, the greatest demand, intensity of harvest, and price per pound occurs in October and November (Figure 10), coinciding with the peak spawning period of striped mullet (Bichy and Taylor 2002, Jacot 1920).

LANDINGS BY MARKET GRADE

Striped mullet harvest is categorized by size and market grades when purchased by seafood dealers from fishermen. Striped mullet landings only began to be recorded by specific market grades on trip tickets in 1994, as extra-small, small, medium, large, jumbo, mixed, red roe, roe, and white roe market categories. For the market grade analyses in this FMP, landings reported as extra small, small, medium, large, jumbo, and mixed were combined into the “Mixed” market grade category and landings reported as roe or red roe were combined into the “Red Roe” market grade category. From 1994 to 2021, striped mullet landings were sorted into either mixed (54%), red roe (40%), or white roe (spawning male striped mullet; 6%) market grades (Figure 11). During the same time period 42% of the value came from mixed market grade striped mullet, 55% of the value came from red roe, and 3% of the value came from white roe.

Mixed market grade harvest occurs year-round but increases in late summer, early fall, and January, likely because of the increased availability of striped mullet to the commercial fishery during their spawning migration. From 1994 to 2021, 97% of the annual red roe harvest, 95% of the annual white roe harvest, and 23% of the annual mixed market grade harvest occurred in November and December. Most spawning striped mullet are graded as mixed after Thanksgiving,

even though ripe (ready to spawn) fish are occasionally harvested into February and March. The roe market typically shifts from North Carolina to Florida in December. From 1994 to 2021, landings of Red Roe and Mixed grade mullet have fluctuated, with mixed grade landings increasing substantially since 2016 (Figure 12).

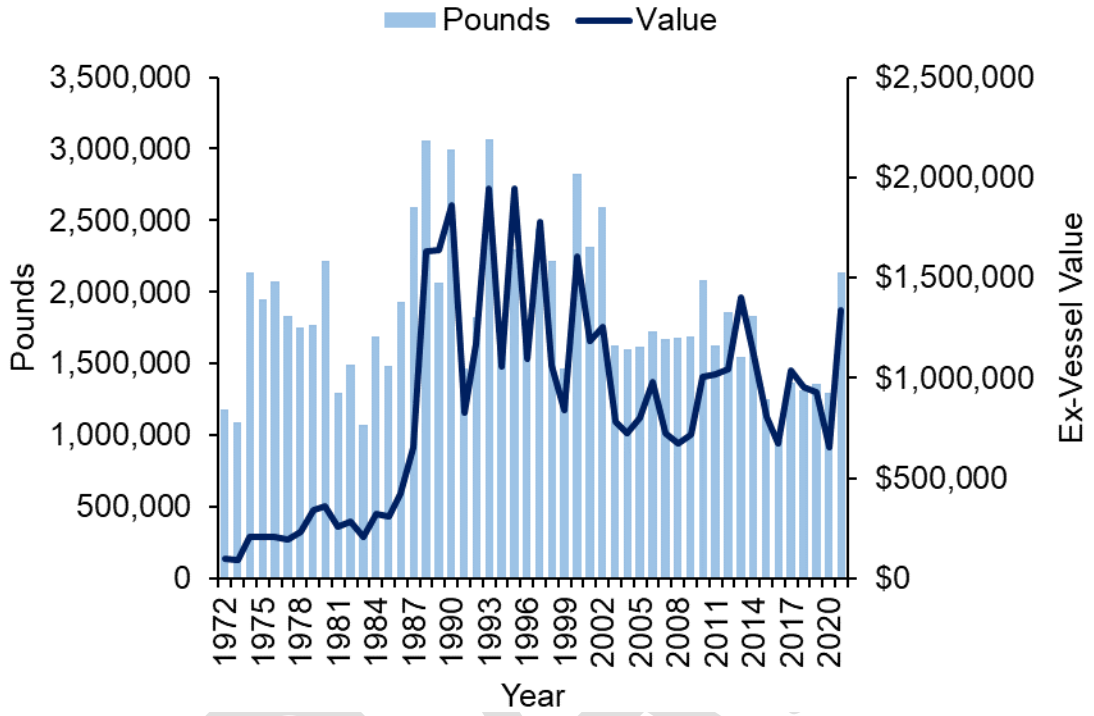

Figure 9. North Carolina annual striped mullet commercial landings and ex-vessel value for 1972 to 2021. Values include all market grades and are not adjusted for inflation.

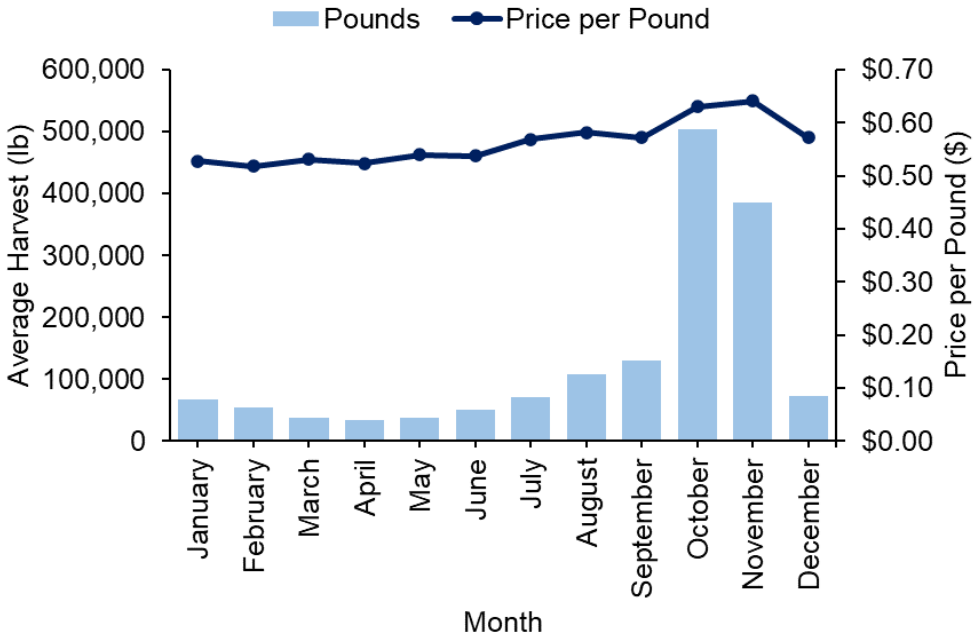

Figure 10. North Carolina striped mullet average monthly landings and average price per pound for 2010 to 2021. Averages include all market grades and are not adjusted for inflation.

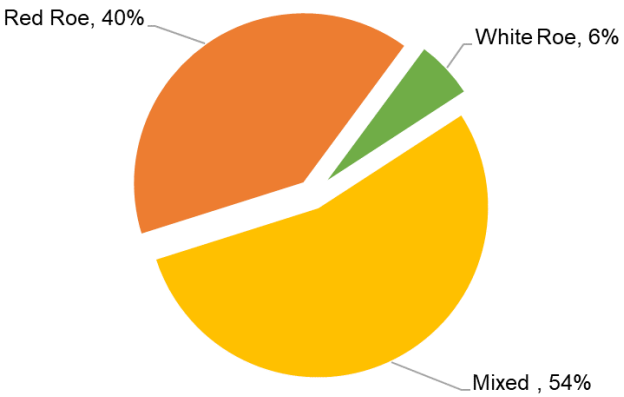

Figure 11. Percent of total landings by market grade in the North Carolina striped mullet commercial fishery, for 1994 to 2021. Landings reported as extra small, small, medium, large, jumbo, and mixed were combined into the "Mixed" market grade category. Landings reported as roe or red roe were combined into the "Red Roe" market grade category.

BAIT LANDINGS

The option for seafood dealers in North Carolina to report the disposition of landings on their trip tickets became available in 2017. Disposition is now a required field on trip tickets for dealers reporting electronically but some seafood dealers reporting on paper trip tickets are still using older, unused trip tickets that are missing the disposition field. Some seafood dealers leave the disposition field blank, an option intended to indicate that the default disposition for mullets of "food" should be used; however, a blank field could also indicate an accidental omission while recording the ticket. Additionally, mullets reported in numbers of fish rather than in pounds are often but not always bait landings, and some dealers report bait mullets using generic bait codes rather than using the correct species codes for "Finger Mullet" or "Jumping Mullet" (white and striped combined). Seafood dealers do not report mullets to the species level on trip tickets, but instead can report landings of larger fish as "Jumping Mullet" (all market grades except for extra-small) or smaller fish as "Finger Mullet" (extra-small market grade).

Commercial landings disposition data for striped mullet are currently considered to be inadequate for use in developing management measures because of the limited time series of disposition data for striped mullet landings and inconsistency in seafood dealers using the correct species and disposition codes when recording trip tickets. Additionally, commercial landings data for extra-small market grade mullet, or "Finger Mullet", used as bait are not recorded to the species level. A DMF study completed in the early 2000s indicated that most of these landings are white mullet, and that species composition can depend on the month and location of harvest (NCDMF 2006).

LANDINGS BY COUNTY AND WATERBODY

For information about trends in striped mullet commercial landings by county and by waterbody, please refer to the Small Mesh Gill Net Fishery Characterization Information Paper (Appendix 1). Most commercial striped mullet landings in North Carolina come from gill net fisheries and are landed in Dare and Carteret counties.

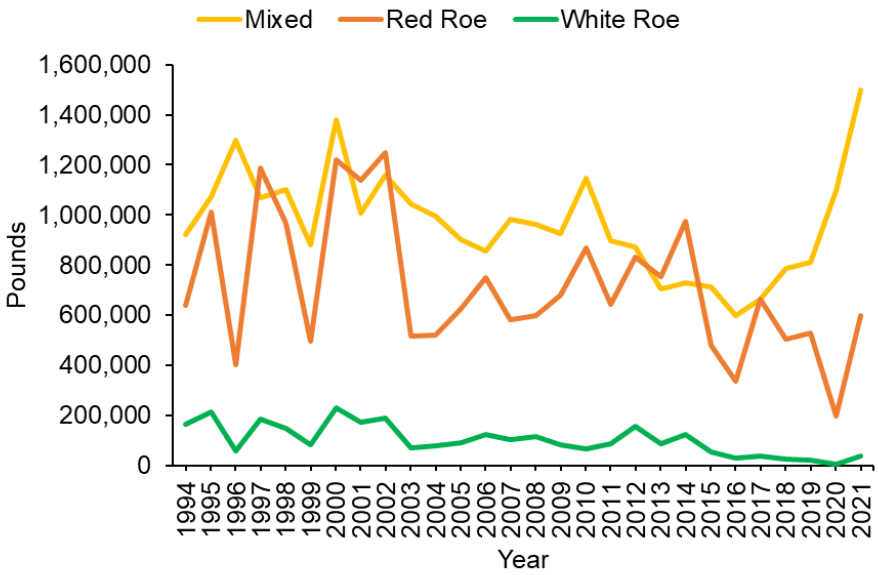

Figure 12. Annual landings by major market grade in the North Carolina striped mullet commercial fishery for 1994 to 2021. Landings reported as extra small, small, medium, large, jumbo, and mixed were combined into the "Mixed" market grade category. Landings reported as roe or red roe were combined into the "Red Roe" market grade category.

LANDINGS BY 1314GEAR TYPE

Beach Seines and gill nets have been the two primary gear types used in the striped mullet commercial fishery since the earliest landings were documented in 1887. The beach seine fishery accounted for most commercial harvest for nearly 100 years, from 1887 to 1978. Gill nets replaced beach seines as the dominant gear type in the fishery in 1979 and the yearly proportion of total commercial striped mullet landings harvested by gill nets steadily increased until 1995 (Figure 15). Since then, gill net landings have averaged around 91% of striped mullet landings through 2021. Please refer to the Small Mesh Gill Net Characterization Information Paper (Appendix 1) for more information about gear classifications and small mesh gill nets in the North Carolina striped mullet fishery.

RUNAROUND GILL NETS

The contribution of runaround gill nets to total commercial harvest of striped mullet each year has steadily increased since 1972, and experienced a large increase in the 1990s, possibly resulting from the gill net closure in Florida state waters at the time. Anecdotal reports from North Carolina fishermen indicate an influx of Florida striped mullet fishermen into North Carolina and subsequent improvements in harvesting methods. More jet drive boats, spotting towers, night fishing, and runaround gill netting were reported by the mid-1990s. Additionally, expanded fishing regulations requiring gill net attendance for anchored small mesh gill nets (less than 5 inch stretched mesh) in North Carolina began in 1998, which may have further prompted a shift from set nets to runaround gill net fishing for striped mullet. (Figure 16).

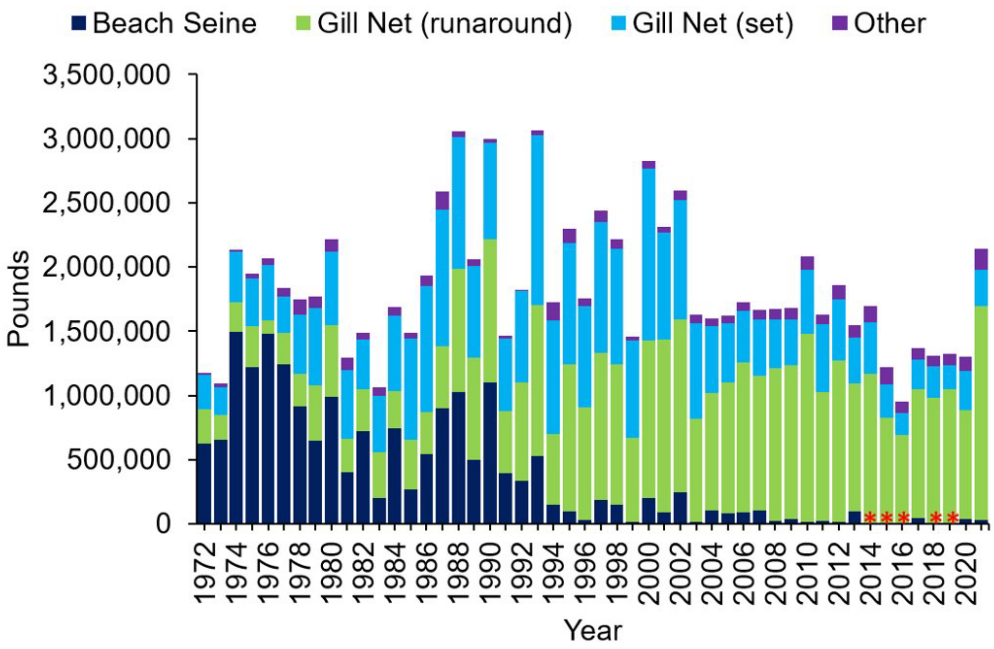

Figure 15. Total landings in pounds by dominant gear type in the North Carolina striped mullet commercial fishery for 1972 to 2021. Beach seine landings for 2014 through 2016 and 2018 through 2019 are confidential due to the number of vessels, dealers, or participants involved and therefore not presented, indicated by asterisks.

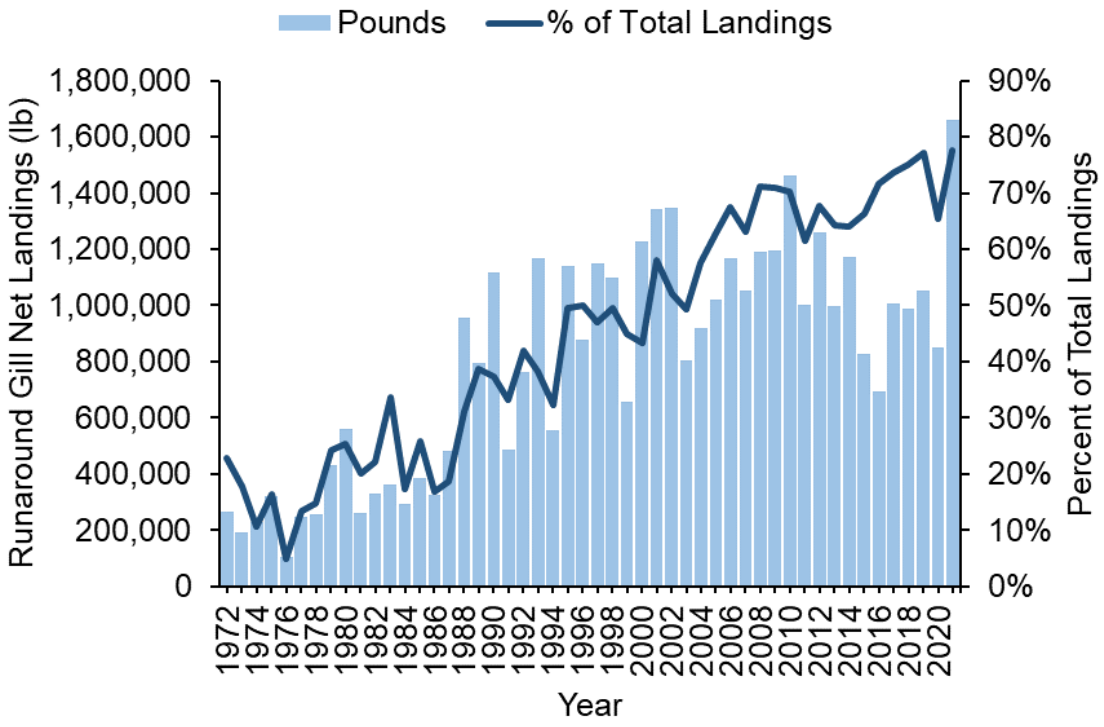

Figure 16. Pounds harvested by runaround gill nets by year and percent of total landings harvested by runaround gill nets by year in the North Carolina striped mullet commercial fishery for 1972 to 2021.

SET GILL NETS

Set gill nets have also become increasingly important in the striped mullet commercial fishery since 1972, although the proportion of total landings harvested by set gill nets has not increased since the mid-1980s (Figure 17). Set gill net trips in North Carolina do not usually target striped mullet, but they do harvest marketable striped mullet incidentally. Small mesh anchored gill nets have accounted for most of the striped mullet landings harvested using set gill nets. Since peaking in 1993 and 2000, annual striped mullet landings from set gill nets have generally declined with the increasing contribution of runaround gill nets to the fishery (Figure 17). Most striped mullet harvested using set gill nets are landed in October and November, coinciding with the roe fishery. Landings from set gill nets at other times of the year tend to be small, reflecting the incidental capture of striped mullet in other fisheries. For more information about the small mesh set gill net fishery for striped mullet in North Carolina, please refer to the Small Mesh Gill Net Fishery Characterization Information Paper (Appendix 1).

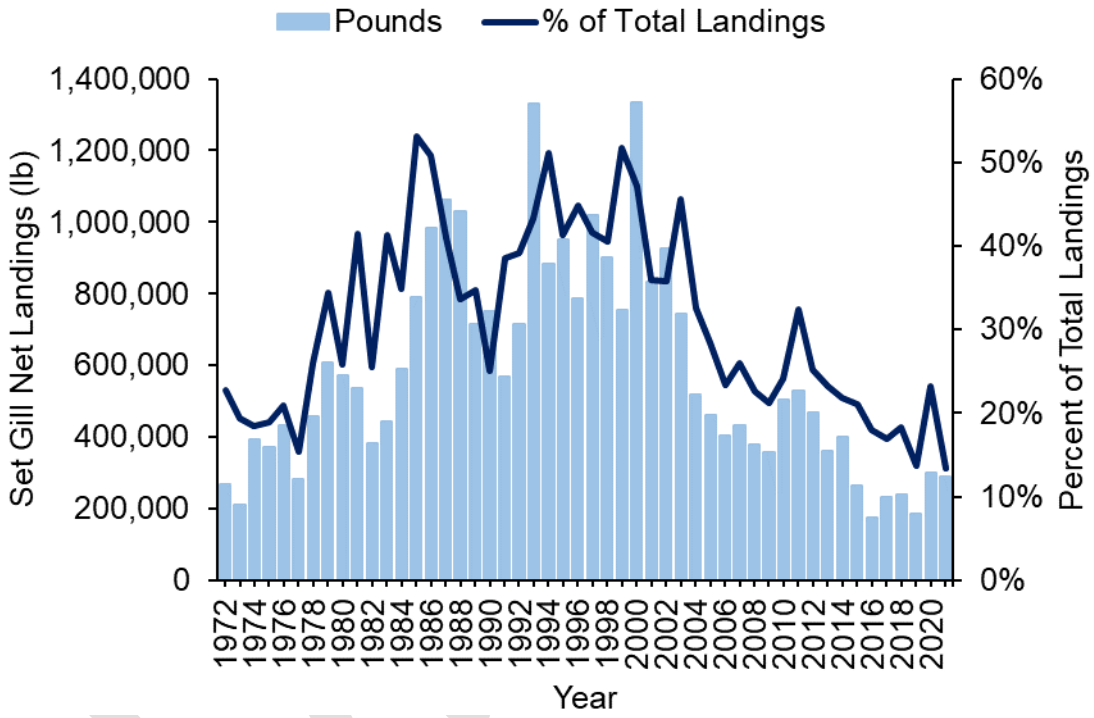

Figure 17. Pounds harvested using set gill nets and percent of total landings harvested using set gill nets by year in the North Carolina striped mullet commercial fishery for 1972 to 2021.

BEACH SEINES

The historic striped mullet beach seine fishery was predominantly composed of beach crews scattered among established territories along the central coastline of North Carolina, from Ocracoke Island and along Core, Shackleford, and Bogue banks (Simpson and Simpson 1994). Spotters along the beach would alert boat crews of southwestward, ocean migrating striped mullet schools. A long seine was deployed by small boat or skiff to intercept the oncoming school. Striped mullet were hauled in by manpower, horses, oxen, or tractors in later years. Stop nets (stationary nets not intended to gill fish but used to impede the movement of schooling fish so that they can be harvested with a seine) were employed in Bogue Banks.

The proportion of annual striped mullet harvest from the beach seine fishery has dwindled since 1972 and landings have fluctuated but declined greatly since 1994 (Figure 18). Beach seine

landings of striped mullet occur almost exclusively in October and November due to the restricted stop net fishery season. Extremely poor landings throughout the 1990s and 2000s may have resulted from fall hurricanes and strong weather conditions, which can have a particularly profound effect on stop net harvest because of its limited fishing season. The majority of striped mullet landings from beach seines are landed in the Ocean (93%) in the stop net fishery along Bogue Banks in Carteret County. The stop net fishery has operated under fixed seasons, and net and area restrictions since 1993. Stop nets are limited in number (four), length (400 yards), and mesh sizes (minimum eight inches – outside panels, six inches – middle section). Stop nets are only permitted along Bogue Banks (Carteret County) in the Atlantic Ocean from October 1 to November 30.

Landings from the other, smaller seine fisheries are harvested in ocean waters (0-3 miles), primarily in Carteret, Dare, and Hyde counties. Typically, monofilament gill nets (200-300 yards) are used to intercept ocean schooling striped mullet and hauled onto the beach as functional seines. Most striped mullet landings in this fishery occur in October and November during the fall spawning migration (J. B. Bichy 2000, M. R. Collins 1985a, Leard, et al. 1995). Outside of October and November, most of this fishery does not target striped mullet. Seines for spot, spotted seatrout, kingfish, and other species along the Outer Banks account for most trips from December to September of the next year.

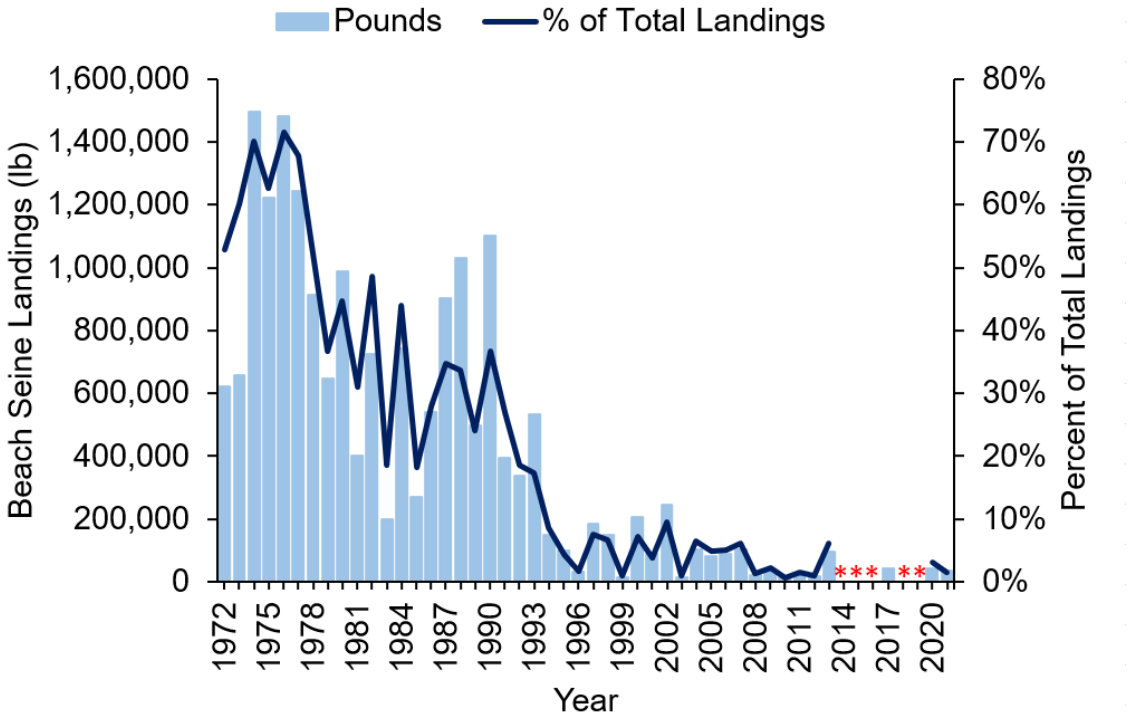

Figure 18. Pounds harvested using beach seins and percent of total landings harvested using beach seines by year in the North Carolina striped mullet commercial fishery for 1972 to 2021. Values for 2014 through 2016 and 2018 through 2019 are confidential and therefore not presented, indicated by asterisks.

CAST NETS

Cast net harvest of striped mullet is predominantly sold as bait. Cast net landings only represent 3% of the total striped mullet landings from 1994 to 2021 and increased from 1994 through 2015 before declining over recent years (Figure 19). In 2015, cast net landings contributed 8% of all

striped mullet landings that year, the highest proportion since 1994, when seafood dealers began reporting cast net landings on trip tickets (Figure 19).

Cast net landings of striped mullet are seasonal, with 76% of the annual harvest occurring in September and October. This seasonality of landings coincides with the spawning migration of white mullet. Most of the bait fish harvested commercially using cast nets that are reported by seafood dealers (striped and white combined) are likely white mullet (NCDMF 2006). A recreational cast net bait mullet fishery characterization study in the early 2000s showed that white mullet make up most commercial cast net landings in September and October, but striped mullet make up the majority of the landings in November in North Carolina (NCDMF 2006). The fall cast net fishery primarily targets mullets that will be used as bait, either as cut, whole (frozen), or live bait, in contrast to other mullet fisheries that almost exclusively target roe fish during this period. The greatest proportion of mullet landed by cast nets from 1994 to 2021 were harvested in the Ocean (0-3 miles; 58%) and the Pamlico Sound (30%).

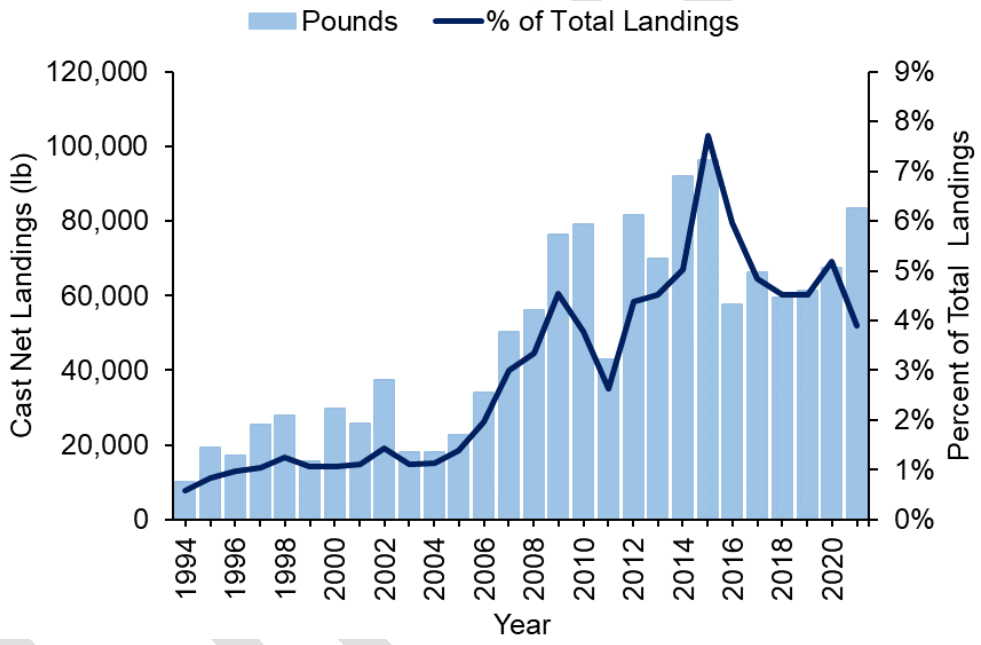

Figure 19. Pounds harvested using cast nets and percent of total landings harvested using cast nets by year in the North Carolina striped mullet commercial fishery for 1972 to 2021.

EFFECTS OF WEATHER ON FISHERY

Hurricanes occur frequently in eastern North Carolina, particularly in the fall during peak striped mullet fishing periods and may impact the striped mullet fishery, though impacts are inconsistent and largely influenced by timing of the hurricane. Hurricanes can damage fishing gear, prevent fishermen from fishing, and may cause striped mullet to leave the estuarine system earlier than normal (Burgess, et al. 2007). Increased migratory movement of striped mullet, sometimes referred to by fishermen as a “mullet blow”, has also been associated with north or northwest winds and cold fronts (Jacot 1920, Apekin and Vilenskaya 1979, Mahmoudi, et al. 2001). Hurricanes and unseasonably warm fall water temperatures may delay or disrupt the usual timing of spawning migrations (Thompson, et al. 1991). However, hurricanes and unusual weather conditions are not the only causes of lower striped mullet landings, and the potential reduction in fishing mortality during hurricane years could have a positive effect on spawning stock biomass of the striped mullet stock in subsequent years (Burgess et al. 2007).

Striped Mullet Bycatch

Bycatch is the portion of the catch made up of species not being targeted on the fishing trip, captured because the gear is not selective enough or because of species and size differences. Bycatch can be divided into two categories: incidental catch and discarded catch. Incidental catch is retained, marketable catch of non-target species, while discarded catch is returned to the sea for regulatory, economic, or personal reasons. Fisheries most likely to encounter striped mullet bycatch include the set gill net and crab pot fisheries. Most striped mullet bycatch can be regarded as incidental catch and is not usually discarded unless it is unmarketable. Historically, there have not been regulations that would require striped mullet to be discarded in commercial fisheries, and striped mullet harvested incidentally can be used for food or bait, even outside of the roe fishery season.

Set Gill Net Fishery

From 2011 to 2021, there were 1,150 anchored small mesh gill net trips observed by DMF of which 389 trips caught striped mullet (35% of observed trips). From these trips, a total of 7,874 striped mullet were caught and 46 were discarded (0.6% of mullet). During the same period, there were 4,439 anchored large mesh gill net trips observed of which 120 trips caught striped mullet (3% of observed trips). From these trips, a total of 166 striped mullet were caught and 25 were discarded (15% of mullet). From 2011 to 2021, there were no commercial harvest restrictions for striped mullet, so most striped mullet caught incidentally in set gill nets were kept and sold. Discarded fish are usually unmarketable. Set gill nets do not appear to be a source of significant striped mullet discarded bycatch.

Crab Pot Fishery

From 2011 to 2021, annual landings of finfish bycatch (excluding crabs, shrimp, shellfish, and squids) from hard crab pots have averaged at about 1,800 pounds per year. Striped mullet are the eighth most common species overall and third most common finfish (not mollusk or crustacean) landed in crab pots by total weight. Striped mullet make up 11% of total finfish bycatch from hard crab pots by weight yet make up less than 1% of total hard crab pot landings. Annual total landings of striped mullet from hard crab pots averaged 6,054 pounds per year from 2011 to 2021. Striped mullet landings in peeler pots averaged 533 pounds per year during the same period and are the seventh most common species overall by weight landed in peeler pots. Striped mullet are the fourth most common finfish bycatch species by weight in peeler pots and make up about 4% of total finfish bycatch in peeler pots. Striped mullet make up less than 1% of total peeler pot landings.

Bycatch in Targeted Striped Mullet Fisheries

The two most important commercial fisheries in North Carolina that target striped mullet are the runaround gill net fishery and the stop net component of the beach seine fishery that occurs in Carteret County. From 2011 to 2021, Striped mullet have made up most landings by weight in both the runaround gill net fishery (70%) and the in the stop net fishery (89%). Other species harvested incidentally in the runaround gill net fishery include spotted seatrout (10% of total landings by weight), spot (4%), bluefish (4%), menhaden (2%) and red drum (2%). The remaining 8% of total runaround gill net landings from 2011 to 2021 were made up of 83 other species. Other species harvested incidentally in the stop net fishery include spotted seatrout (4% of total landings by weight), bluefish (2%), spot, (2%), and kingfishes (1%). The remaining 2% of total stop net landings from 2011 to 2021 were made up of 16 other species. The stop net component of the beach seine fishery that targets striped mullet has declined in importance over the past 30 years and striped mullet are no longer the top species landed in beach seines. In both targeted

striped mullet fisheries, the species commonly harvested as bycatch are marketable and not likely to be discarded unless regulations or the condition of the fish require them to be discarded.

RECREATIONAL CAST NET FISHERY

The 2006 Striped Mullet FMP (NCDMF 2006) examined the issue of large amounts of bait mullet harvested recreationally by cast net being discarded at the end of fishing trips, and the additional issue of fishermen harvesting large amounts of bait mullet in North Carolina and selling them in other states. Effective July 1, 2006, Marine Fisheries Commission Rule 15A NCAC 03M .0502 was amended to include section (b), which implemented a 200 mullet (white mullet and striped mullet in aggregate) per person per day recreational bag limit for striped mullet. This rule limited the number of bait mullet that may eventually be discarded at the end of fishing trips by recreational fishermen and addressed the issue of large amounts of bait mullet being sold in other states.

Recreational Fishery

Few anglers target striped mullet using hook and line gear; however, striped mullet and white mullet are popular bait fish for anglers targeting a variety of inshore and offshore species. Mullets are used as live, cut, and trolling baits (Nickerson Jr. 1984) and are commonly used by anglers fishing in the surf recreationally. Anglers using cast nets often catch young of the year mullets, commonly known as finger mullet. At the end of each fishing trip, anglers typically discard dead and unused bait mullet. Cast netting for mullet generally occurs during the summer and fall, with the majority caught in September and October, coinciding with the southward migration of young of the year striped and white mullet. For more information about the North Carolina recreational striped mullet fishery and how recreational data are collected, please see the Recreational Harvest Information Paper (Appendix 3).

SUMMARY OF ECONOMIC IMPACT

Commercial landings and effort data collected through the DMF trip ticket program were used to estimate the economic impact of the commercial striped mullet fishery. For commercial fishing output, total impacts were estimated by incorporating modifiers from the NOAA Fisheries Economics of the United States report (NMFS 2021), which account for proportional expenditures and spillover impacts from related industries. By assuming the striped mullet fishery contribution to expenditure categories at a proportion equal to its contribution to total commercial ex-vessel values, estimates were generated of the total economic impact of the commercial striped mullet fishery statewide. Modeling software, IMPLAN, was used to estimate the economic impacts of the industry to the state at-large, accounting for revenues and participation. For a detailed explanation of the methodology used to estimate the economic impacts please refer to the latest DMF License and Statistics Annual Report.

From 2011 to 2021 striped mullet economic ex-vessel value has been about $1 million dollars, impacting about 9,000 jobs annually (Table 1). Annual sales impacts have varied over the described decade but averaged $3.5 million from 2011 to 2021 (Table 1). It is estimated the striped mullet fishery contributes to about 1% of commercial fishing sales impact.

The striped mullet commercial fishery is driven by seasonal changes in availability of the stock to commercial fisheries, coinciding with the migration of spawning adult fish from inshore waters through the inlets and into the ocean. Estimated changes in job impacts and sales impacts reflect the accessibility of the population to fishing throughout the year. Most of the economic impacts

are concentrated in October and November of each year when annual commercial harvest levels peak (Table 2).

Table 1 Annual estimates of commercial economic impact to the state of North Carolina from striped mullet harvest for 2011 to 2021.

Year	Pounds Landed	Ex-Vessel Value	Job Impacts	Income Impacts	Value-Added Impacts	Sales Impacts
2021	2,135,952	$ 1,273,639	12,106	$ 1,869,008	$ 3,521,559	$ 4,024,260
2020	1,299,464	$ 651,104	9,100	$ 1,357,820	$ 2,320,755	$ 2,968,469
2019	1,362,212	$ 940,747	7,539	$ 1,402,513	$ 2,629,596	$ 3,022,280
2018	1,312,121	$ 982,925	7,421	$ 1,539,201	$ 2,842,970	$ 3,324,933
2017	1,366,338	$ 1,095,476	8,602	$ 1,557,537	$ 2,964,234	$ 3,348,036
2016	965,337	$ 722,324	7,471	$ 1,038,377	$ 1,969,253	$ 2,233,376
2015	1,247,044	$ 878,666	8,005	$ 1,259,705	$ 2,391,057	$ 2,709,024
2014	1,828,351	$ 1,216,200	9,375	$ 1,748,458	$ 3,315,835	$ 3,760,652
2013	1,549,157	$ 1,558,612	10,930	$ 2,423,011	$ 4,485,190	$ 5,232,261
2012	1,859,587	$ 1,174,215	9,483	$ 1,902,954	$ 3,479,302	$ 4,117,409
2011	1,627,894	$ 1,168,822	8,443	$ 1,912,423	$ 3,486,877	$ 4,139,736
Average	1,504,860	$ 1,060,248	8,952	$ 1,637,364	$ 3,036,966	$ 3,534,585

Table 2. Monthly estimates of commercial economic impact to the state of North Carolina from striped mullet harvest for 2017 to 2021.

Month	Pounds Landed	Ex-Vessel Value	Job Impacts	Income Impacts	Value Added Impacts	Sales Impacts
January	93,518	$ 36,787.74	483	$ 55,122.56	$ 103,188.91	$ 118,813.91
February	68,261	$ 34,269.91	560	$ 51,349.20	$ 96,125.69	$ 110,681.67
March	45,331	$ 20,651.10	428	$ 30,942.78	$ 57,925.11	$ 66,696.75
April	42,875	$ 29,097.26	561	$ 43,599.54	$ 81,617.66	$ 93,976.05
May	45,283	$ 24,951.98	417	$ 37,387.80	$ 69,989.69	$ 80,587.72
June	57,684	$ 31,887.30	474	$ 47,779.04	$ 89,442.44	$ 102,986.47
July	79,218	$ 38,471.98	505	$ 57,645.44	$ 107,912.28	$ 124,253.08
August	120,815	$ 65,723.94	698	$ 98,480.57	$ 184,354.57	$ 212,269.67
September	135,479	$ 73,183.96	810	$ 109,657.51	$ 205,278.52	$ 236,362.79
October	623,868	$ 338,771.88	1,805	$ 507,611.74	$ 950,246.01	$ 1,094,135.29
November	392,134	$ 214,307.87	1,511	$ 321,117.07	$ 601,128.63	$ 692,152.90
December	77,310	$ 53,998.88	785	$ 80,911.09	$ 151,465.19	$ 174,400.68

It is difficult to determine the economic impact and importance of the North Carolina recreational striped mullet fishery because there is a lack of data, and the data are not precise; however, striped mullet are used as bait in several economically important recreational fisheries in North Carolina. Striped mullet are a common bait species for red drum and flounder and for fishing in the surf. Bait mullet are also commonly sold in tackle shops to recreational anglers and are likely an important product for local bait and tackle businesses.

ECOSYSTEM PROTECTION AND IMPACT

Coastal Habitat Protection Plan

The Fisheries Reform Act statutes require that a Coastal Habitat Protection Plan (CHPP) be drafted by the NCDEQ and reviewed every five years (G.S. 143B-279.8). The CHPP is a resource

and guide compiled by NCDEQ staff to assist the Marine Fisheries, Environmental Management, and Coastal Resources commissions in developing goals and recommendations for the continued protection and enhancement of fishery habitats in North Carolina. These three commissions are required by state law (G.S. 143B-279.8) to adopt and implement management strategies specified in the CHPP as part of a coordinated management approach. Habitat recommendations related to fishery management can be addressed directly by the MFC. The MFC has passed rules that provide protection for striped mullet habitat including the prohibition of bottom-disturbing gear in specific areas, and designation of sensitive fish habitat such as nursery areas and SAV beds with applicable gear restrictions. Habitat recommendations not under MFC authority (e.g., water quality management, shoreline development) can be addressed by the other commissions through the CHPP process. The CHPP helps to ensure consistent actions among these commissions as well as their supporting NCDEQ divisions. The CHPP also summarizes the economic and ecological value of coastal habitats to North Carolina, their status, and potential threats to their sustainability (NCDEQ 2016).

Striped mullet use different habitats depending on life stage, season, and location (Able and Fahay 1998, Pattillo, et al. 1999, Cardona 2000) and are found in most habitats identified in the CHPP including: water column, wetlands, submerged aquatic vegetation (SAV), soft bottom, and shell bottom (NCDEQ 2016). Striped mullet are found in almost all shallow marine and estuarine habitats such as beaches, tidal flats, lagoons, bays, rivers, channels, marshes, and grass beds (Moore 1974, Pattillo, et al. 1999, Nordlie 2000). These habitats provide striped mullet with the conditions they need for thriving and maintaining a healthy population. Growth and survival of striped mullet within the habitats they use are maximized when water quality parameters such as temperature, salinity, and dissolved oxygen are within optimal ranges. For further information about habitat use by life stage and optimal water quality parameters, see the DESCRIPTION OF THE STOCK section of this FMP**.** Additional information on the habitats discussed below, threats to these habitats, water quality degradation, and how these topics relate to fisheries can be found in the CHPP (NCDEQ 2016).

Threats and Alterations

Suitable habitat is a critical element in the ecology and productivity of estuarine systems. Degradation or improvement in one aspect of habitat may have a corresponding impact on water quality. All habitats used by striped mullet are threatened in some way.

Water column habitats in warm oceanic waters are used as spawning habitat for striped mullet. Coastal inlets act as critical water column habitat corridors for adult striped mullet to pass through during their annual spawning migrations out to the ocean, and for larvae to reach estuarine nursery areas. Terminal groins may threaten striped mullet stocks by obstructing inlet passage of striped mullet, impeding recruitment (Kapolnai, Werner and Blanton 1996, Churchill, et al. 1997, Blanton, et al. 1999). Inlets are also hydraulically dredged on a regular basis to ensure safe passage for vessels of all sizes, potentially entraining marine animals, particularly eggs and larval fishes that cannot avoid the suction field of the gear due to their reduced swimming abilities (Todd, et al. 2015). The DMF recommends an in-water-work moratorium from April 1 to July 30 to minimize impacts during peak biological activity; however, most projects are given moratorium relief in favor of public safety.

Soft bottom habitats act as important nursery, refuge and feeding areas for striped mullet. These habitats support zooplankton, detritus, algae, and benthic microorganisms that mullet eat during their early life stages. Dredging threatens soft bottom habitat by impairing water quality and temporarily removing benthic infauna from the areas, reducing food availability to bottom-feeding

species such as striped mullet (NCDEQ 2016). Soft bottom habitats in the surf zone of shallow ocean waters are also used by juvenile striped mullet and may act as transient habitats, orienting fish larvae into estuaries (Kinoshita, et al. 1988, Fujita, et al. 2002, Ross and Lancaster 2002). Beach nourishment projects can temporarily impact benthic prey availability in surf zone habitats, and the increased turbidity generated from beach nourishment projects can impact the growth and survival of marine organisms (Reilly and Bellis 1983, Lindquist and Manning 2001).

Submerged aquatic vegetation habitats are used by striped mullet as nursery, forage, and refuge habitats, where striped mullet feed on epiphytic algae and invertebrates that live on seagrasses and other structures (Odum 1968, M. R. Collins 1985a). Seagrass beds are threatened by physical destruction from bottom disturbing fishing gear, dredging, damage from boat use, and water quality degradation. Shell bottom habitats such as oyster reefs are used as forage habitat for striped mullet (Bliss, et al. 2010) and can be damaged by bottom-disturbing fishing gears, disease, and overfishing. Freshwater and estuarine wetlands, especially surrounding estuarine rivers and marshes, are used transiently by juvenile striped mullet for foraging, refuge, and nursery habitat (Peterson and Turner 1994). Wetlands are threatened by many human activities, including dredging for marinas and channels, filling for development, and ditching and draining for agriculture, silviculture, channelization, and shoreline stabilization.

For more information about these habitats and how they are managed, please refer to the CHPP (NCDEQ 2016).

WATER QUALITY DEGRADATION

Good water quality is essential, both for supporting the various life stages of striped mullet and for maintaining their habitats. Naturally occurring and anthropogenic activities can alter salinity and temperature conditions or elevate levels of toxins, nutrients, and turbidity, as well as lower dissolved oxygen levels, which can degrade water quality and impact striped mullet survival. Water quality degradation through stormwater runoff, discharges, toxic chemicals, sedimentation, and changes in turbidity can threaten striped mullet survival. There are increasing concerns about declining water quality and the influence it is having on habitats such as SAV, shell bottom, and wetlands. Studies have found that macroalgal biomass is directly related to increased nutrient levels and that SAV loss is greater with increased macroalgae (Valiela, et al. 1997). Once macroalgal blooms die, they decompose rapidly, increasing nutrient levels in the water column, stimulating phytoplankton production, further reducing light, and decreasing dissolved oxygen in the water and sediments. These have all been important factors in the decline of SAV up and down the Atlantic seaboard (Hauxwell, et al. 2000).

The 2021 CHPP Amendment includes priority issues with elements of improving water quality, including “Protection and Restoration of Submerged Aquatic Vegetation (SAV) through Water Quality Improvements” and “Protection and Restoration of Wetlands through Nature-based Solutions”. Both of these priorities may benefit the North Carolina striped mullet stock. Striped mullet use all three habitats targeted in the amendment throughout their life history, especially wetlands. The recommended actions are expected to not only improve these habitats but strengthen coastal community and ecosystem resilience, bolstering the ability of these habitats to provide ecosystem services and support stocks of economically important marine species such as striped mullet. In 2023, the North Carolina Environmental Management, Marine Fisheries, Coastal Resources, and Soil & Water Conservation commissions unanimously adopted the resolution crafted by the Stakeholder Engagement for Collaborative Coastal Habitats Initiative (SECCHI) workgroup advocating for increased funding for the voluntary cost-share programs that will help landowners protect their property and significantly reduce nutrient loading in North Carolina's coastal waters.

More detailed information on water quality degradation, including the topics of hypoxia, toxins, and temperature in North Carolina and effects on fish stocks can be found in the NCDWQ guides on the NCDWQ website: NCDWQ Water Quality Information (NCDWQ 2000, NCDWQ 2008) and in the CHPP (NCDEQ 2016). More information about the water quality requirements for striped mullet can be found in the DESCRIPTION OF THE STOCK section of this FMP.

Gear Impacts on Habitat

Bottom disturbing fishing gear can impact ecosystem function through habitat degradation. Static (non-mobile) gears tend to have a lesser impact on habitat compared to mobile gears, as the amount of area affected by static gears tends to be insignificant when compared to that of mobile gears (Rogers, Kaiser and Jennings 1998). Both bottom disturbing and static gears can result in bycatch while in operation and can have negative impacts if the gear is abandoned or lost.

The primary gears used in the striped mullet commercial fishery are gill nets (runaround, and set), beach seines, and cast nets. In the recreational fishery, cast nets are the primary gear. Other gears that may harvest striped mullet as incidental catch include pounds nets, crab pots, drift gill nets, and fyke nets. Many gears that interact with striped mullet are static (Barnette 2001, NCDEQ 2016) and generally have minimal impact on habitat.

Beach seines and runaround gill nets are both mobile and may disturb local habitats. Impacts from mobile bottom-disturbing fishing gears such as seines and runaround gill nets include changes in community composition from the removal of species and physical disruption of the habitat (Barnette 2001). Gears may damage or uproot SAV as they are dragged across the seafloor, potentially reducing productivity of these habitats and destroying the structures that provide feeding surfaces and shelter for striped mullet (NCDEQ 2016). Gears that drag across the seafloor may also suspend sediments, temporarily increasing turbidity (Corbett, et al. 2004) and reducing clarity, SAV growth, productivity, and survival (NCDEQ 2016). Sediment suspended by bottom disturbing fishing gears and boat propeller wash may also bury SAV (Thayer, Kenworthy and Fonseca 1984), degrading habitat quality and reducing productivity.

Despite the potential impacts, it has been determined that the bottom impact from actively fished gill nets represent a low disturbance and that impacts from boat propellers during side-setting are likely more significant (Kimel, Corbett and Thorpe 2010). Beach seines are used to encircle schools of fish and may scrape the seafloor with a lead line as they are fished along the beach. The impact of beach seines on habitat is unknown but is likely minor due to the high-energy nature and typical sediment disruption of the surf zone where beach seines are used. Bottom impacts from active gill net fishing and seining are likely to be greater in low energy environments such as bays and creeks than in open high energy areas such as rivers, large sounds, and the surf zone of the ocean. Cast nets do not usually disturb habitat as they are fished in the water column. Crab pots are weighted and rest on the bottom, so they can smother SAV and are capable of ghost fishing if lost or abandoned.

PROTECTED SPECIES INTERACTIONS

Protected species include a variety of animals that are protected by federal or state statutes because their populations are at risk or vulnerable to risk of extinction. Several protected species occur in North Carolina, including diamondback terrapins (*Malaclemys terrapin*), migratory birds, five species of sea turtles, bottlenose dolphins (*Tursiops truncates*), and two species of sturgeon. Entanglement gears such as the gill nets used in some commercial striped mullet fisheries are size-selective; however, gill nets are capable of unintentionally capturing larger, non-targeted species. For more information about protected species in North Carolina, their interactions with

fishing gear, and how the DMF monitors interactions between protected species and commercial fisheries, please refer to the DMF Observer Program website. Interactions between protected species and the stop net fishery in Bogue Banks that targets striped mullet are monitored by the National Oceanic and Atmospheric Administration (NOAA).

Climate Change and Resiliency

Extreme weather events have always occurred, but scientists anticipate that changes this century to North Carolina's climate will be larger than anything historically experienced (Kunkel, et al. 2020). It is predicted that average annual temperatures will continue to increase, sea level will continue to rise, the intensity of hurricanes will increase, total annual precipitation from hurricanes and severe thunderstorms will increase resulting in increased flooding events, while severe droughts will also likely increase due to higher temperatures (Kunkel, et al. 2020). Flood events can flush contaminated nutrient-rich runoff into estuaries causing degraded water quality. Runoff from flood events can cause eutrophication resulting in fish kills due to hypoxia, algal blooms, and alteration of the salinity regime. Flood events can also cause erosion of shorelines resulting in loss of important coastal habitats, such as SAV, soft bottom, and wetlands, that are critical to striped mullet throughout their life history. Potential increases in extreme weather events could have an adverse effect on the recruitment and survival of striped mullet in the estuarine system.

Increasing temperatures could also impact the distribution of finfish and invertebrate populations and the coastal habitats they use. It has been predicted that hundreds of finfish and invertebrate species will be forced to move northward due to increasing temperatures caused by climate change (Morley, et al. 2018). North Carolina already exhibits one of the greatest northward shifts in commercial fishing effort, with average vessel landings occurring 24 km further north each year (Dubik, et al. 2019).

The repeated impacts and compounding losses from the effects of climate change can be catastrophic not only to coastal communities, but to coastal habitats and the fisheries they support. While the risks and hazards associated with climate change and extreme weather events cannot be completely eliminated, the effects can be decreased by improving coastal resilience, which can be broken down into two parts: 1) community resiliency – the ability of a community to withstand, respond to, and recover from a disruption, and 2) ecosystem resiliency – the ability of the natural environment to withstand, respond to, and recover from disruption, such as hurricanes, tropical storms, and flooding. A resilient ecosystem can bounce back from disturbances over time compared to resistant ecosystems, which may not be able to recover their full functionality in face of repeated disturbances. Building a more resilient coastal community and ecosystem will help ensure the persistence of coastal habitats critical to the life history of striped mullet and many other species (NCDEQ 2020).

FINAL AMENDMENT TWO MANAGEMENT STRATEGY

****Section will be completed when the MFC selects preferred management prior to DEQ secretary and legislative committees review****

RESEARCH NEEDS

The research recommendations listed below are offered by the division to improve future management strategies of the striped mullet fishery. They are considered high priority as they will help to better understand the striped mullet fishery and meet the goal and objectives of the FMP.

A more comprehensive list of research recommendations is provided in the Annual FMP Review and DMF Research Priorities documents.

- Explore effects of offshore and nearshore environmental conditions and climate change on the North Carolina striped mullet stock, including potential changes in recruitment and sex ratios.
- Explore effects of modified shorelines (e.g., beach renourishment projects, hardened shorelines, and development) on striped mullet food sources and habitats.
- Conduct a striped mullet tagging study, including acoustic and satellite tags, to explore movement patterns and range of striped mullet found in North Carolina.
- Repeat and expand the cast net study conducted by the Division in the early 2000s, including use of various net and mesh sizes to characterize cast net effort and catch by net size, mesh size, and user group in the recreational fishery.
- Explore market price drivers for striped mullet in North Carolina, including exploration of the link between fishing target species, market prices, and fisher behavior.

Appendix 1: SMALL MESH GILL NET CHARACTERIZATION IN THE NORTH CAROLINA STRIPED MULLET FISHERY

Issue

The estuarine small mesh gill net fishery in North Carolina is managed and regulated by North FMPs and numerous MFC rules and North Carolina DMF proclamations. However, concerns about biological impacts from the use of small mesh gill nets remain. The primary issues to be addressed concern greater flexibility with constraining harvest in the striped mullet fishery, reducing bycatch, and to the greatest extent practical reducing conflict between gill net users and other stakeholders. Specific management options for gill net regulations can be found in Appendix 2: Sustainable Harvest Issue Paper.

Origination

The North Carolina Marine Fisheries Commission.

Background

At their August 2021 business meeting, the MFC passed a motion to not initiate rulemaking on small mesh gill nets but refer the issue through the FMP process for each species, and any issues or rules coming out of the species-specific FMP to be addressed at that time. In North Carolina, small mesh gill nets are the predominant gear used to harvest striped mullet. Most striped mullet are harvested commercially using runaround or other actively fished gill nets. Per direction from the MFC, small mesh gill nets must be addressed during review of the striped mullet FMP.

North Carolina General Statutes authorize the MFC to adopt rules for the management, protection, preservation, and enhancement of the marine and estuarine resources within its jurisdiction (G.S. 113-134; G.S. 143B-289.52). The MFC has authority to adopt FMPs and the DMF is charged with preparing them (G.S. 113-182.1; G.S. 143B-289.52). Further, the MFC may delegate to the DMF director in its rules the authority to issue proclamations suspending or implementing MFC rules that may be affected by variable conditions (G.S. 113-221.1; G.S. 143B-289.52). Variable conditions include compliance with FMPs, biological impacts, bycatch issues, and user conflict, among others (15A NCAC 03H .0103). The estuarine gill net fishery in North Carolina is managed and regulated by FMPs and numerous MFC rules and DMF proclamations. Rules are periodically amended to implement changes in management goals and strategies for various fisheries and are the primary mechanism for implementing FMPs under the Fisheries Reform Act of 1997 (FRA).

In recent years, modifications to gill net management resulting from the adoption of FMPs or other circumstances have largely been implemented through the DMF director's proclamation authority, not through rulemaking. This is primarily due to the need to implement management changes in a timely fashion and to accommodate variable conditions. Over time, this has resulted in incongruent restrictions between rules and proclamations. Additionally, many of the rules related to small mesh gill nets were first developed prior to the FRA and have not been thoroughly evaluated since the addition of more recent rules developed through the FMP process.

The striped mullet small mesh gill net fishery operates year-round, but the type of gill net used varies by season and area (NCDMF 2018). Multiple species may be landed during a single trip; however, the target species usually dominates the catch (NCDMF 2008). In North Carolina, gill nets are restricted to a minimum mesh size of 2.5 inches stretched mesh (ISM) (15A NCAC 03J .0103 (a)). The DMF categorizes gill nets with ISM from 2.5 to less than 5 inches as small mesh (Daniel 2013). Although the rule uses "mesh length" and not "mesh size", their meanings are

identical for the purpose of this document; this helps to demarcate the discussion of “mesh size” from “net length” throughout the document. Small mesh gill nets are generally classified into three categories based on how the net is deployed and fished: set gill nets, runaround gill nets, and drift gill nets (Figure 1.1; Table 1.1; (Steve, et al. 2001)). For this document, “set” gill nets, or “set nets”, includes anchored, fixed, and stationary nets.

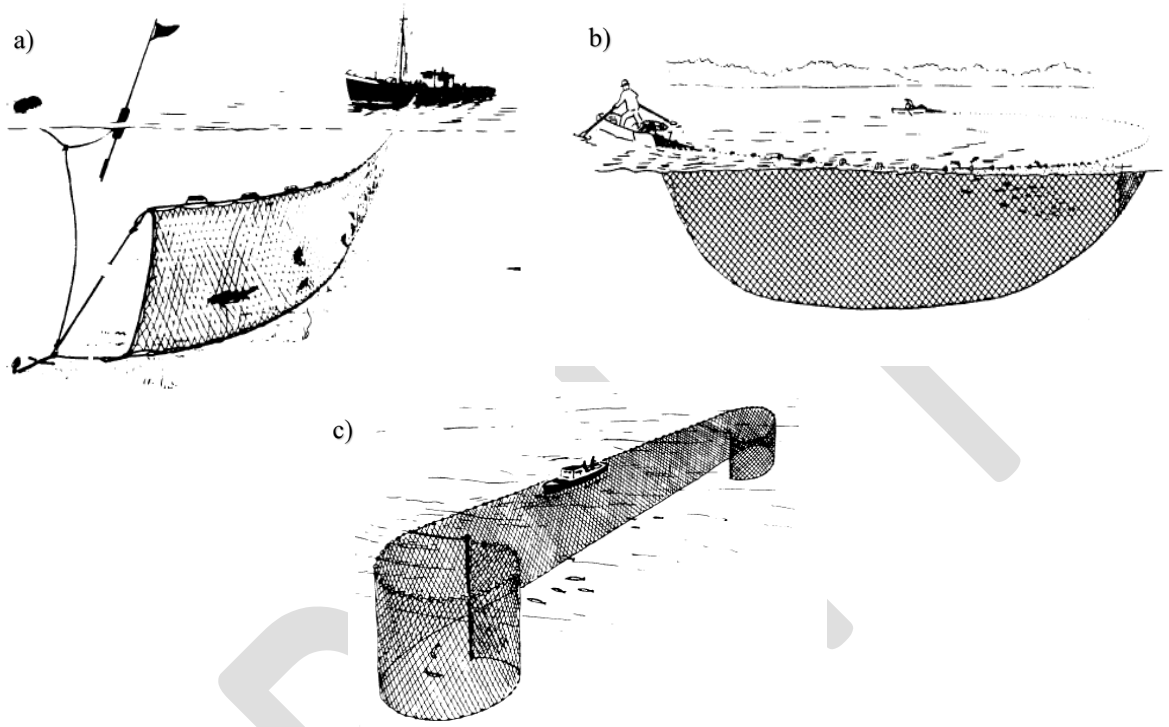

Figure 1.20. Illustrations of (a) set, (b) runaround, and (c) drift gill nets extracted from Steve et al. (2001).

Set nets (Figure 1.1a) are the second most common gill net method used for commercial striped mullet harvest in North Carolina. They are kept stationary with the use of anchors or stakes attached to the bottom or attached to some other structure attached to the bottom, at both ends of the net (15A NCAC 03I .0101). Set nets can be further classified as sink or float gill nets (Steve et al. 2001). A sink gill net fishes from the bottom up into the water column a fixed distance by having a lead line (bottom line) heavy enough to sink to the bottom. Depending on the height of the net and the depth of the water, the float line (top line) may or may not be submerged below the surface of the water. A float gill net may fish the entire water column by having the top line with buoys sufficient for floating on the surface of the water, or a portion of the water column depending on the depth of the net (number of meshes deep). Set nets are deployed by dropping one end of the net and running out the rest of the length of net usually in a line. Once deployed, soak times for fishing set nets vary depending on factors such as target species, water temperature, season, waterbody, and regulations (NCDMF 2018).

A runaround gill net is the most common gill net method used for commercial striped mullet harvest in North Carolina. It is an actively fished gear used to encircle schools of fish (Figure 1.1b). They are deployed with a weight and a buoy at one end that enables the rest of the net to be fed out, creating a closed circle around the school of fish due to the vessel’s path. Runaround gill nets tend to be deep nets capable of fishing the entire water column. Mesh sizes and net lengths vary depending on the size of the targeted species (Steve et al. 2001). Another form of

runaround gill net is the strike net or drop net. Rather than deploying the net in a circle, the net is set parallel to shore, often with one end anchored to the bank. Once the net is set, the boat is driven between the net and the shore to drive fish into the net (NCDMF 2018). Soak times for all types of runaround gill nets are almost always an hour or less.

Table 1.3. Small mesh gill net gear categories with descriptions and capture method descriptions.

Small Mesh Gill Net Gear Categories	Sub-Categories	Gear Description	Capture Method
Anchored/Fixed /Stationary/Set	Sink	Attached to bottom or some other structure by anchors or stakes at both ends. Sink nets are fished from the bottom up into the water column.	Passively Fished - For both sink and float set nets the gear is left in place for a period of time. Fish, if appropriately sized, swim into the net and are gilled.
	Float	Attached to bottom or some other structure by anchors or stakes at both ends. Float nets are fished from the top down into the water column. Depending on target species nets fish part of the water column or the entire water column.	
Runaround	Circle	Attached to the bottom at one end. Once the end is set, the rest of the net is then fed out of a boat creating a circle and meeting back at the original set point. Generally, these nets fish the entire water column.	Actively Fished - Used to encircle a school of fish. Primary target species for this gear is striped mullet.
	Strike/Drop	Attached to the bottom at one end. Deployed along shore with the terminal end finishing at another point along the shore. The boat is driven into the blocked section to “drive” the fish into the net and are then retrieved.	Actively Fished - Used to corral or intercept a school of fish and then immediately retrieve. Primary target species for this gear is striped mullet, and spotted seatrout to a lesser extent.
Drift		Attached to boat or free-floating with close attendance. Lighter leadlines and no anchors allow the net to drift. Depending on target species and water depth, nets fish part of the water column or the entire water column. Primarily used in Pamlico Sound to target Spanish mackerel and bluefish.	Actively Fished - Drift with the water current with continuous attendance.

Drift gill nets are unanchored, non-stationary nets that are actively attended (i.e., remain attached to the vessel or the fishing operation remains within 100 yards of the gear) (Figure 1.1c) and tend to have shorter soak times than set nets. They are constructed with lighter lead lines to allow for the net to drift with the current. The small mesh drift gill nets currently employed in North Carolina estuaries are primarily used to target Spanish mackerel and bluefish in Pamlico Sound. This gear can also be used to target spot (as a sink net) and striped mullet (typically fishing the entire water

column) in areas primarily from Core Sound and south (Steve et al. 2001). Drift nets account for less than 0.5% of striped mullet landings.

METHODS

Information specific to the North Carolina estuarine gill net fishery was gathered from two DMF sampling programs briefly described below:

N.C. Trip Ticket Program

The N.C. Trip Ticket Program began in 1994. This program requires licensed commercial fishermen to sell their catch to licensed fish dealers, who are then required to complete a trip ticket for every transaction. Data collected on trip tickets include gear type, area fished, species harvested, and total weights of each species. Information recorded on trip tickets for gear type and characteristics is self-reported by the dealer. This information may be verified by DMF fish house staff after the fact, but the potential exists that some trips may be mischaracterized by dealers. In 2004, trip tickets included mesh size categories for gill nets: small mesh = <5 inch ISM, and large mesh = >5 inch ISM. However, the use of this new field was not prevalent until about 2008 because dealers were still using old trip tickets they had on hand.

Commercial Fish House Sampling

Commercial fishing activity is monitored through fishery dependent (fish house) sampling. Sampling occurs dockside as fish are landed. Commercial fishermen and/or dealers are interviewed by DMF staff, and the catch is sampled. Samplers collect data on location fished, effort (soak time, net length, etc.), gear characteristics (net type, net depth, mesh size, etc.), and the size distribution of landed species.

Commercial Observer Program

On board observations of commercial estuarine gill nets, primarily set nets, occur through Program 466. Observers collect data on effort (soak time, net length, etc.), location fished, gear characteristics, size, and the fate (harvest, discard, etc.) of captured species. The Observer Program was born out of the need to estimate incidental takes of protected species such as sea turtles and Atlantic sturgeon in estuarine set nets per the Endangered Species Act Section 10 Incidental Take Permits (NMFS 2013, 2014). As a result, observations of runaround or drift gill nets are rare.

The following analysis and information are presented to characterize the striped mullet small mesh gill net fishery in North Carolina relative to time, area, configuration, and species composition of the harvested and discarded catch:

Data from 1994 through 2021 or 2017 through 2021 for these three programs were used to characterize the North Carolina striped mullet small mesh gill net fisheries depending on the analysis conducted. Using trip ticket data, trips where striped mullet were the species of highest abundance in landings were considered targeted striped mullet trips. These trips were then defined as either small mesh or large mesh. Basing analysis on trips where striped mullet are the presumed target species allows for results that describe the gear parameters associated with the directed striped mullet fishery (see NCDMF 2008 for further description of methodology). Once targeted mullet trips were identified, the method of fishing (set net, runaround gill net, or drift gill net), mesh size, and net length were characterized based on available fish house sampling data from 1994 through 2021 or 2017 through 2021 for each of the target species depending on the analysis conducted.

Regional analysis of the striped mullet small mesh gill net fishery was investigated by county of landing. The coastal counties were grouped into regions using distinct area boundaries or clear differences in fishing practices (Figure 1.2). All other counties within the state with landings were grouped into the “other” region.

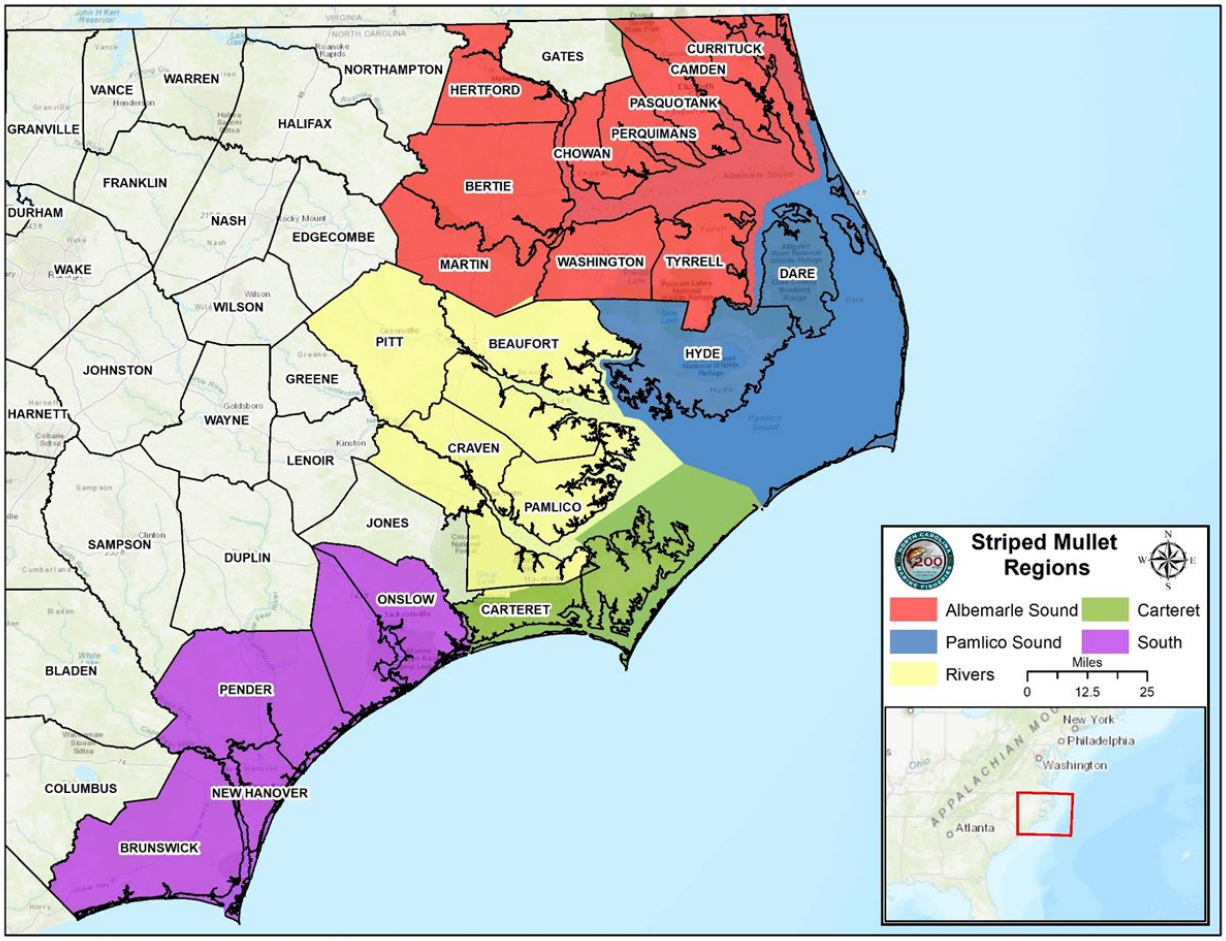

Figure 1.2. Map of defined regions used for regional characterization of the striped mullet small mesh gill net fishery.

RESULTS

For information regarding characterization of small mesh gill nets across all fisheries in North Carolina please refer to the Small Mesh Gill Net Rule Modifications Information Paper presented to the MFC at its August 2021 business meeting.

Striped Mullet Fishery General Characterization

Historically, beach seines and gill nets were the two primary gear types used in the striped mullet commercial fishery, with most commercial landings prior to 1978 coming from the beach seine fishery. Gill nets (runaround, set, and drift) replaced seines as the dominant commercial gear type in 1979 and since 2017 runaround gill nets have accounted for most (>70%) striped mullet commercial landings (Figure 1.3). Since the trip ticket program was initiated in 1994, the striped mullet fishery has shifted from a fairly even mix of set gill net and runaround gill net landings, to one strongly dominated by runaround gill net landings (Figure 1.4).

Because the commercial fishery primarily targets striped mullet for roe, the fishery is seasonal with the highest demand and landings occurring in October and November when large schools form during their spawning migration to the ocean and females are ripe with eggs (Figure 1.5). During this time, runaround gill nets are the primary gear used to harvest striped mullet. After the spawning migration striped mullet are no longer found in large aggregations, making runaround gill nets a less effective gear for harvest. Subsequently, from December through April set gill nets become a much more important gear used in the fishery (Figure 6). During this time, striped mullet may be harvested in set gill nets targeting the species, or as incidental catch in other targeted small mesh gill net fisheries such as white perch in the Albemarle Sound.

Mesh size is the most important gear parameter that affects the size of striped mullet caught in small mesh gill nets. As stretched mesh size increases, the average size of the striped mullet increases (Figure 7). Fishermen use stretched mesh sizes ranging from 2.75 ISM to 4.5 ISM to target striped mullet in North Carolina. This relationship between mesh size and size of striped mullet captured makes it feasible to use mesh size restrictions to protect or select for different sized striped mullet. Mesh size restrictions would be best used in conjunction with striped mullet size restrictions to ensure minimal discards. For more information on possible management applications of mesh size restrictions, see Appendix 2. Sustainable Harvest Issue Paper.

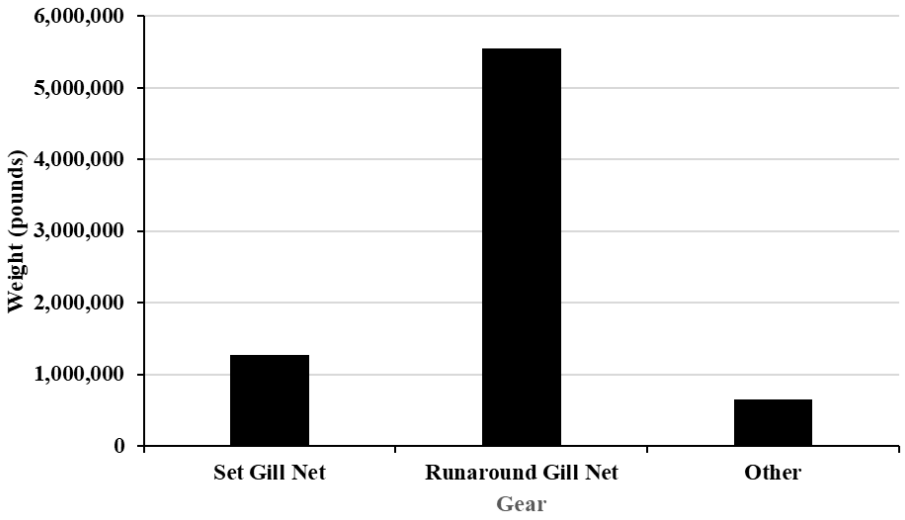

Figure 1.3. Percent of striped mullet commercial landings reported through the North Carolina Trip Ticket Program by gear, 2017–2021.

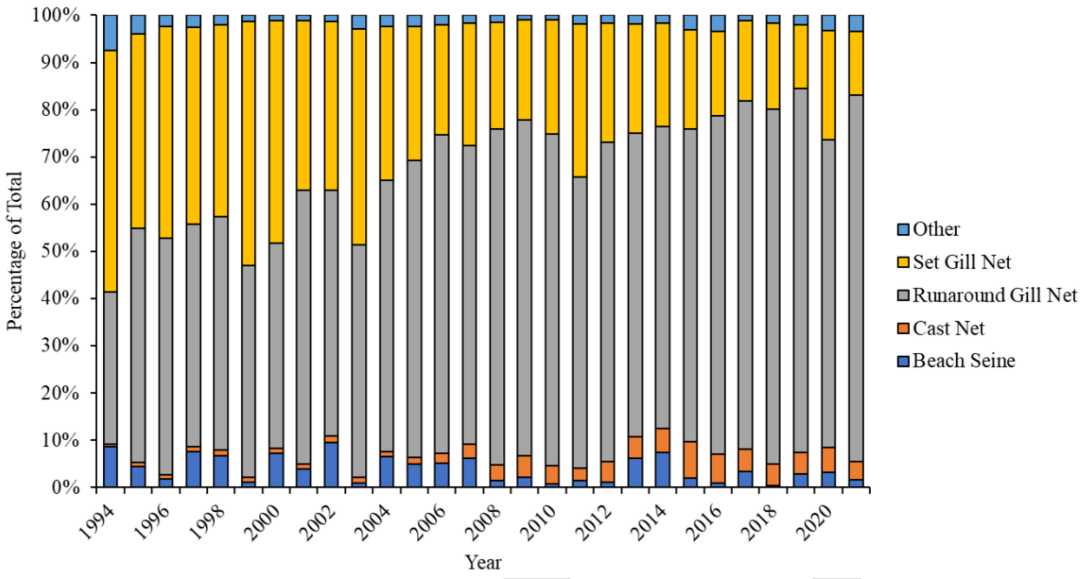

Figure 1.4. Percentage of striped mullet commercial landings by year and gear reported through the North Carolina Trip Ticket Program by gear, 1994–2021.

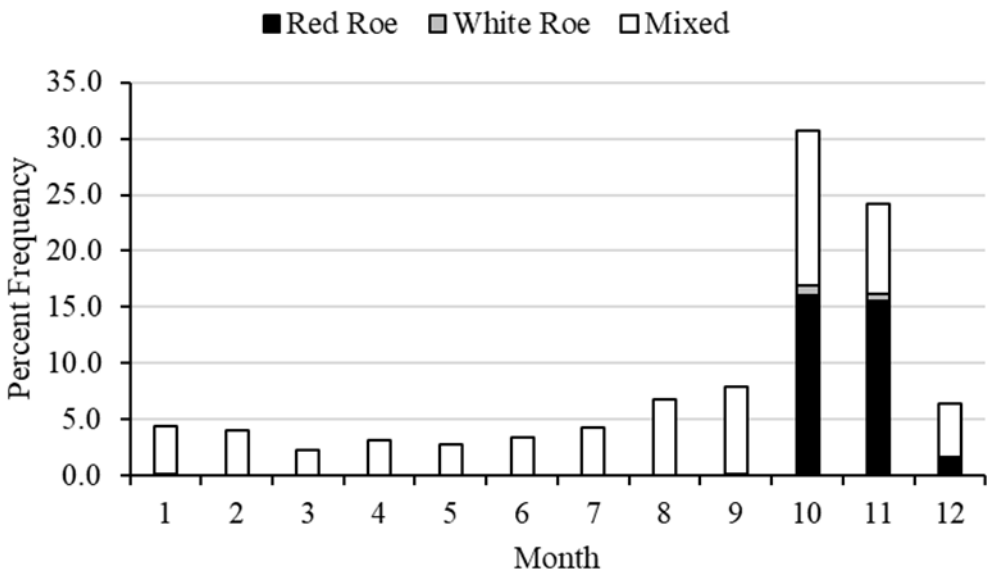

Figure 1.5. Percent frequency of striped mullet commercial landings by market grade and month, 2017-2021. Red Roe includes striped mullet graded as Red Roe and Roe. White Roe includes striped mullet graded as White Roe. Mixed includes striped mullet graded as Jumbo, Large, Medium, Mixed, Small, and X-Small.

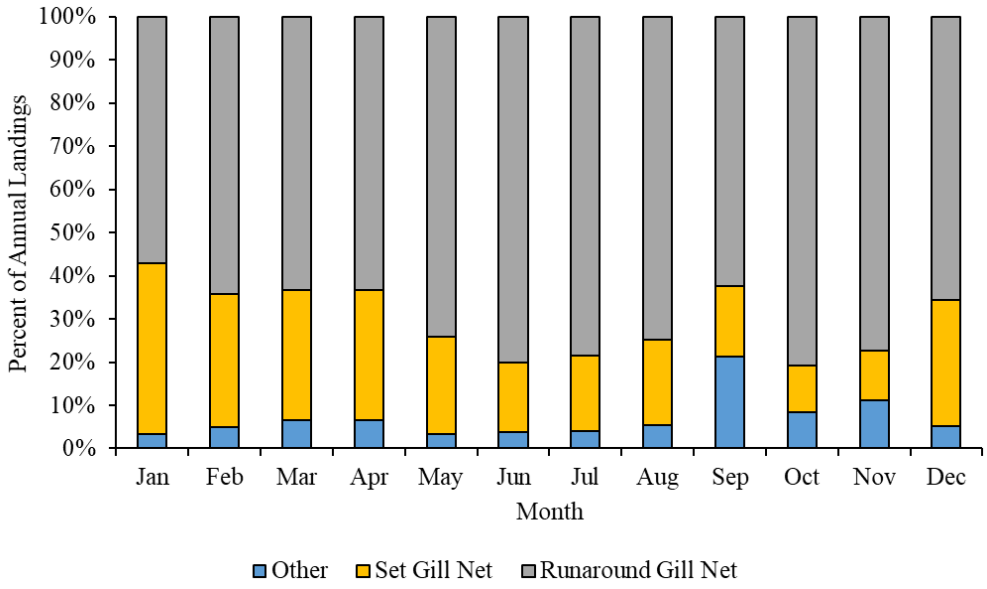

Figure 1.6. Percentage of striped mullet commercial landings by month and gear reported through the North Carolina Trip Ticket Program by gear, 2017–2021.

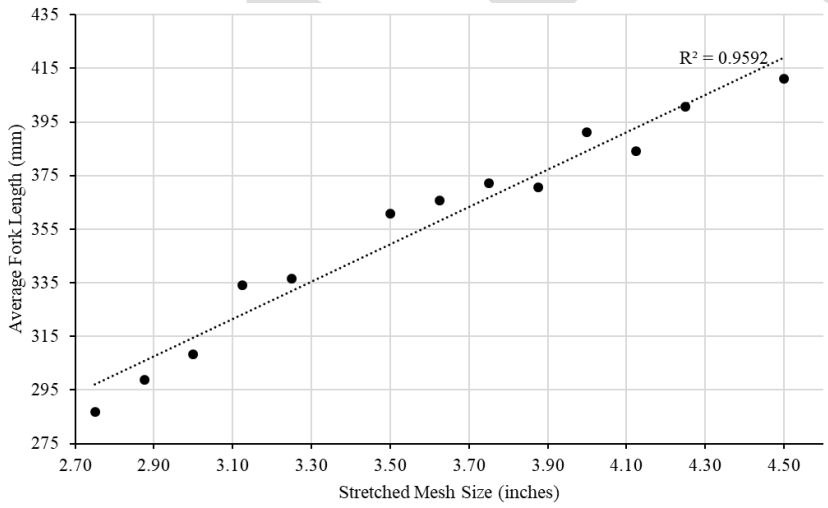

Figure 1.7. Relationship of stretched mesh size versus average fork length of striped mullet captured using data from the commercial fish house sampling program (1991-2021). A trendline and R squared value are provided for reference.

Regional Characterization

In the mid-1990s, the striped mullet small mesh gill net fishery was split between the Pamlico Sound, Carteret, and South regions (Figure 1.8). Since then, the fishery has experienced an expansion and retraction in the Rivers region, a contraction in the South region, and a small expansion in the Albemarle Sound region. These shifts in regional contribution have led to a fishery that is currently dominated by the Pamlico Sound and Carteret regions. These two regions have made up over 70% of the total striped mullet small mesh gill net fishery since 2017. The expansion of the fishery in the Albemarle region has been largely driven by the development of a small mesh set gill net fishery for white perch where striped mullet are primarily captured

incidentally. Set gill nets make up over 80% of striped mullet landings in this region (Figure 9). Runaround gill nets strongly dominate the fishery in the rest of the state.

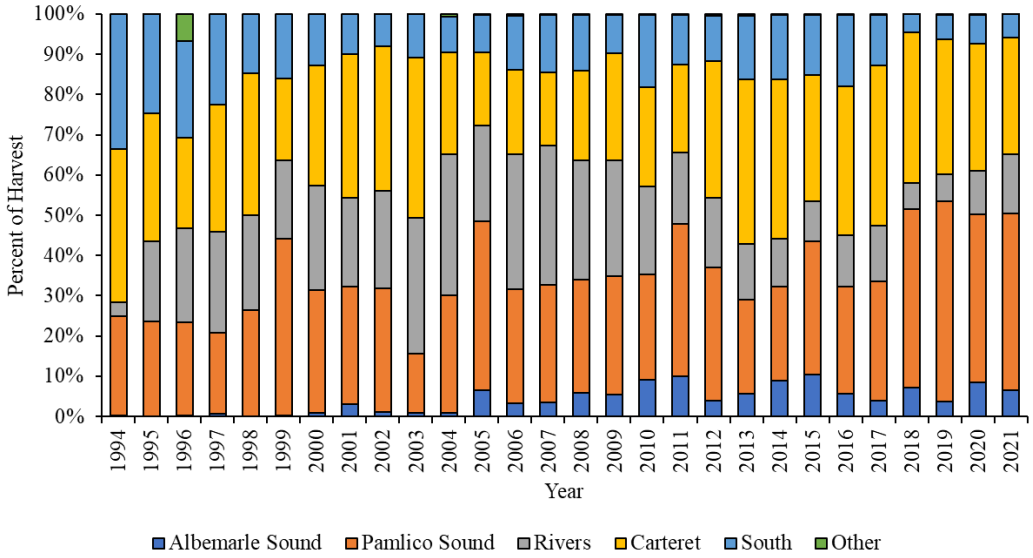

Figure 1.8. Percentage of striped mullet commercial landings by region and year reported through the North Carolina Trip Ticket Program, 1994–2021.

Set gill nets

Striped mullet are the third most important species targeted in the North Carolina small mesh set gill net fishery behind bluefish and spotted seatrout (Figure 1.9). They make up the largest proportion of monthly set gill net trips in November and December.

Set small mesh gill nets are the second most common gear used to capture striped mullet (Figures 1.3 - 1.4) in North Carolina and are the dominant gear in the Albemarle Sound region (Figure 1.10). Striped mullet are primarily landed incidentally in the set gill net fishery. They are typically not targeted with set gill nets as they move around in schools that are more easily targeted with runaround gill nets. Since 1994 use of set gill nets to target striped mullet has declined as both trips made and participants in the fishery have waned (Figure 1.11). This decline in participants and trips matches well with the decreased landings and increase in runaround gill net dominance in the striped mullet fishery over the same time period.

Set gill nets tend to be a low volume fishery for striped mullet. The average trip lands just over 76 pounds of striped mullet (Figure 1.12). Nearly 60% of set gill net trips that target striped mullet land less than 100 pounds. However, the 42% of trips that land more than 100 pounds account for over 80% of the total set gill net landings (Figure 1.13). The modal mesh size used to catch striped mullet in the set gill net fishery was 3.5 ISM (Table 1.2). Average total net length was 567 yards, with a maximum of 3,000 yards. Over 45% of all set gill net trips fished more than 500 yards (Figure 1.14). For reference, small mesh gill nets are currently restricted to a maximum of 800 yards. Yardage restriction could be an effective way to reduce harvest in this fishery. Yardage restrictions would be best used in conjunction with trip limits to ensure minimal discards. For more information on possible management applications of set gill net yardage restrictions, see Appendix 2.

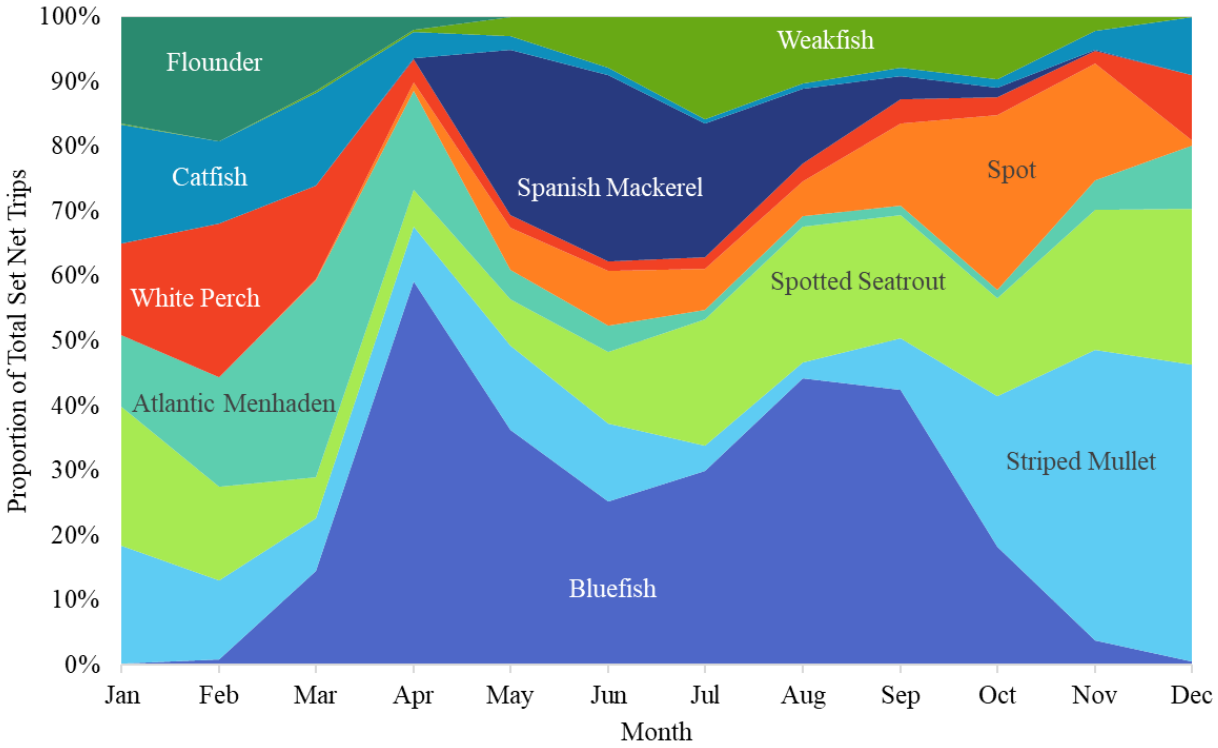

Figure 1.9. Percentage of total set gill net trips for each of the 10 primary target species across months in N.C. waters during 2017-2021.

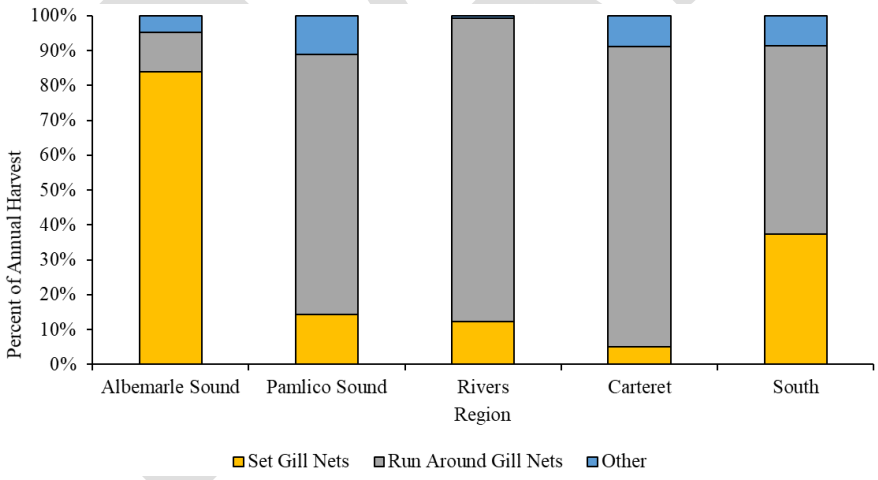

Figure 1.10. Percentage of annual striped mullet commercial landings by gear and area reported through the North Carolina Trip Ticket Program by gear, 2017–2021.

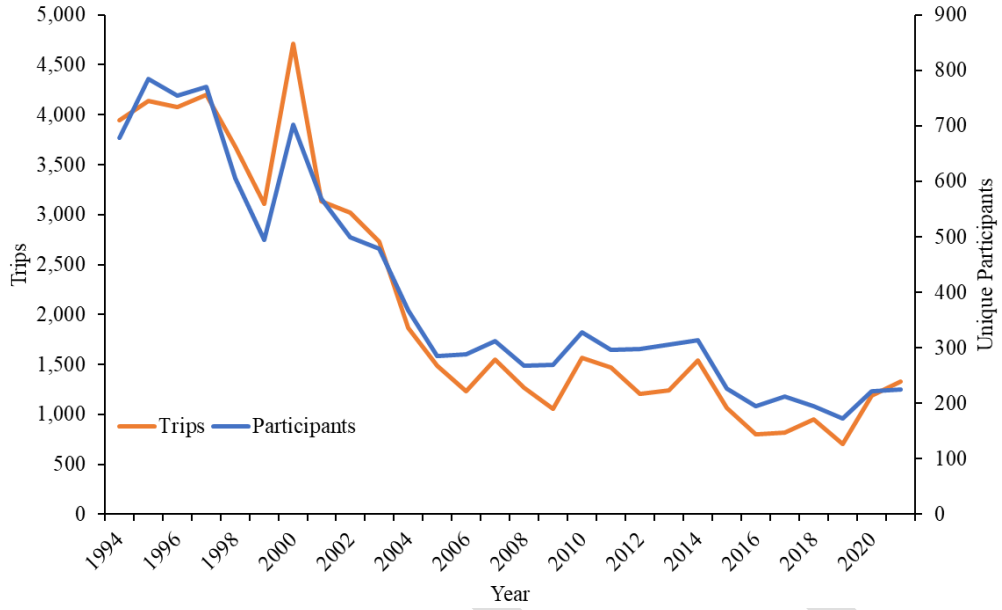

Figure 1.11. Targeted trips and participants in the set small mesh gill net striped mullet fishery by year reported through the North Carolina Trip Ticket Program by gear, 1994–2021.

Table 1.2. Small mesh (<5 inch ISM) set net trips in North Carolina using data from the N.C. Trip Ticket Program with associated gear characteristics from fish house, 2017-2021.

Species	Trips	Avg/Yr	Modal Mesh	Avg Yds	Max Yds
Striped mullet	14,282	2,856	3.5	567	3,000

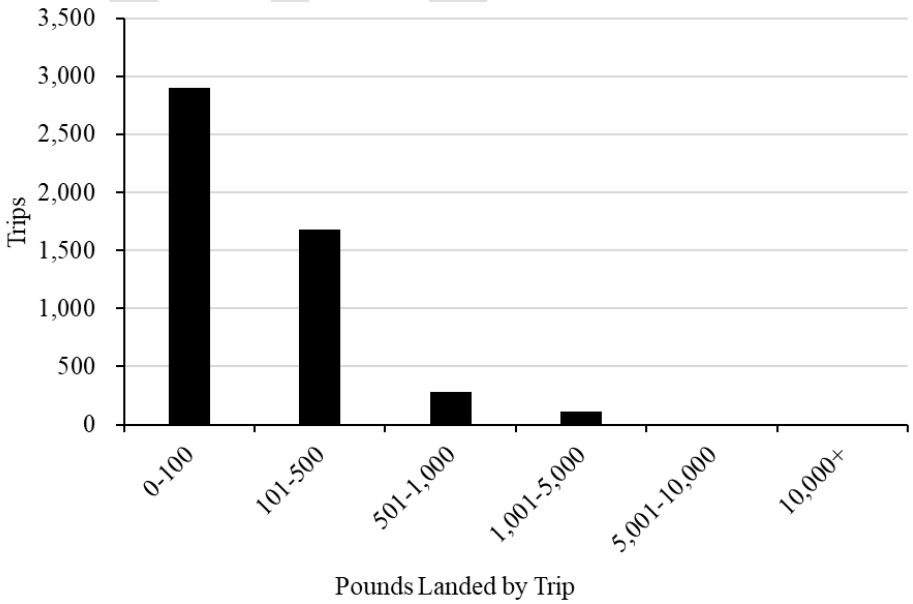

Figure 1.12. Number of targeted Trips grouped by pounds landed per trip in the set small mesh gill net striped mullet fishery reported through the North Carolina Trip Ticket Program by gear, 2017–2021.

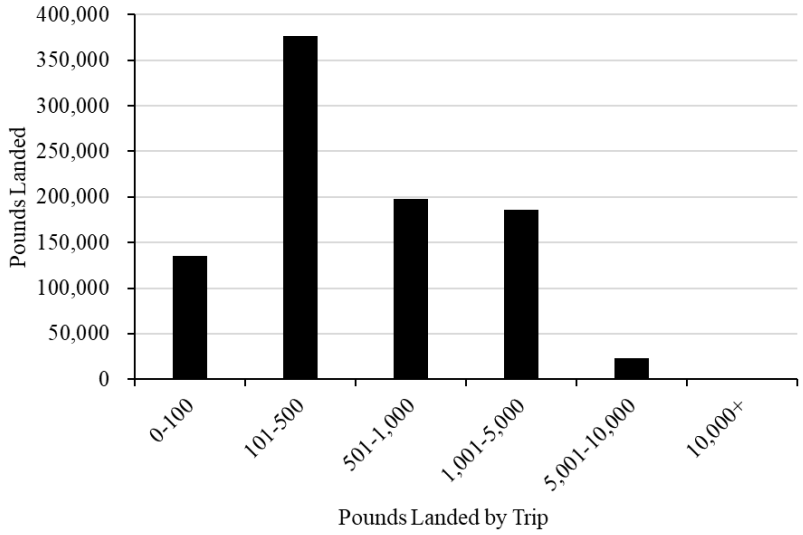

Figure 1.13. Total pounds landed grouped by pounds landed per targeted trip in the set small mesh gill net striped mullet fishery reported through the North Carolina Trip Ticket Program by gear, 2017–2021.

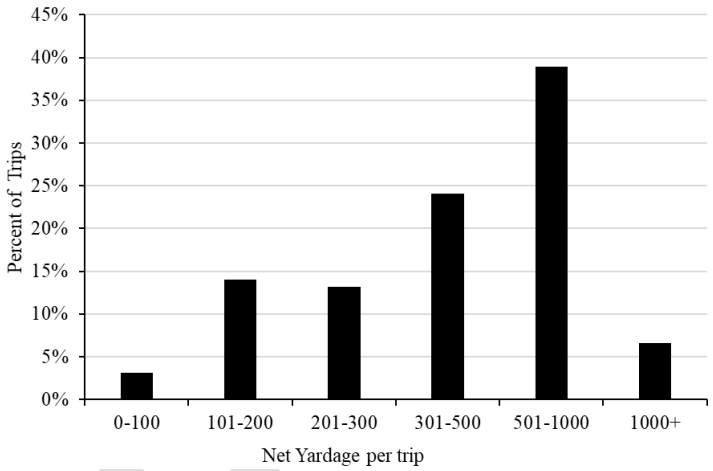

Figure 1.14. Percent of total trips grouped by yards fished per trip in the set small mesh gill net striped mullet fishery using data from the commercial fish house sampling program 2017–2021.

When targeting striped mullet with small mesh set gill nets, it is common to catch other species incidentally. The most common species landed incidentally when targeting striped mullet in set gill nets are spotted seatrout, red drum, catfish, bluefish, white perch, and gizzard shad (Figure 1.15). Conversely, striped mullet are most commonly caught incidentally when set gill net fishermen are targeting spotted seatrout, bluefish, and white perch (NC trip ticket data). This overlap between the striped mullet and spotted seatrout, bluefish, and white perch set gill net fisheries could have management implications for all these fisheries if gear restrictions are put in place to restrict striped mullet harvest.

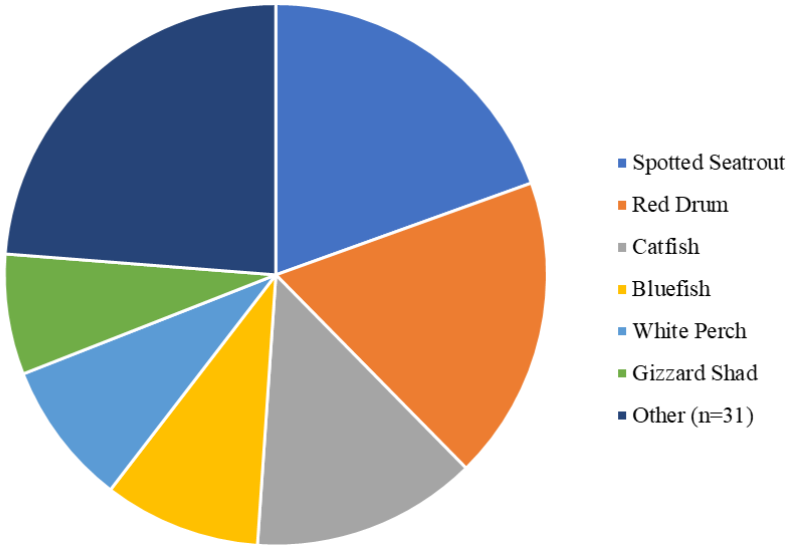

Figure 1.15. Proportion of incidental catch landed by species in the set small mesh gill net striped mullet fishery reported through the North Carolina Trip Ticket Program, 2017–2021.

Striped mullet discards in the set gill net fishery are difficult to characterize due to limited data but appear to be minimal based on observations from the commercial observer program. Of the over 9,500 striped mullet observed in set small mesh nets (2003-2021), only 49 fish were discarded. A discard rate of 0.5%. The low rate of striped mullet discards in the set small mesh fishery is likely due to there being no restrictions on their commercial harvest. Increased restrictions on striped mullet harvest could increase discards in this fishery. For more information on striped mullet bycatch in the set gill net fishery, please refer to the Striped Mullet Bycatch section of the Base Plane.

Discards of other species from striped mullet targeted small mesh set gill net trips could not be characterized due to limited data. Of the over 1,500 observed small mesh set net trips observed from the commercial observer program (2003-2021), only 35 striped mullet targeted trips have been observed. In those trips, eight managed species were discarded, including sheepshead, Atlantic menhaden, blue crab, horseshoe crab, croaker, bluefish, striped mullet, and red drum.

Runaround Gill Nets

Striped mullet are the most important species targeted in the North Carolina runaround gill net fishery (Figure 1.16). Striped mullet make up the largest proportion of monthly runaround gill net trips from April to November and are second to spotted sea trout the rest of the year.

Runaround gill nets are the predominant gear used to catch striped mullet in North Carolina (Figures 1.3 - 1.4) and the dominant gear in every region except the Albemarle Sound (Figure 1.9). The runaround gill net fishery is much more targeted than the set net fishery and is the main gear used to catch striped mullet when they form their spawning aggregations in October and November. During this time, catches from runaround gill nets can be very high as fishermen target striped mullet for their valuable roe. Over 50% of the average yearly landings of striped mullet come from this two-month period. Since 1994 effort and participation in this fishery have remained relatively consistent until 2021 when a significant spike in both trips and participants was observed (Figure 1.17). This sudden increase could be due to fishermen shifting to the fishery from other more restricted fisheries.

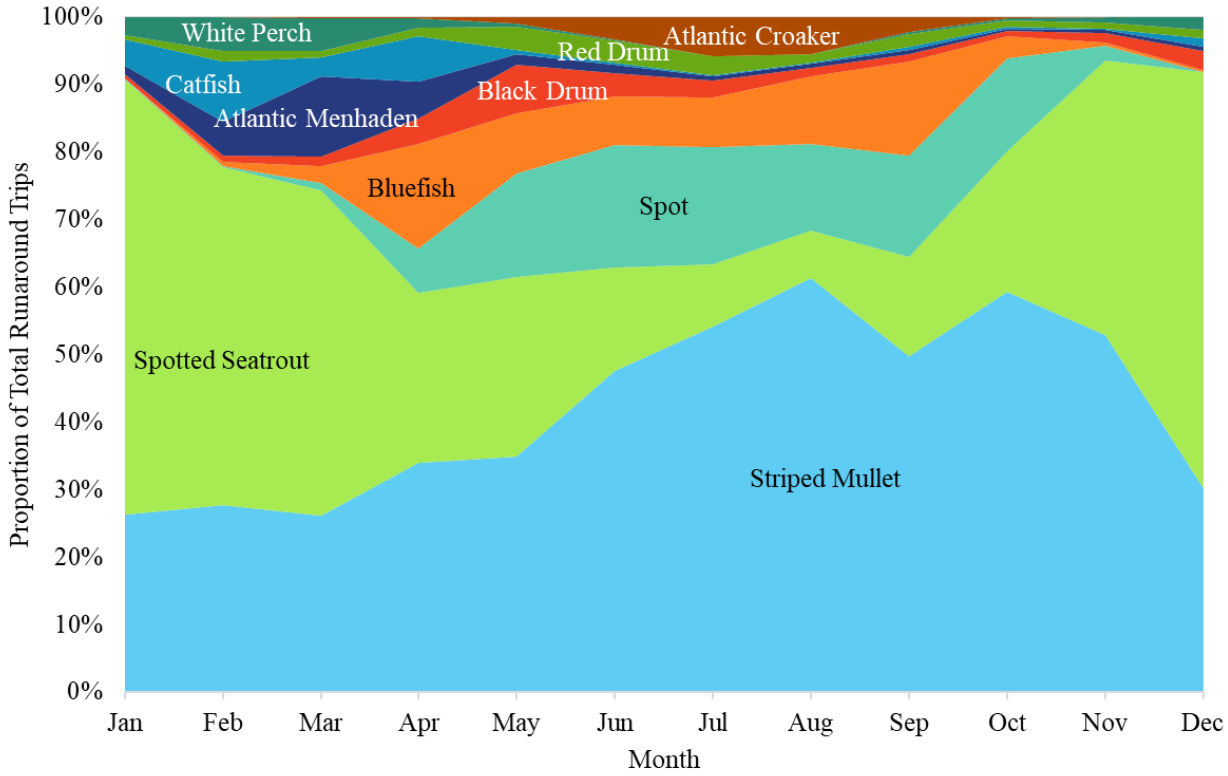

Figure 1.16. Percentage of total runaround gill net trips for each of the 10 primary target species across months in N.C. waters during 2017-2021.

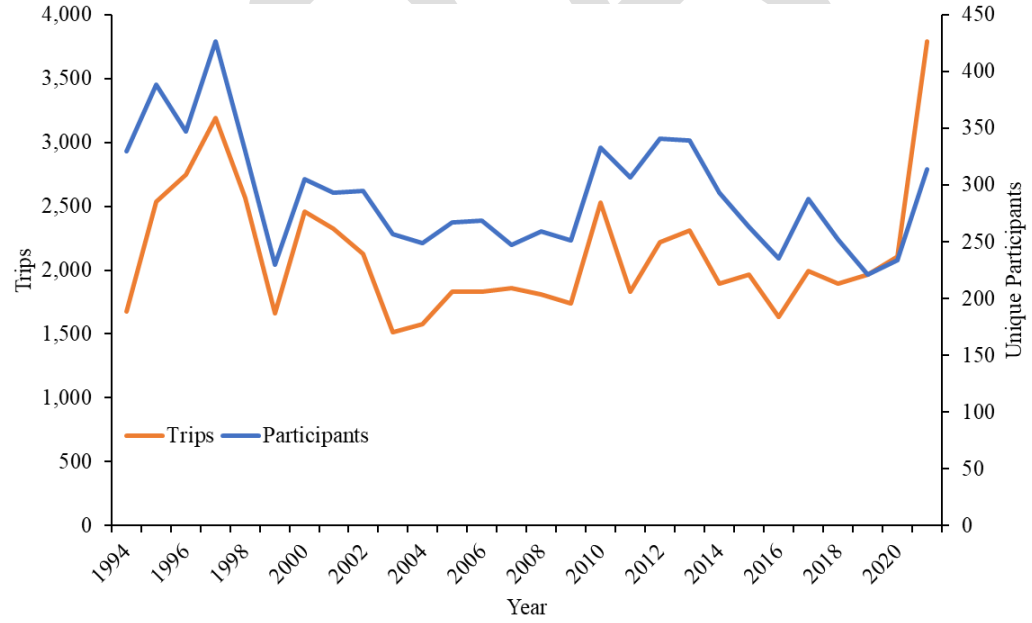

Figure 1.17. Targeted trips and participants in the runaround gill net striped mullet fishery by year reported through the North Carolina Trip Ticket Program by gear, 1994–2021.

Runaround gill nets are a higher volume fishery than set nets, with the average trip landing over 450 pounds (Figure 1.18). This is likely due to runaround gill nets being a more targeted gear for striped mullet. Most trips that target striped mullet land less than 500 pounds of mullet. However, the 12% of trips that catch over 1,000 pounds account for over 50% of total landings from runaround gill nets (Figure 1.19).

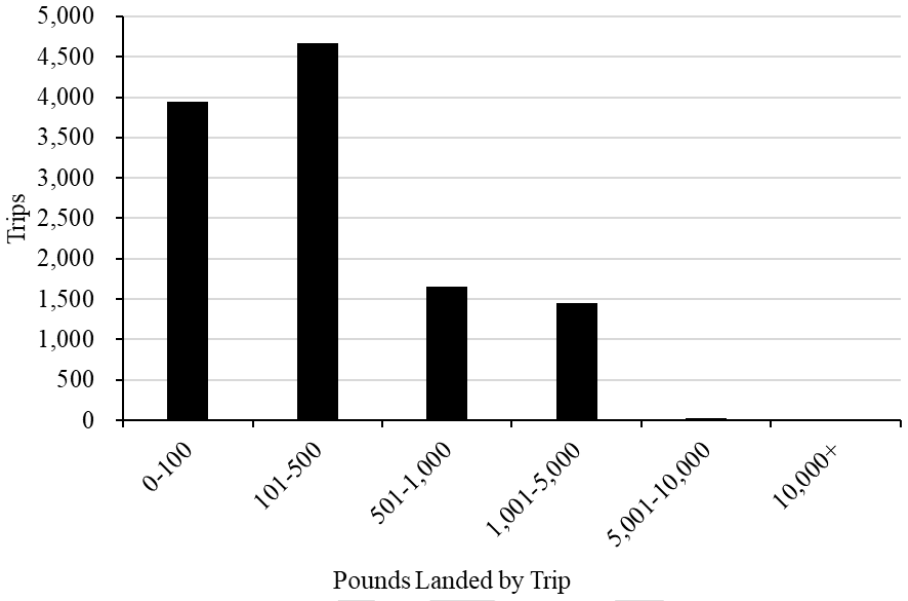

Figure 1.18. Number of targeted trips grouped by pounds landed per trip in the runaround gill net striped mullet fishery reported through the North Carolina Trip Ticket Program by gear, 2017–2021.

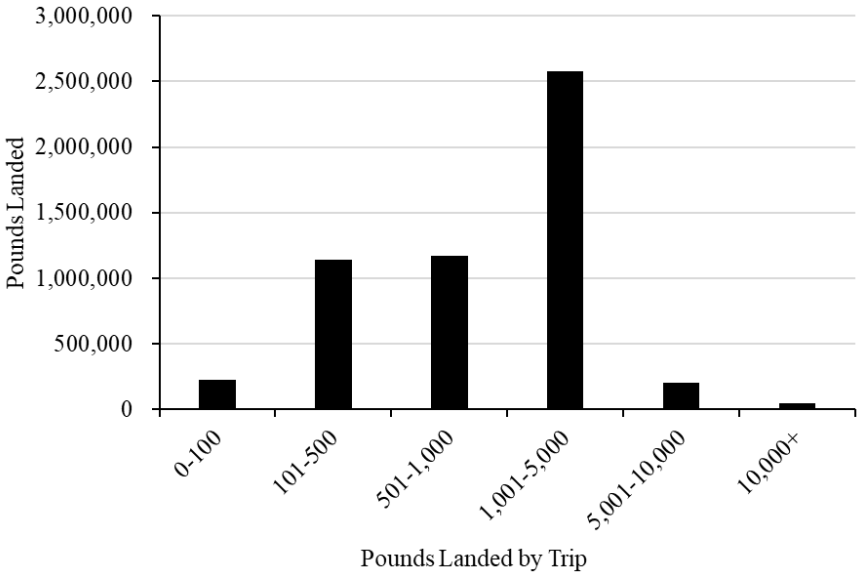

Figure 1.19. Total pounds landed grouped by pounds landed per targeted trip in the runaround gill net striped mullet fishery reported through the North Carolina Trip Ticket Program by gear, 2017–2021.

Runaround gill nets have a higher modal mesh size (3.75 ISM) than set small mesh gill nets (3.5 ISM; Table 1.3). This is likely due to most runaround gill net trips occurring in October and

November during the roe season when fishermen are targeting larger females. The average net length is 366 yards with a maximum of 1,000 yards, with nearly half of all trips setting less than 300 yards of net (Figure 1.20). Runaround gill nets tend to be much shorter than set gill nets because runaround gill nets are actively fished to encircle schools of striped mullet. This allows for much less yardage needed to catch the fish than the passively fished set gill nets. Since the gill nets are already significantly shorter, and nets can be fished several times consecutively, maximum yardage restrictions may not be effective in managing harvest in this fishery. For more information on possible management applications of runaround gill net yardage restrictions, see Appendix 2.

Table 1.3. Small mesh (<5 inch ISM) runaround gill net trips in North Carolina using data from the N.C. Trip Ticket Program with associated gear characteristics from fish house, 2017-2021.

Species	Trips	Avg/Yr	Modal Mesh	Avg Yds	Max Yds
Striped mullet	20,763	4,153	3.75	366	1,000

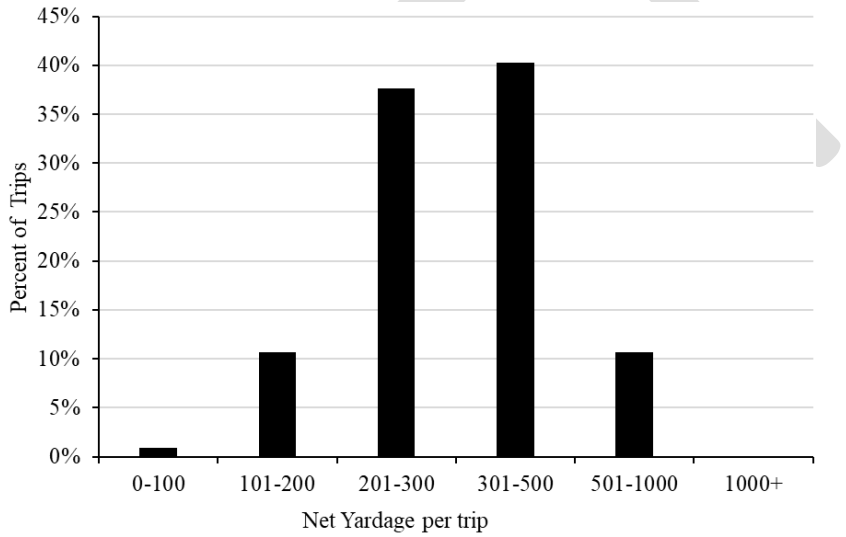

Figure 1.20. Percent of total trips grouped by yards fished per trip in the set small mesh gill net striped mullet fishery using data from the commercial fish house sampling program 2017–2021.

When targeting striped mullet with runaround gill nets, it is common to catch other species incidentally. The most common species landed incidentally when targeting striped mullet in set gill nets are spotted seatrout, red drum, bluefish, spot, black drum, and blue crab (Figure 1.21). Conversely, striped mullet are most commonly caught incidentally when runaround gill net fishermen are targeting spotted seatrout, bluefish, and spot (NC trip ticket data). This overlap between the striped mullet and spotted seatrout, bluefish, and spot runaround gill net fisheries could have management implications for all these fisheries if gear restrictions are put in place to restrict striped mullet harvest.

No data is available to characterize discards in this fishery because the commercial observer program does not observe runaround gill net trips.

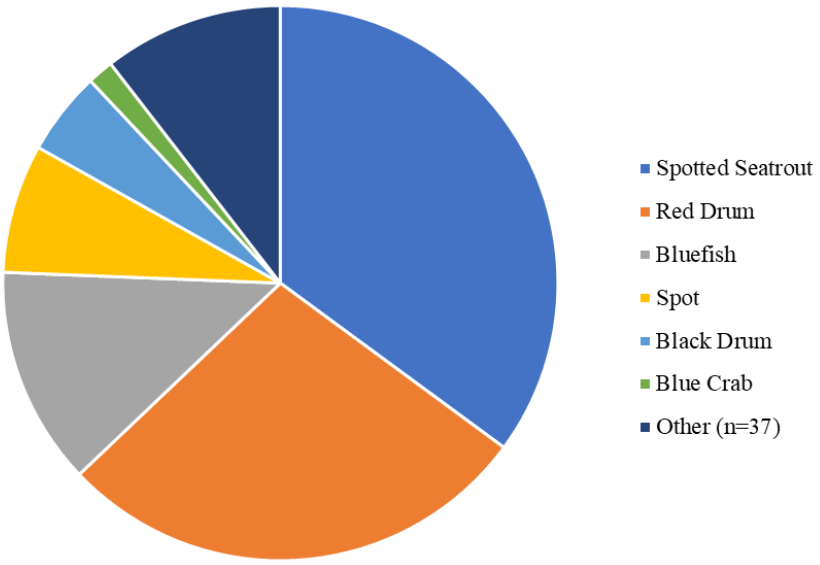

Figure 1.21. Proportion of incidental catch landed by species in the runaround net striped mullet fishery reported through the North Carolina Trip Ticket Program, 2017–2021.

Appendix 2: Achieving Sustainable Harvest in the North Carolina Striped Mullet Fishery

Issue

Implement management measures to achieve sustainable harvest in the North Carolina striped mullet fishery.

Origination

DMF

Background

The North Carolina striped mullet stock is overfished with overfishing occurring in 2019, the terminal year of the stock assessment (NCDMF 2022a). The observed data and model predictions suggest a decreased presence of larger, older striped mullet in the population. The model estimated declining trends in age-0 recruitment and female SSB over the last several decades. Model results also indicate consistent overestimation of biomass and the greatest risk for overfishing.

The stock assessment model estimated a value of 0.37 for the $F_{25\%}$ threshold and a value of 0.26 for the $F_{35\%}$ target. In 2019 *F* was 0.42, greater than the $F_{25\%}$ threshold, indicating overfishing is occurring (Figure 5). The model estimated a value of 1,364,895 pounds for the $SSB_{25\%}$ threshold and a value of 2,238,075 pounds for the $SSB_{35\%}$ target. Female SSB in 2019 was estimated at 579,915 pounds, lower than the $SSB_{25\%}$ threshold, indicating the stock is overfished (Figure 6).

North Carolina General Statute 113-182.1 states that fishery management plans shall: 1) specify a time period not to exceed two years from the date of adoption of the plan to end overfishing, 2) specify a time period not to exceed 10 years from the date of adoption of the plan for achieving sustainable harvest, and 3) must also include a standard of at least 50% probability of achieving sustainable harvest for the fishery. Sustainable harvest is defined in North Carolina General Statute 113-129 as “the amount of fish that can be taken from a fishery on a continuing basis without reducing the stock biomass of the fishery or causing the fishery to become overfished”.

Stock recovery is highly dependent on age-0 recruitment. The 2022 stock assessment indicates recruitment has not only declined but has been below average since 2009 (Figure 2.1). Stock projections based on the stock assessment indicate a conservative, 21.3-35.4% reduction in total removals is needed to rebuild spawning stock biomass to a sustainable level. If low recruitment continues, female SSB is never projected to reach the SSB target at a 21.3-35.4% harvest reduction. A 21.3-35.4% reduction in total removals is projected to, at a minimum, rebuild SSB to the threshold even if low recruitment continues (Figures 2.2-2.3). Assuming average recruitment, a 21.3% reduction in total removals rebuilds SSB to the target in eight years with a 78% probability of success and a 35.4% reduction in total removals rebuilds SSB to the target in four years with a 100% probability of success (Table 2.1). Either reduction scenario meets the statutory requirement to achieve sustainable harvest with at least a 50% probability of success. A 9.9% reduction in total removals reduces *F* to the *F* threshold and a 33% reduction reaches the *F* target.

In response to stock assessment results the MFC adopted Supplement A to Amendment 1 to the Striped Mullet FMP in May 2023 to end overfishing (NCDMF 2023). Supplement A established season closures for the striped mullet commercial and recreational fisheries with the goal of achieving a 21.7% reduction in harvest relative to 2019 commercial landings, ending overfishing and beginning to rebuild the stock (see Season Closure section of this issue paper for additional

information). Supplement A management will remain in place until adoption of Amendment 2 to the Striped Mullet FMP.

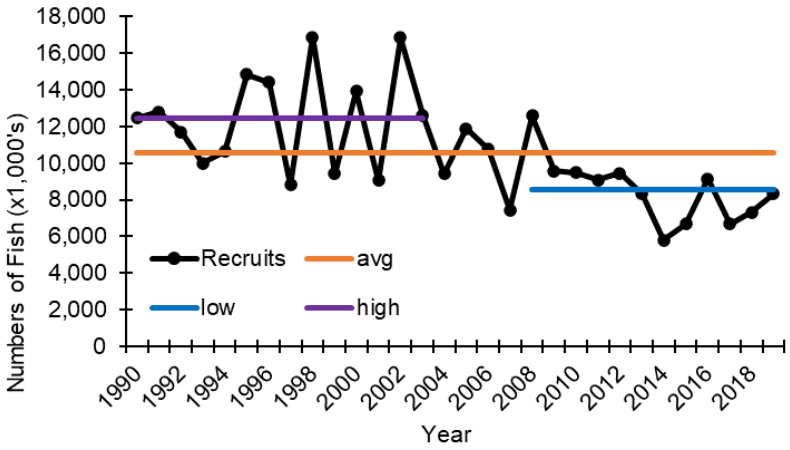

Figure 2.1. Estimates of striped mullet recruitment from the 2022 striped mullet stock assessment (NCDMF 2022). Average recruitment is the average number of recruits from 1990 to 2019, high recruitment is the average number of recruits from 1990 to 2003, and low recruitment is the average number of recruits from 2008 to 2019.

Table 2.1. Number of years to reach the SSB_{Target} and $SSB_{Threshold}$ with probability of success in parentheses at 21.3% and 35.4% reduction in total removals assuming low and average recruitment. Removals assumed are in comparison to removals in 2019. Both reduction scenarios end overfishing.

		number Years from 2024		
Reduction	Recruitment Assumption	Reach Target	Reach Threshold	Removals Assumed (lb)
21.3%	Low	Never (0%)	7 (68%)	1,072,538
	Average	8 (78%)	2 (100%)	1,072,538
35.4%	Low	Never (0%)	3 (99%)	880,418
	Average	4 (100%)	2 (100%)	880,418

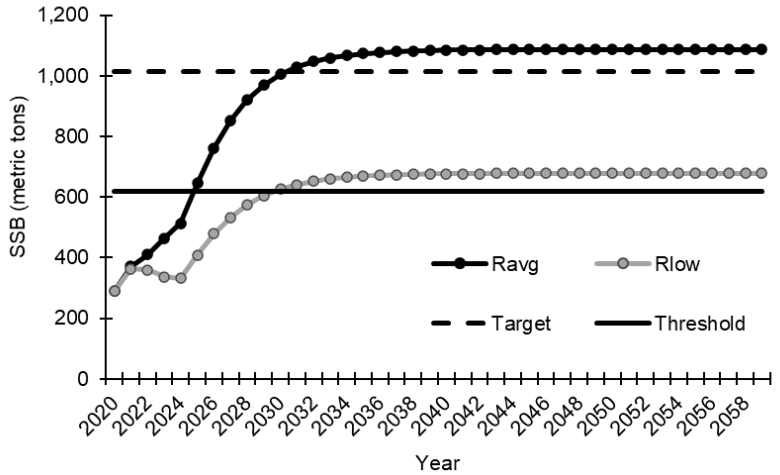

Figure 2.2. Projected striped mullet spawning stock biomass at various recruitment levels (average and low) compared to the SSB_{Target} (dashed line) and $SSB_{Threshold}$ (solid line) assuming a 21.3% reduction in total removals.

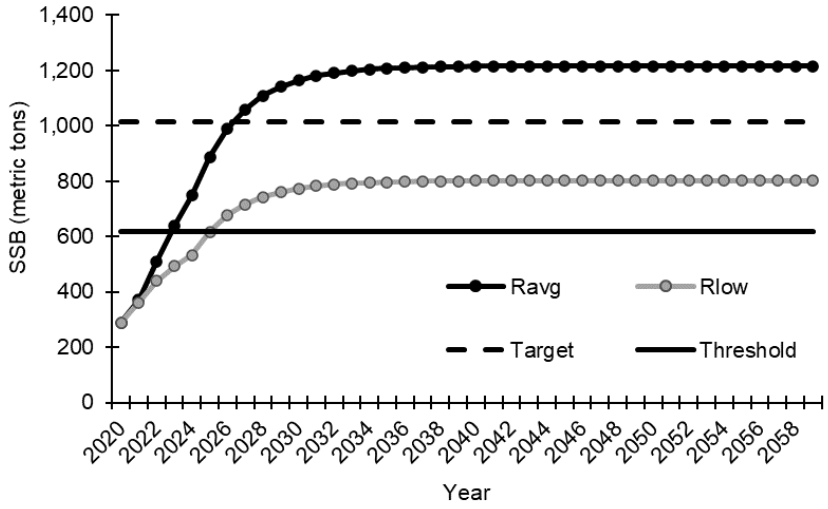

Figure 2.3. Projected striped mullet spawning stock biomass at various recruitment levels (average and low) compared to the SSB_{Target} (dashed line) and $SSB_{Threshold}$ (solid line) assuming a 35.4% reduction in total removals.

Several management tools are available to achieve sustainable harvest in the striped mullet fishery. This discussion includes specific quantifiable management measures projected to meet the required harvest reductions to rebuild the striped mullet stock and fulfill the statutory requirements. Several management tools, including combinations of management measures, were explored including size limits, seasonal closures, day of week closures, trip/creel limits, gear restrictions, and seasonal catch limits. To establish context for small mesh gill net management options to support sustainable harvest options, Appendix 1: Small Mesh Gill Net Characterization in the North Carolina Striped Mullet Fishery provides a comprehensive review of the small mesh gill net fishery for striped mullet.

Discussion of sustainable harvest primarily focuses on reductions in the commercial fishery, where most striped mullet harvest occurs. Because of recreational harvest data limitations, harvest reductions from any specific management measure cannot be calculated. In 2019, recreational striped mullet harvest accounted for 1.7% of total harvest and accounted for 4.2% of total harvest from 1994-2019. While recreational harvest is not expected to have significant impacts on stock status (NCDMF 2022), management measures discussed in this issue paper could apply to the recreational sector. Additional information about the recreational fishery for striped mullet and potential recreational specific management measures can be found in the 2022 stock assessment (NCDMF 2022) and Appendix 3: Characterization and Management of the North Carolina Recreational Striped Mullet Fishery.

Because recreational harvest reductions cannot be quantified due to data limitations, sustainable harvest reduction calculations are based solely on commercial striped mullet landings (Table 2.2). All management options represent the percent reduction to commercial harvest relative to commercial landings in 2019 (terminal year of the stock assessment). While a 9.3% reduction does end overfishing, it does not rebuild SSB to the threshold and cannot be considered for long-term management of the stock.

Table 2.2. Harvest reduction, and commercial only harvest reduction necessary to end overfishing and rebuild the stock. Target landings are 2019 commercial landings reduced by the given percentage. *Does not meet statutory requirement to rebuild stock.

Commercial Harvest Reduction (%)	Target Landings (pounds)
9.9*	1,227,358*
21.3	1,072,065
35.4	879,992

Authority

N.C. General Statute
G.S. 113-134 RULES
G.S. 113-182 REGULATION OF FISHING AND FISHERIES
G.S. 113-182.1 FISHERY MANAGEMENT PLANS
G.S. 113-221.1. PROCLAMATIONS; EMERGENCY REVIEW
G.S. 143B-289.52 MARINE FISHERIES COMMISSION-POWERS AND DUTIES

N.C. Rule
15A NCAC 03M .0502 MULLET
15A NCAC 03H .0103 PROCLAMATIONS, GENERAL

Discussion

The discussion below includes specific management measures that were both quantifiable and projected to meet the striped mullet harvest reduction. Reductions are based on the terminal year of the stock assessment (2019) and achieve sustainable harvest within 10 years with at least a 50% probability of success. Several management tools explored include: size limits, season closures, trip limits, day of week closures, combinations of measures, stop net management, seasonal catch limits, area closures, limited entry, and adaptive management.

Size Limits

Throughout this section, unless otherwise stated, all lengths are fork length (FL), which is a measurement of the fish from tip of snout to the fork in the tail.

Size limits are a common management tool to focus harvest on specific size and age classes of a fish stock. Management objectives and species life histories help managers determine what size limits should be implemented. By setting a minimum size limit based on length at maturity, managers can ensure a portion of the females in the stock have a chance to spawn at least once before harvest. In North Carolina, the length at 50% maturity (L50) for female striped mullet is 319 mm (12.6 inches; NCDMF 2021), and the length where 100% of the females are mature is 367 mm (14.4 inches; Bichy 2004). Striped mullet at 367 mm are as young as age-1 but more commonly are age-2. Other states with striped mullet fisheries, including Florida and Texas, use some form of a size limit to restrict harvest. Florida has an 11-inch minimum size in their commercial fishery with an allowance for 10% of the total weight possessed to be undersized. Texas has a 12-inch maximum size limit in both their recreational and commercial striped mullet fisheries during October, November, December, and January. A maximum size limit during the fall and early winter prevents harvest of the largest spawning fish.

Increasingly, minimum size limits are being re-evaluated as a conservation measure for fish stocks (Ahrens et al. 2019; Coggins et al. 2007; Garcia et al. 2012; Gwinn et al. 2013). While

minimum size limits are considered a good strategy for meeting some management objectives, sustainability may not be met through minimum size limits alone because minimum size limits often create additional discards and larger, older fish typically contribute disproportionately more to spawning success. For striped mullet, fish in the 300-350 mm size range (11.8-13.8 inches) are estimated to produce 551,105 to 984,000 eggs per individual whereas fish greater than 400 mm (15.7 inches) can produce upward of 2 million eggs (Table 2.3; Leard et al. 1995).

In North Carolina all sizes of striped mullet are targeted commercially and recreationally. Recreational and commercial fisheries use cast nets to target small striped mullet, or "finger mullet", for use as live bait. "Finger mullet" typically range from 70-140 mm (2.8-5.5 inches; NCDMF 2006, 2022a). Commercial fisheries harvest larger striped mullet ranging from 229-508 mm FL (9-20 inches; Figure 2.4). These fish are typically harvested for use as food, cut bait, or for roe. All sizes of striped mullet are targeted by commercial fisheries throughout the year to meet market demand for food and bait, but the size of striped mullet harvested begins to increase in September, with the largest striped mullet consistently captured in October and November as larger fish become available to the fishery and demand for roe increases (Tables 2.4-2.5; Figure 2.5). During October and November, the largest striped mullet are targeted by the roe fishery because larger fish have a higher roe content than smaller fish and a narrower size range of fish are harvested.

Table 2.3. Striped mullet fecundity estimates by size from Leard et al. (1995).

Fork Length (mm)	Fork Length (inches)	Average Fecundity (number of eggs)	
		Mahmoudi (1990)	J. Render (personal communication)
300-350	11.8-13.8	984,000	551,104
350-400	13.8-15.7	1,493,000	913,456
400-450	15.7-17.7	2,152,000	1,077,163
450-500	17.7-19.7	2,979,000	2,960,897[1]
500-550	19.7-21.7	3,992,000	2,269,251

[1]Figure may be overestimated because average was obtained from only two samples, 491 and 495 mm FL.

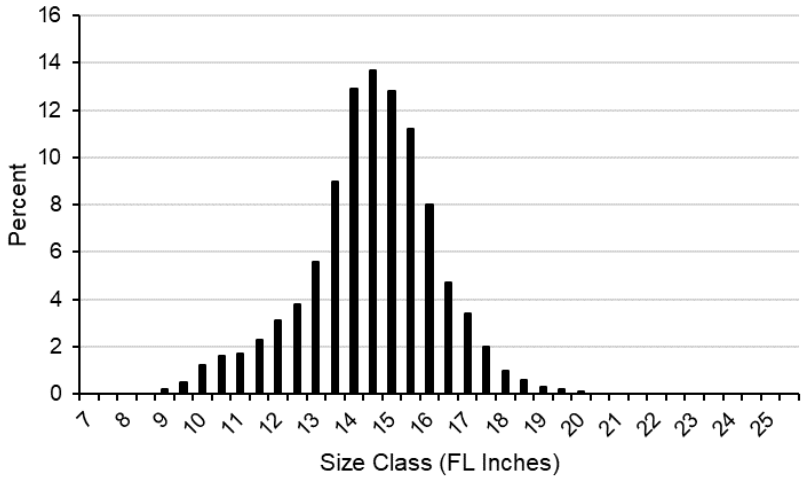

Figure 2.4. Length-frequency of striped mullet harvested in North Carolina commercial fisheries based on commercial fish house sampling, 2017-2021.

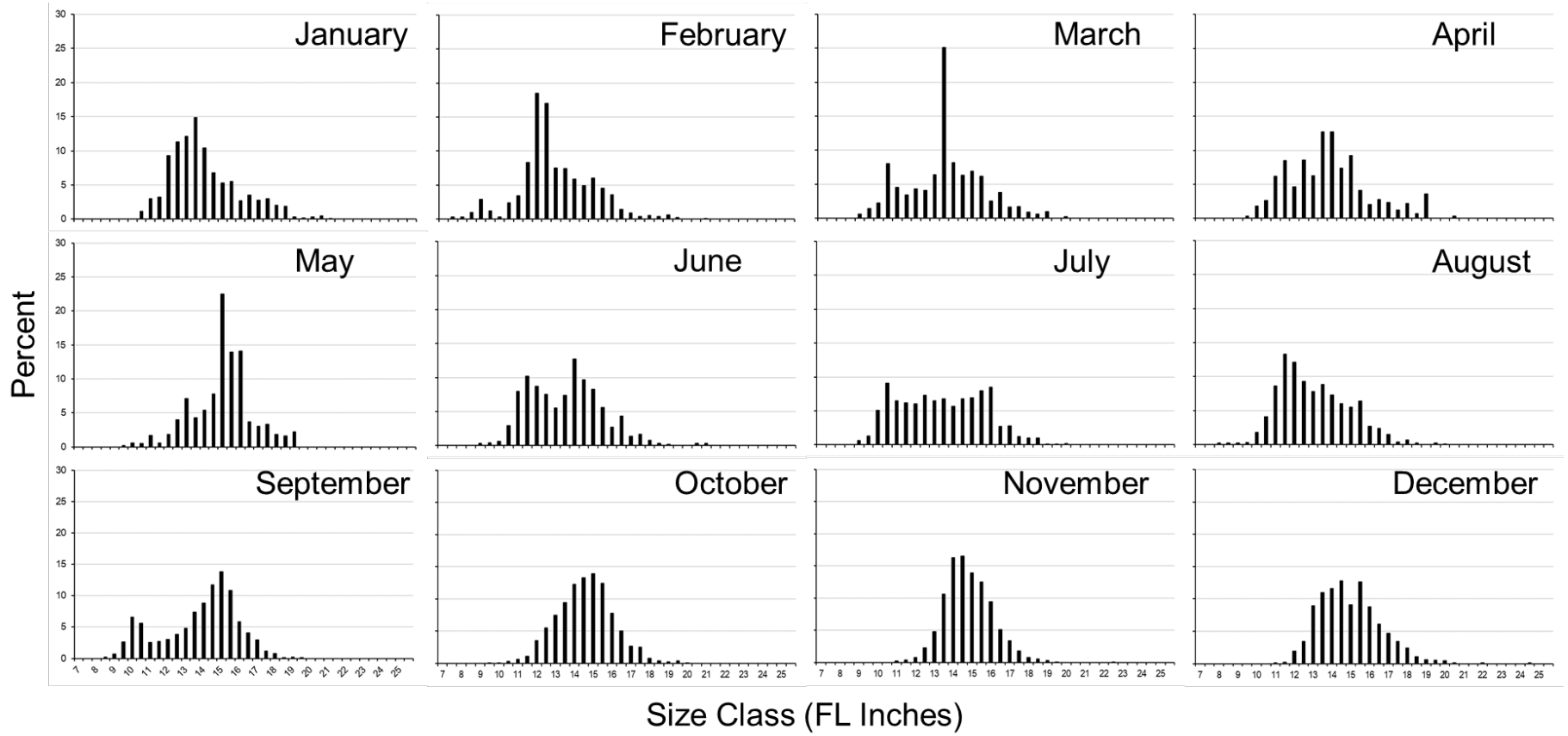

Figure 2.5. Length-frequency (inches) of striped mullet harvested in North Carolina commercial fisheries by month based on commercial fish house sampling, 2017-2021.

Table 2.4. Length-frequency (inches) of striped mullet harvested in North Carolina commercial fisheries by month based on commercial fish house sampling, 2017-2021. Shaded area represents modal length.

Size Class (inches)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.5	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
8.5	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0
9.0	0.0	2.9	0.6	0.0	0.0	0.3	0.6	0.2	0.7	0.0	0.0	0.0
9.5	0.0	1.2	1.4	0.3	0.2	0.4	1.3	0.3	2.6	0.1	0.0	0.0
10.0	0.0	0.3	2.2	1.8	0.6	0.6	5.1	1.8	6.6	0.1	0.0	0.0
10.5	1.1	2.4	8.0	2.6	0.5	2.9	9.1	4.1	5.6	0.3	0.0	0.0
11.0	3.0	3.4	4.5	6.2	1.7	8.0	6.5	8.6	2.5	0.6	0.2	0.1
11.5	3.2	8.3	3.4	8.5	0.6	10.2	6.2	13.3	2.7	1.1	0.4	0.2
12.0	9.3	18.5	4.3	4.6	1.8	8.7	6.0	12.1	3.0	3.5	0.8	1.9
12.5	11.3	17.0	4.1	8.6	4.0	7.5	7.3	9.3	3.8	5.5	2.3	3.4
13.0	12.1	7.5	6.4	6.3	7.1	5.5	6.5	7.8	4.8	7.5	4.8	8.9
13.5	14.9	7.4	25.1	12.7	4.3	7.4	6.8	8.8	7.4	9.4	10.6	11.0
14.0	10.4	5.9	8.2	12.7	5.4	12.7	5.7	7.3	8.8	12.3	16.3	11.6
14.5	6.8	4.9	6.3	7.4	7.8	9.7	6.8	6.0	11.7	13.3	16.5	12.8
15.0	5.3	6.0	6.9	9.2	22.5	8.3	6.9	5.5	13.8	13.9	13.9	9.1
15.5	5.5	4.5	6.2	4.1	13.9	5.6	8.0	6.4	10.8	12.4	12.5	12.6
16.0	2.7	3.6	2.5	2.0	14.1	2.7	8.5	2.7	5.8	7.8	9.4	8.8
16.5	3.5	1.4	3.8	2.8	3.7	4.3	2.7	2.4	4.1	5.0	5.1	6.1
17.0	2.8	0.9	1.6	2.3	3.0	1.4	2.8	1.5	2.9	2.7	3.4	4.7
17.5	3.0	0.4	1.7	1.2	3.3	1.7	1.2	0.4	1.2	2.5	1.8	3.4
18.0	2.0	0.5	0.9	2.2	1.8	0.8	1.0	0.7	0.8	0.8	0.8	2.4
18.5	1.9	0.4	0.6	0.7	1.6	0.3	1.0	0.2	0.1	0.4	0.5	1.1
19.0	0.3	0.6	1.0	3.6	2.2	0.2	0.1	0.0	0.2	0.2	0.3	0.6
19.5	0.2	0.2	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.4	0.1	0.5
20.0	0.3	0.0	0.2	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.0	0.4
20.5	0.5	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.1
21.0	0.1	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
21.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
22.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
23.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 2.5. Length-frequency (inches FL) of striped mullet harvested in North Carolina commercial fisheries by month based on commercial fish house sampling, 2019. Shaded area represents modal length.

Size Class (inches)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9.5	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.1	0.2	0.0
10.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	0.2	0.3	0.0	0.0	0.0
10.5	0.0	0.0	0.0	0.0	0.0	0.0	3.9	4.0	0.1	0.0	0.0	0.0
11.0	0.0	0.0	0.0	0.1	0.0	0.0	3.0	12.7	0.5	0.1	0.0	0.0
11.5	0.0	0.0	0.0	0.5	0.0	0.0	6.9	22.3	0.1	0.1	0.1	0.0
12.0	0.0	0.0	0.0	1.0	0.0	0.5	3.5	21.5	1.9	0.2	0.1	0.6
12.5	0.0	0.0	0.0	2.7	0.0	4.2	9.2	14.0	6.6	1.0	1.4	0.7
13.0	2.3	0.0	0.0	6.1	0.0	0.9	6.8	6.6	7.6	4.0	3.7	8.7
13.5	19.7	4.1	100.0	15.2	0.0	9.1	11.9	2.1	10.5	8.4	7.8	9.4
14.0	30.2	16.9	0.0	11.4	0.0	11.0	8.8	2.7	10.7	15.4	15.4	12.0
14.5	12.9	8.7	0.0	9.3	0.0	19.8	5.6	1.0	14.0	14.9	15.1	12.3
15.0	9.1	33.1	0.0	18.0	50.0	9.7	5.7	2.4	22.0	13.1	15.4	16.6
15.5	6.1	20.7	0.0	7.6	25.0	10.3	11.6	2.4	14.3	15.7	15.9	12.9
16.0	2.7	8.3	0.0	3.1	25.0	4.0	9.4	2.2	4.2	8.6	11.1	10.6
16.5	1.5	8.3	0.0	7.9	0.0	20.3	3.7	2.0	5.0	8.2	6.0	4.5
17.0	1.5	0.0	0.0	4.7	0.0	3.1	2.1	2.0	0.9	3.7	2.8	1.6
17.5	2.7	0.0	0.0	4.4	0.0	3.9	3.6	1.1	0.0	3.4	2.5	3.1
18.0	2.7	0.0	0.0	4.0	0.0	3.1	0.0	0.4	0.7	1.4	0.7	1.4
18.5	3.1	0.0	0.0	3.1	0.0	0.0	0.0	0.2	0.0	0.6	0.8	2.4
19.0	1.1	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.5	0.4	0.8
19.5	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	0.6	0.1	1.2
20.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1
20.5	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
21.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
22.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
22.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
23.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

On its own, implementation of a minimum size limit set at the L50 for striped mullet would be unlikely to meet sustainability objectives and would eliminate the bait fishery for finger mullet. Striped mullet less than L50 size (12.6 inches) are captured in commercial fisheries during every month, and in some months make up significant portions of the commercial catch. Generally, striped mullet reach length at maturity in the estuary before migrating offshore to spawn. If a minimum size limit based on the L50 was implemented, striped mullet would reach harvestable size before spawning, resulting in little conservation benefit. As an example, implementing a minimum size limit of 12.5 inches would appear to reduce harvest by around 14.5% (Table 2.6). However, overall harvest would likely not be reduced by that amount because harvest would likely be delayed until those fish reach harvestable size, preventing achieved harvest reductions and

minimizing conservation benefit. In addition, minimum size limits would likely increase discards if gear modifications and changes in fishery behavior did not also occur.

Implementing a maximum size limit or seasonal maximum size limit, like what is done in Texas, would reduce harvest and provide additional non-quantifiable benefits to the stock. Unlike minimum size limits, a maximum size limit would not cause delayed harvest or recoupment of catch, once a fish reached the maximum size limit it could not be harvested. While there is little information to inform an ideal maximum size limit (Texas has a 12-inch maximum size limit during October-January), as an example, a 15-inch maximum size limit could reduce harvest by 39.8% compared to commercial landings from 2017-2021 (Table 2.6) and would have reduced commercial landings by 49% in 2019.

A maximum size limit, focused on the spawning season (October-December), would have a more direct impact on the spawning stock. As an example, implementing a 15-inch maximum size limit during the spawning season could reduce overall commercial harvest by 27.0% compared to landings from 2017-2021, while continuing to allow significant harvest of smaller roe size striped mullet (Table 2.6). An October-November 15-inch maximum size limit would have reduced harvest up to 33% in 2019. This type of harvest control would likely result in quantifiable harvest reductions and have nonquantifiable benefits to the stock by allowing larger females, that produce more eggs, to spawn while allowing the roe fishery to occur. While discards would likely occur during the spawning season, discards would be lower outside of the spawning season. In addition, because of market demands the largest striped mullet are generally not targeted outside of the spawning season so it is unlikely effort would shift to larger fish earlier in the season. However, a seasonal maximum size limit during the fall would negatively affect the roe fishery, which targets large fish with a high roe content.

Slot limits should not be considered in the striped mullet fishery. Implementation of a harvest slot would exclude “finger mullet” and large roe mullet from harvest. This type of measure would not allow for the fish to be used in the same way they are used currently and may have little conservation benefit because peak harvest already occurs on a narrow range of sizes. A protected slot would direct more harvest to larger fish and would likely prevent significant amounts of harvest resulting in excessive discards.

Implementing a minimum or maximum size limit would need to be accompanied by corresponding changes to minimum or maximum mesh sizes used in gill nets to reduce dead discards. As illustrated in Appendix 1, the primary method for harvesting striped mullet is runaround gill nets with the most common mesh size of 3.75 inches stretched mesh (ISM; Table 1.3), but mesh sizes ranging from less than 3.0 ISM up to 4.5 ISM are used in the fishery. As an example, if a minimum size limit of 12.5 inches was implemented, a minimum mesh size of around 3.25 ISM would need to be adopted to minimize discards (Figure 1.7). If a maximum size limit of 15 inches was implemented, a maximum mesh size of around 4.0 ISM or 3.75 ISM would need to be adopted to minimize discards. If a maximum size limit is seasonal, the associated mesh size restrictions could also be seasonal and could apply to runaround gill nets only, all small mesh gill nets, or just gill net trips landing mullet. However, if additional mesh size restrictions are adopted there would likely be some impact to small mesh gill net fisheries targeting other species.

The striped mullet FMP Advisory Committee (AC) was not supportive of any type of size limit because striped mullet of all sizes are marketable. In addition, the AC cautioned that setting minimum or maximum mesh sizes in response to a size limit may increase overall harvest because of annual, seasonal, and regional variation in the size of striped mullet available to the fishery.

Table 2.6. Example minimum, maximum and seasonal maximum size limit options (inches) and associated percent commercial harvest reduction based on fish house sampling, 2017-2021. Options that meet the needed 21.3-35.4% reduction in commercial harvest on their own are shaded in gray.

Size Limit Options (Inches FL)	
Minimum	Percent Reduction
12.5	14.5
13.0	20.4
13.5	27.2
14.0	37.2
Maximum	**Percent Reduction**
15.0	39.8
15.5	28.4
16.0	18.2
16.5	11.4
17.0	7.1
17.5	4.4
18.0	2.5
18.5	1.5
19.0	0.9
19.5	0.4
Oct-Dec Maximum	**Percent Reduction**
14.5	51.4
15.0	27.0
15.5	19.3
16.0	12.2
16.5	7.4
17.0	4.5
17.5	2.6
18.0	1.3
18.5	0.8
19.0	0.4
19.5	0.3

Option 1: Size Limit Options

a. *Status Quo – Manage fishery without minimum or maximum size limits*
   + Allows for continued use of all striped mullet size classes
   + Does not increase discards
   – No preferential protection for largest fish

b. *Minimum Size Limit and 3.25 ISM Minimum Gill Net Mesh Size*
   + Could benefit the roe fishery later in the year
   – Prevents use of smaller mullet as bait
   – Unlikely to meet sustainability objectives
   – Allows for recoupment of catch
   – Directs harvest to biggest fish
   – Would need to implement corresponding minimum mesh size requirements
   – May increase harvest

c. *Maximum Size Limit and 3.75 or 4.0 ISM Maximum Gill Net Mesh Size*
   + Preferential protection for largest fish

+ Would result in quantifiable harvest reductions
+ No recoupment of catch
– Prevents harvest of valuable larger fish
– Increased discards
– Would need to implement corresponding maximum mesh size requirements
– May increase harvest

d. Seasonal Maximum Size Limit and 3.75 or 4.0 ISM Maximum Gill Net Mesh Size

+ Preferential protection for largest fish
+ Would result in quantifiable harvest reductions
+ No recoupment of catch
+ More directly protects the spawning stock
+ Increased discards would not occur prior to the spawning season
– Prevents harvest of valuable larger fish
– Increased discards
– Would need to implement corresponding seasonal maximum mesh size requirements
– May increase harvest

Seasonal Closures

Season closures, specifically end of year season closures, are considered an effective and efficient management option to end overfishing of the striped mullet stock and rebuild SSB. In May 2023, the MFC adopted Supplement A to Amendment 1 to the North Carolina Striped Mullet FMP. The intent of Supplement A is to end overfishing of the striped mullet stock. The Supplement implements regional season closures to reduce harvest by 21.7% in 2023 to end overfishing by reducing *F* to a level between the threshold and target. The anticipated harvest reduction from the season closures also begins to rebuild the stock to the target assuming average recruitment occurs. Additional information about season closures can be found in Supplement A. Options from the supplement are presented in this paper. Only options that meet the statutory requirement to end overfishing and rebuild the stock (21.3%-35.4%) are presented.

Statewide Season Closures

Options 2.b and 2.c (Table 2.7) reduce commercial harvest enough to end overfishing and recover the stock. Any statewide season closure must occur no sooner than October 29 and continue through the end of the year to meet needed reductions.

Region Specific Season Closures

To better account for the difference in management impact between the two regions, options for region specific season closures were developed. Options for region specific seasons are shown in Table 2.8. The split between the northern and southern regions was designated as the Highway 58 Bridge to Emerald Isle, including a line extending from the bridge to a point three miles offshore.

Table 2.7. End of year season closure options that reduce harvest to end overfishing and recover the stock. Supplement A included a third option which cannot be considered for Amendment 2 management since it does not recover the stock.

Option	Season Closure	Reduction	End Overfishing?	Recover Stock?
2.b*	October 29 - December 31	33.7	Yes, Target	Yes
2.c	November 7 - December 31	22.1	Yes, *F* Below Threshold	Yes

*Adding one more closure day exceeds 35.4% statutory reduction requirement

Table 2.8. Management options to reduce commercial harvest to end overfishing and recover the stock by splitting the seasons between north and south. All reductions are calculated from 2019 commercial harvest levels (terminal year of stock assessment).

	Season Closure				
Option	North	South	Reduction	End Overfishing?	Recover Stock?
2.d	Oct. 28-Dec. 31	Oct. 30-Dec.31	35.6	Yes, Target	Yes
2.e	Nov. 7-Dec. 31	Nov. 10-Dec. 31	21.7	Yes, *F* Below Threshold	Yes

Options 2.d and 2.e (Table 2.8), which meet the reduction needed to end overfishing and recover the stock, provide up to three additional fishing days in the south without substantially reducing fishing days in the north. In 2019, there appeared to be minimal overlap in participation between the northern and southern regions. However, under a split season, where the north closes earlier than the south, effort could shift from north to south and expected harvest reductions may not be realized. The Striped Mullet FMP AC indicated the striped mullet fishery has highly mobile participants who move between regions following the fish and suggested it would be beneficial for management measures to be consistent statewide. In addition, AC members questioned the accuracy of waterbody locations recorded on trip tickets and expressed concern about using waterbody fished or county of landing to set regional specific seasons. While this concern is valid, the NC Trip Ticket Program continues to provide outreach and education to dealers about the importance of accurate trip tickets for fair and effective management. These season closure options assume an equal reduction for each region. However, additional options could be developed for scenarios where the amount of reduction is different between regions to allow the season to be extended in one region or the other.

Region specific closures were not considered using other regional splits because other splits are more likely to have overlap in participation and there is no clear delineation for different areas where the striped mullet commercial fishery operates in a different manner. The one exception may be the Albemarle Sound area, where low landings of striped mullet occur throughout the year but increase slightly in the winter. These landings occur incidentally to other small mesh gill net fisheries in the region, primarily the white perch fishery (see Appendix 1). However, most of these landings occur in January and February, months which are not being considered for striped mullet season closures. Because there is not a large directed striped mullet fishery in the Albemarle Sound region, creating a region-specific season closure in this area would likely be ineffective unless other fisheries were significantly impacted. No additional regional closure options were suggested or discussed by the AC.

The Striped Mullet FMP AC strongly disagreed with the use of statewide or regional season closures as a management measure to reduce harvest in the striped mullet fishery. AC members suggested putting a hard closure date on the fishery would result in effort shifts and participants trying to catch as much as they can before the closure. AC members also expressed concern that if the fishery were to close, roe buyers may not come to the state, eliminating the most profitable segment of the fishery. In addition, AC members felt having a complete closure would result in striped mullet discards occurring in other fisheries and suggested having a small bycatch allowance during the closed season may help prevent discards.

Option 2. Season Closure Options

a. No Season Closure
   - \+ Short season closures
   - \+ Does not have significant impacts on roe fishery
   - \+ Does not have significant impacts on bait fishery
   - \+ Landings less likely to be impacted by extreme weather events

- Other measures may be more complicated to monitor and enforce
- Other measures may be less effective

b. Statewide Season Closure – October 29 - December 31
c. Statewide Season Closure – November 7 - December 31
   + No additional resources required to implement
   + No additional reporting burden on fishermen or dealers
   + Reduces effort from current level
   + High likelihood of ending overfishing and recovering stock
   – Weather may prevent fishing during open periods
   – Effort may increase during the open period reducing the effectiveness of the closure
   – Reduction in fishing mortality may not be achieved
   – Overfishing may still occur if recruitment is low
   – May adversely impact some fisheries and more than others
   – Create discards in the closed period

d. Regional, North/South, Season Closure – North Oct. 28-Dec. 31 South Oct. 30-Dec.31
e. Regional, North/South, Season Closure – North Nov. 7-Dec. 31 South Nov. 10-Dec. 31
   + No additional resources required to implement
   + No additional reporting burden on fishermen or dealers
   + Reduces effort from current level
   + High likelihood of ending overfishing and recovering stock
   – Weather may prevent fishing during open periods
   – Effort may increase during the open period or open regions reducing the effectiveness of the closure
   – Reduction in fishing mortality may not be achieved
   – Overfishing may still occur if recruitment is low

May adversely impact some fisheries more than others Create discards in the closed period

Additional Options

Several management options could be used in place of season closures or in conjunction with season closures to extend the open season, prevent excessive harvest during the open season, or prevent excessive discards. Many options, like trip limits, would likely need to be implemented in conjunction with small mesh gill net restrictions. See Appendix 1 for a comprehensive review of the small mesh gill net fishery for striped mullet and information about small mesh gill net restrictions that could be implemented to support sustainable harvest.

Trip Limits

Applying a daily trip limit or seasonal daily trip limit to striped mullet commercial catches could be used to limit harvest during the open season. Early in the year, commercial catches are smaller, but during the peak season in October and November landings per trip increase substantially (Tables 2.9 and 2.10). Striped mullet are primarily targeted with actively fished gear, like runaround gill nets, with smaller landings amounts coming from anchored gill nets (see Appendix 1). In high volume fisheries, daily trip limits would typically be expected to result in higher levels of discards. However, in a fishery like striped mullet where landings volume is seasonal, and trips are highly targeted, daily trip limits could be used to limit landings by discouraging participants from targeting large numbers of fish. The Striped Mullet FMP AC expressed some concern with using daily trip limits as a management tool, particularly when catch volume is high, but did suggest participant behavior would likely change to reduce effort and waste if daily trips limits are implemented. A lower daily trip limit could be applied early in the year when the fishery lands less and a larger daily trip limit could be applied during the peak fall season to allow for the typical

high-volume trips during the peak of landings. Restrictive daily trip limits may cause increased discards if participant behavior does not change, and trips continue to target the highest volume of striped mullet possible. It is also possible implementation of daily trip limits, particularly early season daily trip limits, may just delay harvest and necessary harvest reductions may not be realized. For this reason, combining daily trips limits with other management measures may be beneficial for reducing total harvest.

Table 2.9. Percentage of commercial trips landing striped mullet by landings bin (lb), 2017-2021.

Month	0-100	101-500	501-1,000	1,001-5,000	5,001-10,000	10,000+
Jan	75.3	18.2	4.4	2.1	<0.1	.
Feb	81.3	13.6	3.2	1.9	.	.
Mar	83.5	13.8	1.9	0.8	.	.
Apr	81.5	14.3	3.2	1.0	.	.
May	78.4	17.2	2.8	1.6	.	.
Jun	75.9	19.0	3.3	1.8	.	.
Jul	70.8	23.5	4.0	1.7	.	.
Aug	68.5	23.7	5.5	2.3	.	.
Sep	70.9	21.2	5.1	2.8	.	.
Oct	63.8	23.4	6.4	6.2	0.2	.
Nov	66.7	22.4	5.6	5.0	0.2	<0.1
Dec	76.5	17.4	4.4	1.7	.	<0.1
Total	71.7	20.2	4.8	3.3	0.1	<0.1

Table 2.10. Percent harvest reduction from 2019 commercial landings based on various daily trip limits and time periods.

	Reduction (%)		
Trip Limit (lb)	Jan-Sept, Dec	Oct-Nov	Total
50	33.1	50.4	83.4
75	30.3	47.8	78.1
100	27.9	45.5	73.5
150	24.3	41.7	66.0
200	21.3	38.5	59.8
300	16.8	33.3	50.2
400	13.6	29.4	42.9
500	11.0	26.1	37.2
600	9.0	23.4	32.4
1,000	3.8	15.5	19.3
1,100	3.0	14.1	17.1
1,250	2.1	12.3	14.4
1,500	1.2	10.0	11.2
1,750	0.7	8.2	9.0
2,000	0.4	6.8	7.2
2,500	0.1	4.8	4.9

Any daily trip limit option would need to be implemented in tandem with yardage limits on runaround gill nets. Appendix 1 provides a review of gear characteristics in the small mesh gill net fishery. To effectively limit landings and prevent excessive discards, daily trip limit options should be implemented with restrictions limiting runaround gill nets to 300-500 yards. Members of the Striped Mullet FMP AC were not in favor of reducing the maximum yardage allowed for small mesh gill nets and thought the 800-yard maximum currently in place was restrictive enough.

However, AC members also suggested commercial fishery participants would likely reduce the yardage they used to limit landings within a lower daily trip limit, essentially self-regulating. They did not suggest what a likely yardage reduction might be.

Option 3: Trip limits

+ No additional resources required to implement
+ No additional reporting burden on fishermen or dealers
+ Reduces length of season closures
+ Limits impacts on roe fishery
+ Limits impacts on bait fishery
– Unlikely to meet sustainability objectives
– Increased discards

Day of Week Closures

Day of week closures could be used to reduce effort and harvest. Generally, the highest landings occur early in the week (Monday and Tuesday) and drop as the week goes on (Table 2.11). However, late in the summer, a higher percentage of landings occur on Friday, likely to supply bait markets, and early in the roe season a higher percentage of landings occur on Saturday (Table 2.12). Typically, the lowest landings occur on Saturday and Sunday.

Table 2.11. Percent of harvest by day of week or combination of days, 2019 and 2017-2021.

Day(s) of Week	2019 Landings	Landings (%)	2017-2021 Landings	Landings (%)
Sunday	162,709	11.9	780,061	10.4
Monday	209,707	15.4	1,201,290	16.1
Tuesday	247,756	18.2	1,273,991	17.0
Wednesday	190,343	14.0	1,148,997	15.4
Thursday	191,313	14.0	1,038,243	13.9
Friday	173,090	12.7	1,048,743	14.0
Saturday	187,294	13.7	984,763	13.2
Saturday-Sunday	350,003	25.7	1,764,823	23.6
Friday-Sunday	523,093	38.4	2,813,566	37.6
Saturday-Monday	559,710	41.1	2,966,113	39.7
Friday-Monday	732,800	53.8	4,014,856	53.7

Table 2.12. Percent of commercial landings by day of week for each month, 2017-2021.

Month	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
January	8.5	18.2	18.7	16.4	15.2	13.5	9.5
February	8.6	14.7	20.6	13.8	15.2	14.1	13.1
March	9.7	20.2	15.8	15.8	17.1	14.2	7.1
April	11.0	13.7	15.1	17.6	16.2	12.0	14.4
May	11.7	10.4	17.4	19.0	14.0	13.1	14.3
June	10.9	16.3	15.4	14.4	12.8	17.0	13.2
July	10.1	16.0	15.5	15.9	16.8	15.3	10.4
August	9.1	19.6	14.4	13.4	15.4	17.4	10.7
September	14.3	14.3	14.2	15.1	13.2	12.5	16.4
October	10.8	16.7	19.1	15.0	11.4	11.4	15.5
November	9.7	14.7	17.9	16.0	15.1	15.3	11.4
December	10.2	18.1	10.0	14.8	15.2	19.3	12.5

Striped mullet are most available to the fishery during the fall as they aggregate in schools and migrate through the estuary to the ocean to spawn. Conventional thinking suggests striped mullet migration increases, and they become most susceptible to the fishery ahead of cold fronts. Day

of week closures could be effective at reducing harvest by preventing fishing during periods of ideal fishing conditions, particularly given the runaround gill net fishery is largely dependent on good weather days. For example, prohibiting fishing for striped mullet on Saturday and Sunday would have reduced 2019 landings by 25.7% (Table 2.11). This percentage reduction is relatively consistent from 2017-2019. There is the possibility prohibiting fishing on one day shifts effort to other days or that potential catch from one day can be recouped another day. However, given most of the striped mullet commercial landings occur during a brief period from October 15-November 15 limiting the number of days participants can fish is likely to reduce landings. The Striped Mullet FMP AC shared concerns about recoupment of catch but generally supported day of week closures, particularly weekend closures, as a method to reduce harvest. AC members further suggested allowing some limited bycatch on closed days as a method to reduce discards. In addition, the AC members felt weekend closures may reduce user group conflict and preferentially benefit full-time fishery participants.

Option 4: Day of week closures

+ No additional resources required to implement
+ No additional reporting burden on fishermen or dealers
+ Reduces length of season closures
+ Limits impacts on roe fishery
+ Limits impacts on bait fishery
+ Could meet sustainability objectives
+ May prevent user group conflicts
+/- May preferentially benefit full time participants
+/- Weather could prevent fishing on open days
– Possibility for recoupment of catch
– Landings reduction highly dependent on external factors

Combination of Measures

Fisheries are commonly managed using a combination of management measures rather than relying on a single, all-encompassing measure. Using a combination of management measures allows for more comprehensive management to address multiple objectives in addition to sustainability. From 1990-1992, the state of Florida required gill nets to have a minimum mesh size of three inches and striped mullet fishery weekend closures of 36 hours and 54 hours from October-January (Leard et al. 1995). In 1993, in response to a stock assessment indicating overfishing was occurring on the Florida striped mullet stock, the state adopted additional management measures including an extension of the 54-hour weekend closure to 72 hours from July to January, a pre-roe season (July-September) trip limit of 500 pounds, and a reduction of the maximum gill net yardage allowed to 600 yards. These additional measures were intended to reduce catch, increase escapement of spawners during the roe season, increase SPR to the 35% target in 5-7 years, and increase SSB by 90%. However, before success of these measures could be evaluated the state implemented a ban on gill nets, the primary gear used to harvest striped mullet, significantly reducing harvest in an absolute manner that did not preserve traditional fisheries and precluded determination of the effectiveness of the combination of management measures initially implemented.

Management measures directly limiting commercial harvest of striped mullet have never been implemented in North Carolina. Stock assessment results suggest some stock-recruit relationship for striped mullet, and projections indicate if average or higher recruitment occurs the stock recovers quickly even at moderate harvest reduction levels. A combination of management measures including end of season closures, day of week closures, and daily trip limits may be suitable to reduce harvest while allowing traditional fisheries and uses to continue. Some form of

all these measures, except for end of season closures, were supported by the Striped Mullet FMP AC. However, given the life history of striped mullet and nature of the fishery, management measures should focus on reducing harvest during the peak of the fishery in the fall. The fall fishery accounts for most striped mullet commercial landings and is primarily composed of females because the fishery specifically targets roe mullet during their spawning migration. As an example, implementing a December closure, a year-round weekend closure (Saturday-Sunday), and a 1,000 lb daily trip limit from January-September would result in a 31.8% reduction (Option 5.i; Table 2.13). In this example there would be minimal discarding of fish from the daily trip limit early in the season allowing for catch to supply bait markets, the roe fishery would remain relatively unaffected except for the weekend closure, and the December closure would prevent expansion of the roe fishery later in the year.

The Striped Mullet FMP AC supported the combination management measure strategy to reduce striped mullet harvest. Specifically, the AC supported using a combination of day of week closures and daily trip limits to reduce harvest and minimize discards while avoiding extended end of year closures. The FMP AC recommended options 5.a, c, and f which would reduce harvest by 24.0% to 27.7% using combinations of seasonal daily trip limits, day of week daily trip limits, and day of week closures (Table 2.13). All options supported by the FMP AC meet statutory requirements by, at a minimum, rebuilding SSB to the threshold with a 50% probability of success. The FMP AC also supported an option that would implement a 1,000 lb daily trip limit from January 1 to September 30 and a year-round Saturday and Sunday daily trip limit of 100 lb. (22.1% reduction) and an option that would implement a 1,000 lb daily trip limit from January 1 to October 15 and a year-round Saturday and Sunday daily trip limit of 100 lb. (22.9% reduction). However, when a 30,000 lb stop net catch cap is factored into these options; they do not meet statutory requirements for recovering the stock and were not considered further (see stop net section of this paper for additional details).

Following examples endorsed by the FMP AC, the DMF initially supported option 5.p which would implement seasonal and day of week daily trip limits to achieve a 35.5% commercial harvest reduction after accounting for a 30,000 lb stop net catch cap. This option is projected to rebuild SSB to the target with a 99% probability of success and prevents any complete closure which might result in excessive discards. The seasonal and day of week daily trip limits are low enough that targeting high volumes of striped mullet should be prevented during these times. Implementing a 500 lb daily trip limit from February 1 through October 15 prevents high volume harvest early in the roe season and implementing a November 16 through January 31 50 lb daily trip limit essentially “freezes the footprint” of the roe fishery not allowing for expansion of the roe mullet season which historically occurs from approximately October 15 through November 15. The year-round 50 lb weekend trip limit serves a similar purpose to day of the week closures while still allowing a small incidental catch allowance to minimize discards. While complete end of year season closures are considered an effective conservation measure, the DMF took into consideration the request of the FMP AC to minimize discards and avoid extended end of season closures when making a recommendation. Recommending a higher reduction level than the FMP AC recommendation creates a buffer to account for uncertainty in behavior changes by participants in the fishery and allows for a greater probability of the stock rebuilding to the target.

During MFC AC and public review of the FMP, a strong preference was expressed for a year-round weekend closure (Option 5.a), with no management specific to the stop-net fishery, to achieve a 25.7% reduction (Table 2.13). MFC advisors and commenters cited unusually high landings in the stop net fishery in 2023 and wanting to avoid creating high levels of dead discards in that fishery as reasons to not implement a stop net catch cap.

Considering comments and preferences expressed by MFC ACs and public comment, the DMF recommendation is Option 5.n. This option is calculated to result in a 34.9% commercial harvest reduction relative to 2019 commercial landings. This option applies to harvest, not possession, allowing seafood dealers to sell mullet and commercial operations to use mullet as bait during days closed to harvest. This option extends the weekend closure by 24 hours for three months of the year, during roe season, when landings and effort peak. This addition is projected to reduce commercial harvest closer to a level projected to rebuild SSB to the target allowing for some buffer to account for variability in fishing effort and availability of fish. Additionally, this option preferentially protects spawning fish and potentially benefits full-time commercial participants while reducing user group conflict. For implementation and enforcement purposes, the closures will start at 6 pm Friday and end at 6 am the day the fishery reopens (Monday from January 1 to September 30; or Tuesday from October 1 to December 31). The DMF recommends not implementing a stop net fishery catch cap due to the fishery's highly variable landings, unusually high landings in 2023, and the potential for high volumes of dead discards. While options to limit nighttime fishing were discussed, because of the potential to increase user group conflict, and the disproportionate effect they may have on certain segments of the fishery, they are not recommended.

Option 5: Combination of Measures

See Table 2.13 for all options

Table 2.13. Management measure combinations to end overfishing and achieve sustainable harvest, compared to 2019 commercial landings. Unless otherwise specified all options for day of week closures or day of week reduced trip limits are applied year-round. All trip limit options are applied to a commercial fishing operation regardless of the number of persons, license holders, or vessels involved.

Option	Season Closure	Daily Trip Limit (lb.)	Day of Week Closure	% Reduction	% Reduction with 30k Stop Net Cap
5.a*	.	.	Sat-Sun	25.7	24.0
5.b	Dec 1-Dec 31	Jan-Sep 1,000; Sat-Sun 50 lb	.	28.1	26.4
5.c*	.	Jan-Sep 1,000	Sat-Sun	28.5	26.9
5.d	Dec 1-Dec 31	Jan-Oct 15 1,000; Sat-Sun 50 lb	.	28.9	27.3
5.e	Nov 12-Dec 31	1,000	.	29.1	27.5
5.f*	.	Jan-Oct 15 1,000 lb	Sat-Sun	29.3	27.7
5.g	.	.	Jan-Oct Sat-Sun; Nov-Dec Sat-Mon	30.0	28.5
5.h	.	Jan-Oct 15 and Dec 500; Sat-Sun 50 lb	.	31.3	29.8
5.i	Dec 1-Dec 31	Jan-Sep 1,000	Sat-Sun	31.8	30.2
5.j	.	Jan and Dec 100 lb; Feb-Sep 500 lb; Sat-Sun 50 lb	.	32.4	30.9
5.k	Dec 1-Dec 31	Jan-Oct 15 1,000	Sat-Sun	32.6	31.1
5.l	Nov 8-Dec 31	1,000	.	34.6	33.1
5.m	.	Jan and Dec 50 lb; Sat-Sun 50 lb; Feb-Oct 15 500 lb	.	34.6	33.2
5.n+	.	.	Jan-Sept Sat-Sun; Oct-Dec Sat-Mon	34.9	33.4
5.o	.	Jan-Oct 15 and Dec 500	Sat-Sun	35.4	33.9
5.p	.	Jan1-31 and Nov16-Dec31 50 lb., Sat-Sun 50 lb, Feb1-Oct15 500lb	.	36.9	35.5
5.q	.	Jan and Dec 100 lb; Feb-Sep 500 lb	Sat-Sun	36.5	36.0
5.r	Nov 12-Dec 31	1,000	Sat	38.6	37.2

*Endorsed by Striped Mullet FMP AC

+DMF Recommendation

Stop Nets

The striped mullet beach seine fishery is a historically and culturally important fishery occurring primarily in conjunction with the Bogue Banks stop net fishery (See Striped Mullet FMP and Amendment 1 for review of historical significance of stop net fishery). The stop net fishery has operated under fixed seasons and net and area restrictions since 1993. Currently, stop nets are limited to 4 nets, 400 yards in length, and minimum mesh size of eight inches outside panels and six inches middle section. Stop nets have typically been allowed along Bogue Banks (Carteret County) in the Atlantic Ocean from October 1 to November 30. However, the stop net season was extended to include December 3 to December 17 in 2015 due to minimal landings of striped mullet (Proclamation M-28-2015). In 2020, 2021, and 2022 the stop net fishery was open from October 15 through December 31 (Proclamations M-17-2020, M-21-2021, and M-23-2022). Due to the schooling nature of striped mullet, the beach seine fishery is a high-volume fishery with the ability to land thousands of pounds during a single trip.

From 2017 to 2021 the beach seine/stop net fishery accounted for 2.1% of the total commercial striped mullet harvest. In these years the fishery has primarily operated in November with a few trips occurring in October and December, and minimal landings after November 15.

Current management of the stop net fishery has focused on limiting interactions with protected species, primarily bottlenose dolphins, and limiting conflict with the ocean gill net fishery and recreational pier fisheries. There are no management measures in the stop net fishery to directly limit harvest of striped mullet. A detailed review of current stop net management measures can be found in the Striped Mullet FMP (NCDMF 2006). Additional management of the stop net fishery is addressed in the Spotted Seatrout FMP (NCDMF 2012). The spotted seatrout management strategy grants the DMF Director latitude to reconcile the potentially high-volume catch of spotted seatrout with the 75 fish commercial trip limit. An agreement was reached between the Director, the Fisheries Management Section Chief, and the stop net fishery participants to manage the fishery at a 4,595 lb season quota for spotted seatrout. The agreement required the stop net fishery participants to report spotted seatrout harvest daily and remove the stop nets from the water when the quota is met.

Because commercial harvest reductions are necessary to end overfishing and recover the striped mullet stock, it may be necessary to consider additional stop net management measures. Stop nets could be considered with all other commercial gears and have the same restrictions applied as any other sector of the fishery. However, given the limited extent and seasonality of the fishery some restrictions may disproportionately impact the stop net fishery. For example, extended season closures would likely eliminate all harvest from stop nets (Table 2.14). In addition, restrictive trip limits may create excessive discards in the fishery. Setting a specific season resulting in proportional harvest reductions may be a more equitable management option. Alternatively, the stop net fishery could operate on a sector specific striped mullet catch cap, as is done with spotted seatrout. Given minimal participation and effort in the stop net fishery, along with the already required daily reporting of spotted seatrout landings, requiring additional daily reporting of striped mullet landings could be accomplished.

The Striped Mullet FMP AC supported the strategy to manage the stop net fishery under a sector specific catch cap but did not suggest any specific harvest or reduction level to achieve. After reviewing recent striped mullet commercial landings from stop nets, DMF initially recommended an annual catch cap for the stop net fishery of 30,000 lb. This harvest level is in line with recent landings and prevents increasing harvest above those recent levels. However, following MFC AC and public review, where managing the stop net fishery with the same regulations as the rest of the striped mullet commercial fishery was strongly supported, the DMF revised its

recommendation to not manage stop nets with a catch cap. DMF recommends Option 6.a, manage the stop net fishery with management measures applied to the rest of the commercial fishery. To maintain consistency, the stop net season will open annually no sooner than October 15 and close no later than December 31 and all other stop net and associated gill net regulations will be set by proclamation consistent with, but not limited to, previous management. See proclamations M-17-2020, M-21-2021, and M-23-2022 for stop net season, setting and net restrictions and proclamations M-18-2020, M-20-2021 and, M-22-2022 for associated gill net restrictions.

Table 2.14. Percent reduction of striped mullet landings in the stop net fishery at various season closure options, 2017-2021.

	Percent Reduction				
Season Closure	2017	2018	2019	2020	2021
October 28-December 31	100.0	100.0	100.0	100.0	69.1
October 29-December 31	100.0	100.0	100.0	100.0	69.1
November 6-December 31	88.3	100.0	100.0	98.4	35.9
November 7-December 31	88.3	100.0	100.0	98.4	35.9
November 13-December 31	81.6	99.2	45.1	98.4	1.5

Option 6: Stop net fishery management

a. Status Quo – Manage stop net fishery with management measures applied to the rest of the commercial fishery
   - \+ Prevents confusion
   - \+ Minimizes user group conflict
   - – Some measures may completely eliminate stop net fishery
   - – May not meet sustainability objectives
   - – Could increase discards

b. Stop Net Specific Catch Cap
   - \+ Allows continuation of fishery
   - \+ Likely to meet sustainability objectives
   - \+ Easy to monitor and enforce with minimal participation
   - \+ Already being done in fishery for other species
   - – Could create user group conflict
   - – Daily reporting necessary

Seasonal Catch Limits

Seasonal catch limits, otherwise known as a harvest quota or total allowable landings (TAL), is a management measure used to set harvest levels for a stock to end overfishing, recover the stock, or to maintain *F* and SSB at a specified management target. The intent of implementing a seasonal catch limit on any fishery is to prevent expansion and reduce or stabilize harvest. The benefit of managing harvest through a seasonal catch limit is the harvest level is directly set and controlled.

To calculate the seasonal catch limit, a reduction percentage must be established (21.3-35.4%). The selected reduction percentage is calculated based on 2019 commercial landings (1,362,212 pounds). The simplest method for seasonal catch limit implementation is a single statewide seasonal catch limit starting at the beginning of the year and running until the limit is met. The

seasonal catch limit would be between 879,992 and 1,072,065 pounds depending on the reduction percentage. On average, from 2017 to 2021, the season would close between October 23 (35.4% reduction) and November 6 (21.3% reduction).

While implementing a seasonal catch limit with multiple allocations makes monitoring and enforcement more difficult, allocations could be divided by region, gear, or fishery segment. Most commercial landings come from the northern part of the state (north of the Highway 58 Bridge to Emerald Isle) with minimal contributions from the southern part of the state. More specifically, most commercial landings come from Dare and Carteret counties. From 1994 to 2021, 88.5% of commercial striped mullet landings have come from the northern region, and 11.5% of commercial landings have come from the southern region (Onslow, Pender, New Hanover, Brunswick). If this historical allocation is maintained, an example of a region-specific seasonal catch limit, at various reduction levels that end overfishing and recover the stock, is shown in Table 2.15. A region-specific seasonal catch limit could also be implemented using allocations from a more recent period to better reflect the current fishery, for example 2017-2021 (Table 2.16), or use allocations from 2019 which is the year reductions are calculated from (Table 2.17).

Table 2.15. Regional seasonal catch limit, split at the Highway 58 bridge to Emerald Isle, based on 1994-2021 allocation.

			Reduction and TAL	
Region	1994-2021 Contribution	2019 Landings Contribution	21.3	35.4
North	88.5	1,205,558	948,774	778,790
South	11.5	156,654	123,287	101,199
Total	100	1,362,212	1,072,061	879,989

Table 2.16. Regional seasonal catch limit, split at the Highway 58 bridge to Emerald Isle, based on 2017-2021 allocation.

			Reduction and TAL	
Region	2017-2021 Contribution	2019 Landings Contribution	21.3	35.4
North	92.8	1,264,133	994,872	816,630
South	7.2	98,079	77,188	63,359
Total	100	1,362,212	1,072,061	879,989

Table 2.17. Regional seasonal catch limit, split at the Highway 58 bridge to Emerald Isle, based on 2019 allocation.

			Reduction and TAL	
Region	2019	2019 Landings	21.3	35.4
North	94.1	1,281,870	1,008,832	828,088
South	5.9	80,342	63,229	51,901
Total	100	1,362,212	1,072,061	879,989

Most striped mullet commercial landings come from gill nets, specifically runaround gill nets. Minimal contributions come from other gears, but the stop net fishery has the potential to be a high-volume fishery. If a seasonal catch limit is implemented, it is possible the limit could be reached before the stop net fishery has a chance to operate. Accounting for stop net landings separately may be necessary to allow the fishery the chance to operate. See the stop net section of this issue paper for additional information and discussion.

A seasonal catch limit could be implemented specifically for the striped mullet roe fishery. This fishery occurs predominantly in October and November and typically accounts for up to 50% of the striped mullet commercial landings each year. This fishery is the most valuable portion of the striped mullet fishery and specifically targets large female striped mullet during the spawning migration. A seasonal catch limit could be developed and applied to October-November commercial landings and other measures could be used to limit harvest early in the year (e.g., trip limits, day of week closures, etc., see additional discussion in this paper). Once the roe fishery seasonal catch limit was met, the fishery would be closed through the end of the year. This would allow the most valuable segment of the fishery to operate independent of other fishery segments and have direct conservation benefits to the stock. However, shortening the fishery in this manner would likely create a "derby" fishery, where intensive fishing effort is focused during a short period, which is unpopular with the fishing industry and may create conflict.

To successfully manage harvest using a seasonal catch limit, the ability to accurately monitor harvest in a timely manner and have the flexibility to quickly implement management changes or close fishing sectors when the seasonal catch limit is being approached is essential. Currently, striped mullet commercial landings are reported by the North Carolina Trip Ticket Program, a fishery-dependent program initiated by NCDMF in 1994. A trip ticket is the form used by fish dealers to report commercial landings information. Trip tickets collect information about the fisherman, the dealer purchasing the product, the transaction date, crew number, area fished, gear used, and the quantity of each species landed for each trip. Each month dealers are required to send these forms to the NCDMF for processing.

If a seasonal catch limit is used to manage striped mullet harvest, changes to reporting requirements would need to occur. Daily striped mullet harvest reporting by dealers would be necessary during at least part of the year. Because the striped mullet fishery is highly seasonal, requiring daily reporting during the peak season in October-November until the seasonal catch limit is reached would be necessary. Prior to daily reporting, regular monthly, or weekly, reporting could be sufficient, but an accurate accounting of commercial landings would need to be finalized prior to a period of daily reporting. Implementation of daily or weekly reporting would require development of a permit with conditions requiring time of reporting.

If a seasonal catch limit is implemented, the use of other management measures to limit harvest would likely still be necessary to either extend the fishing season or ensure the catch limit is not exceeded. Specifically, trip limits and gill net yardage limits have been used to constrain harvest for fisheries managed using seasonal catch limits, but day of week closures may also have the same effect. See discussion about trip limits and day of week closures (this paper) for additional information.

If a seasonal catch limit were implemented for striped mullet, restrictions on the use of small mesh gill nets may be needed to prevent excessive discards. The use of anchored small mesh gill nets has been extensively reviewed as part of North Carolina FMPs for red drum (NCDMF 2001; 2008) and striped bass (NCDMF 2004; 2013a). Further restrictions would add additional management complexity to a gear that is already heavily regulated. Appendix 1 summarizes the small mesh gill net fishery in North Carolina including seasonality, gear characteristics and species targeted. If the use of small mesh gill nets is restricted to prevent excessive discards of striped mullet, other fisheries like spotted seatrout (*Cynoscion nebulosus*), bluefish (*Pomatomus saltatrix*), kingfish/sea mullet (*Menticirrhus* spp.), white perch (*Morone americana*), and spot (*Leiostomus xanthurus*) would likely be impacted.

It should be noted previous management has not directly limited the commercial harvest of striped mullet in North Carolina. In many cases, implementation of a seasonal catch limit has been a "last resort" measure when other methods of controlling harvest have been ineffective. At this point, there are no clear models for how participant behavior may change under various management scenarios. Implementation of seasonal catch limits in other fisheries has resulted in "derby fisheries" which are unpopular with participants. Implementation of a seasonal catch limit is the most definitive and blunt method for directly limiting harvest because if the limit is effectively monitored and enforced landings cannot exceed a set level even if variable fishery or stock conditions occur. However, seasonal catch limits are also the most resource intensive to monitor and enforce because of the necessity of daily reporting. Stock projections indicate if average or above average recruitment occurs the striped mullet stock recovers quickly even at moderate harvest reduction levels. If a seasonal catch limit is implemented, updates to the limit could only occur following stock assessment updates, which may constrain harvest excessively even when it is no longer necessary.

While the Striped Mullet FMP AC felt a seasonal catch limit would effectively limit harvest, members were concerned about how low the limit would be set initially, lack of flexibility in adjusting the limit, the potential of a "derby" fishery, the potential for a short season, and the need for a complete closure once the limit is reached. AC members did suggest using a seasonal catch limit but allowing some bycatch limit after the limit was reached. While this could be done, it would require lowering the catch limit to account for limited bycatch, further reducing the limit. While implementing a seasonal catch limit for striped mullet would be effective, given the characteristics of the striped mullet fishery, management objectives could be met using other management strategies that are much less resource intensive for monitoring and that would be less restrictive or constraining to this multi-faceted fishery.

<u>Option 7: Seasonal Catch Limit</u>

a. Status Quo – Manage fishery without Seasonal Catch Limit
   - \+ Other measures may be effective in reducing harvest
   - \+ Less impact to other fisheries
   - \+ No derby fishery
   - – No hard cap on commercial landings

b. Implement Statewide Seasonal Catch Limit
   - \+ Hard cap on landings
   - \+ Should meet sustainability objectives
   - – As stock grows, TAL cannot be adjusted without stock assessment update
   - – Will likely impact other fisheries
   - – Increased discards
   - – Unpopular with fishery participants
   - – Resource intensive to monitor and enforce
   - – Would need to establish new reporting requirements
   - – Could disadvantage certain areas of the state

c. Implement Regional (North/South) Seasonal Catch Limit
   - \+ Hard cap on landings
   - \+ Should meet sustainability objectives
   - \+ Equitable between areas of the state
   - – As stock grows, TAL cannot be adjusted without stock assessment update
   - – Will likely impact other fisheries
   - – Increased discards
   - – Unpopular with fishery participants

- Resource intensive to monitor and enforce
- Would need to establish new reporting requirements

Area Closures

Area closures are a management measure that could be used to achieve nonquantifiable harvest reductions in the striped mullet fishery in support of sustainability objectives. From 1997 to 2001, DMF conducted a striped mullet tagging study to examine movements and migration of striped mullet in North Carolina (Wong 2001). Of approximately 15,000 tagged fish, 384 were recaptured, indicating limited movement prior to the spawning season in October and November (Bacheler et al. 2005). Other than a generally southward movement, tag returns provide little information to inform potential area closures (Figure 2.6). Striped mullet are catadromous, migrating from freshwater to offshore marine waters in the fall to spawn. Because of this life history, striped mullet can be found in nearly all common habitat types including the water column, wetlands, submerged aquatic vegetation, soft bottom, and shell bottom with variation in preference due to location, season, and life stage (see base plan Biological Profile and Ecosystem Protection and Impact sections for further description and NCDMF 2022a). In addition, striped mullet nursery areas and spawning locations, habitats that would benefit most directly from area closures, are considered at a broad level (e.g., estuarine areas serve as nursery areas, spawning occurs in the ocean), therefore, identifying discrete areas for potential closures is difficult.

One recent example of an area closure impacting the striped mullet commercial fishery is the prohibition of all gill nets above the ferry lines in the Pamlico and Neuse rivers (Proclamation M-6-2019; Figure 2.7). During an emergency meeting on March 13, 2019, the N.C. Marine Fisheries Commission directed the DMF Director to issue proclamation M-6-2019 pursuant to N.C. General Statute 113-221.1 (d). The Director has no legal authority to modify or change a proclamation when the proclamation is specifically directed by the Commission under this statute. The intent of the proclamation was to reduce dead discards of striped bass (*Morone saxitilis*) in support of a striped bass harvest moratorium in these rivers. The gill net closure was implemented with little supporting data and potential benefits to striped bass stocks will be evaluated in the future (NCDMF 2022b). However, recreational fishing groups have touted the gill net closure as a conservation success, particularly for striped mullet. Striped mullet are common above the ferry lines in each river and commercial fishery participants have expressed frustration that the closure prevents harvest of striped mullet, particularly early in the year and during the summer. However, because striped mullet migrate from estuarine waters to the ocean to spawn in the fall, the gill net closures in these rivers are not considered an effective conservation measure for striped mullet. Essentially, the gill net closure acts as a harvest delay measure, where striped mullet become available to the fishery when they cross the ferry line while moving down river to spawn.

While there may be fishery benefits to this harvest delay because harvest is delayed until the fall when demand and prices are higher, the closure prevents other components of the fishery (i.e., bait and food) from occurring in the area. Given seasonal migration patterns of striped mullet and characteristics of the fishery, area closures to effectively address sustainability objectives would likely need to be so large the fishery would have limited ability to operate. In this sense, season closures accomplish the same result as area closures with more clearly defined and obtainable objectives.

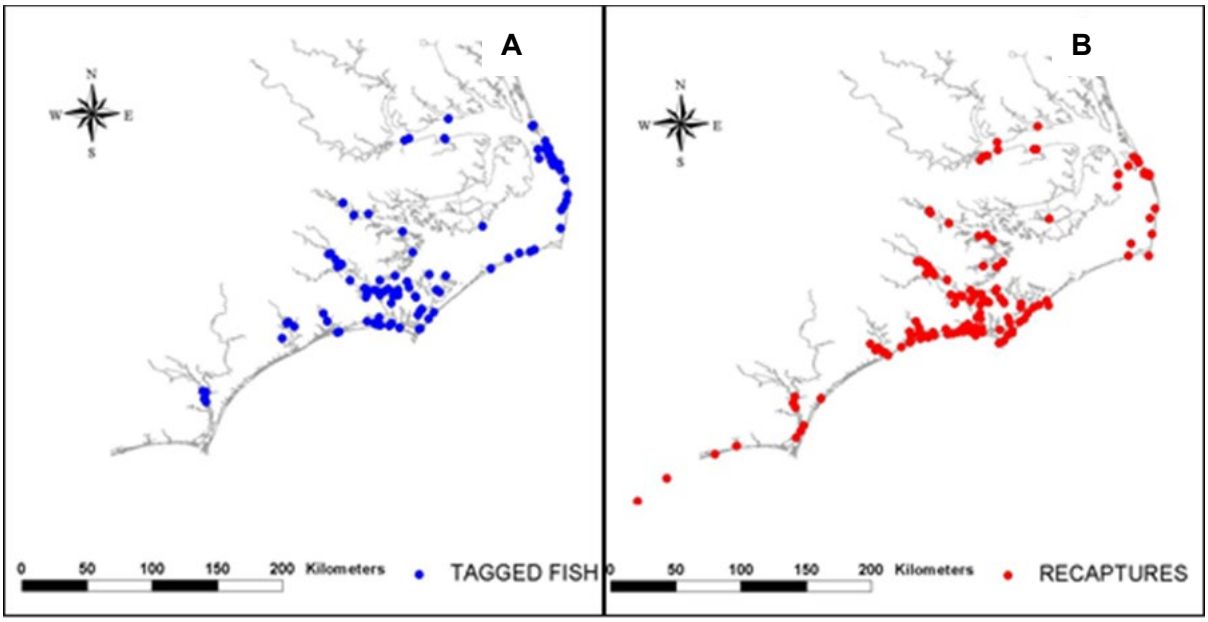

Figure 2.6. Tagging location of recaptured striped mullet (A) and recapture location for all striped mullet tag returns (B). A single dot may indicate multiple fish. From Wong (2001).

Option 8: Area Closures

+ No additional resources required to implement
+ No additional reporting burden on fishermen or dealers
+ Limits impacts on roe fishery
+ Limits impacts on bait fishery
– Unlikely to meet sustainability objectives
– Increased discards

Limited Entry

North Carolina General Statute 113-182.1 states the MFC can only recommend the General Assembly limit participation in a fishery if the commission determines sustainable harvest in the fishery cannot otherwise be achieved. The North Carolina striped mullet stock is overfished and overfishing is occurring so sustainability is a concern. However, there have never been any regulations directly limiting harvest of striped mullet in North Carolina, therefore it would be difficult to conclude limiting participation is the only way to achieve sustainable harvest. Supplement A to Amendment 1 implemented the first management measures directly limiting harvest of striped mullet in North Carolina and Amendment 2 will introduce more comprehensive measures. Success of Amendment 2 management measures can be used to gauge the need for limited entry in the future.

Option 9: Limited Entry

+ Likely to meet sustainability objectives
+ Limits impacts on roe fishery
+ Limits impacts on bait fishery
– Statutory requirements not met
– Additional resources required to implement
– Additional reporting burden on fishermen or dealers
– Increased discards

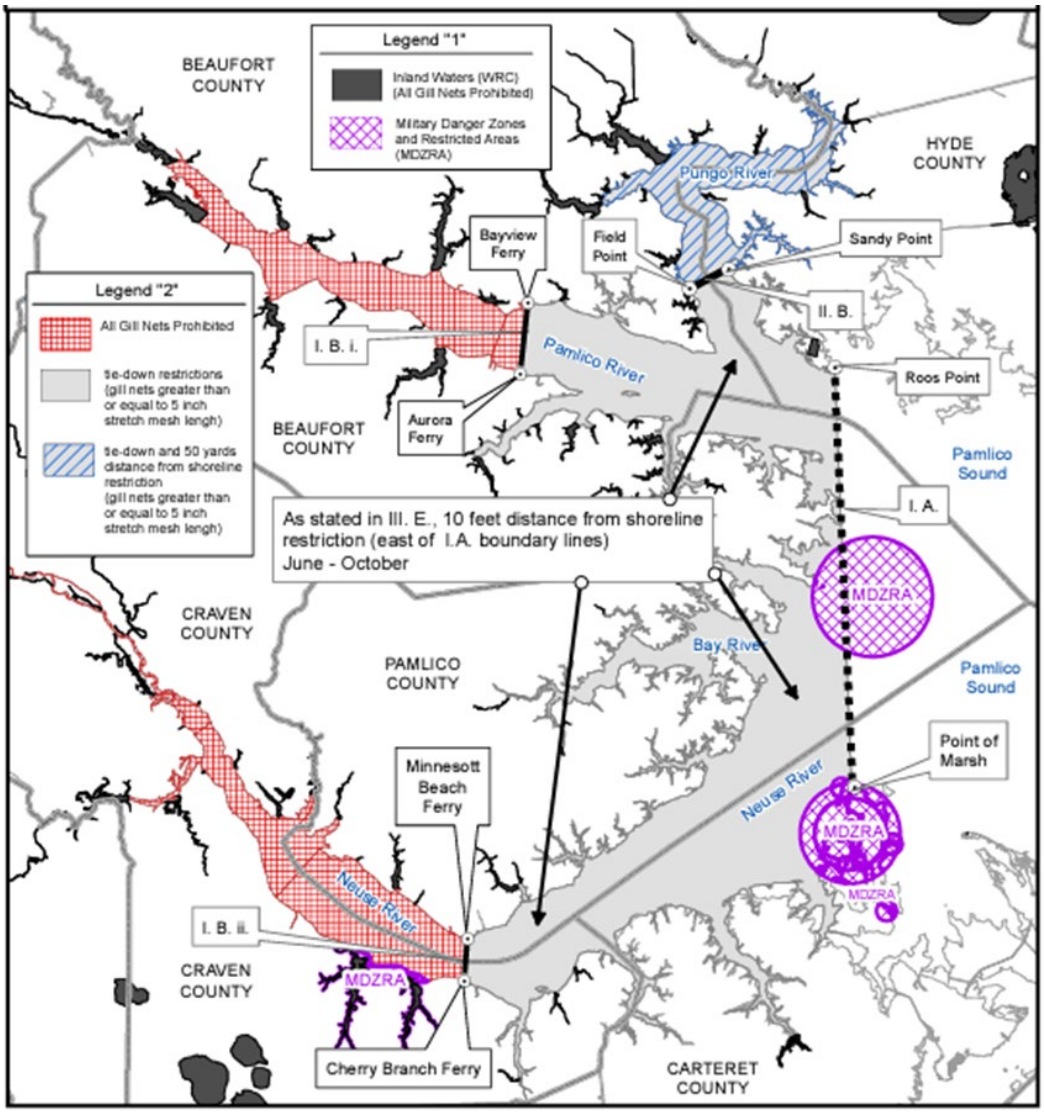

Figure 2.7. Map of the Pamlico and Neuse rivers showing existing gill net restrictions and the prohibition on the use of gill nets above the ferry line in each river.

Adaptive Management

The current striped mullet adaptive management framework and trigger needs to be updated. Adaptive management is a structured decision-making process when uncertainty exists, with the objective to reduce uncertainty through time with monitoring. Adaptive management provides flexibility to incorporate new information and accommodate alternative and/or additional actions. The original FMP established minimum and maximum commercial landings triggers of 1.3 and 3.1 million pounds (NCDMF 2006). Amendment 1 updated the commercial landings triggers to 1.13 and 2.76 million pounds (NCDMF 2015). The triggers were set two standard deviations above or below the average commercial landings from 1994 to 2002 in the original FMP and the average commercial landings from 1994 to 2011 in Amendment 1. If annual landings fall below the minimum trigger, the DMF would investigate whether the decrease in landings is attributed to stock decline, decreased fishing effort, or both. If annual landings exceed the maximum trigger, the DMF would determine whether harvest is sustainable and what factors are driving the increase in harvest.

The commercial landings trigger has only tripped once since its adoption in 2006, when commercial landings fell below the minimum landings trigger in 2016 (Figure 2.8). Commercial landings are a poor indicator of stock abundance because they can be impacted by many factors including fishing effort and market demand. In addition, fishery efficiency could maintain higher, or consistent, commercial landings even as the stock declines. The adaptive management language in Amendment 1 was also vague, providing no specifics for determining stock status or the degree to which management measures should impact the fishery or reduce harvest. Updating the adaptive management framework for striped mullet is necessary to eliminate ambiguity and provide guidance for decision making processes.

Success or failure of any given management strategy to rebuild and sustain the stock is assessed relative to the established biological reference points and can only be determined through a stock assessment. Failure to achieve projected harvest reductions does not necessarily indicate failure of a management measure. It could indicate improving stock conditions but can only be measured with an updated stock assessment. Peer reviewed stock assessments and stock assessment updates should continue to be used to guide management decisions for the North Carolina striped mullet stock. The 2022 peer reviewed stock assessment (NCDMF 2022) should be updated, at least once between full reviews of the plan to gauge success in stock rebuilding and to monitor changes in *F.* The 2022 stock assessment had a terminal year of 2019; Supplement A management measures will be implemented in 2023, and Amendment 2 management measures will be implemented, at the earliest, in 2024. Given this timeline, the earliest a stock assessment update should be completed is during 2025 with the inclusion of data from 2024, though timing of a stock assessment update is at the discretion of the division. An update will determine if management targets are being met and allow for any adjustments to management measures via adaptive management if needed.

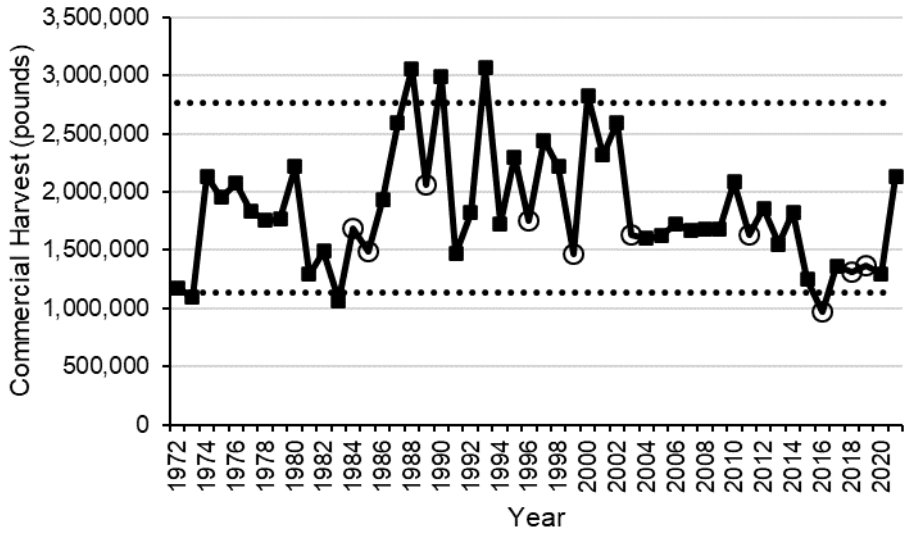

Figure 8. Striped mullet commercial landings (pounds) reported through the North Carolina Trip Ticket Program, 1972–2021 Lower dashed line (1.13 million lb.) and upper dashed line (2.76 million lb.) represent landings limits that trigger closer examination of data. Open circles represent years with significant hurricanes or storms.

The existing mullet rule, 15A NCAC 03M .0502, provides the Fisheries Director proclamation authority pursuant to 15A NCAC 03H .0103 to impose any of the following restrictions on the taking of mullet:

1) Specify time;
2) Specify area;
3) Specify means and methods
4) Specify seasons
5) Specify size; and
6) Specify quantity, except as provided in Paragraph (a) of the rule.

Upon adoption of Amendment 2, the adaptive management framework will consist of the following:

Option 10: Adaptive Management Framework

Parts 1-3 of the adaptive management framework are explicitly tied to an updated stock assessment and implementation of management measures intended to reduce or allow for additional harvest to meet or maintain management targets (as defined in part 1.a).

1) Update the stock assessment at least once in between full reviews of the FMP, timing at discretion of the division
    a. If current management is not projected to meet management targets (management targets are minimum SSB between $SSB_{Threshold}$ and SSB_{Target}, and maximum F between $F_{Threshold}$ and F_{Target}), then management measures shall be adjusted via an adaptive management update and implemented using the Fisheries Director's proclamation authority to reduce harvest to a level that is projected to meet the F_{Target} and SSB_{Target}.
    b. If management targets (as defined in 1.a above) are being met, then new management measures would not be needed, or current management measures could possibly be relaxed provided projections still meet management targets. When management targets are met, a striped mullet industry workgroup will be convened to discuss the possibility of "guard rail management" to maintain a sustainable harvest for the striped mullet stock.
2) Management measures that may be adjusted using adaptive management include:
    a. Season closures
    b. Day of week closures
    c. Trip limits
    d. Gill net yardage or mesh size restrictions in support of the measures listed in a-c
3) Use of the Director's proclamation authority for adaptive management to meet management targets is contingent on:
    a. Consultation with the MFC Northern, Southern, and Finfish advisory committees
    b. Approval by the Marine Fisheries Commission

Part 4 of the adaptive management framework allows for adjustment of management measures outside of an updated stock assessment. Part 4 is intended to allow for adjustment of management measures to ensure compliance with and effectiveness of management strategies adopted in Amendment 2 and would be a tool to respond to concerns with stock conditions and fishery trends.

4) Upon evaluation by the division, if a management measure implemented to achieve sustainable harvest (either through Amendment 2 or a subsequent revision) is not achieving its intended purpose, it may be revised or removed and replaced using the Director's proclamation authority; provided it conforms to part 2 above and provides similar protections to the striped mullet stock. If a revised management measure is anticipated to reduce or increase harvest compared to measures implemented through Amendment 2, it must conform to parts 2 and 3 above.

Table 2.18. Management measures to achieve sustainable harvest in the striped mullet fishery

Topic	Option	Description
Size Limit	1.a	Status quo – no size limit
	1.b	Minimum size limit and 3.25 ISM minimum gill net mesh size
	1.c	Minimum size limit and 3.75 or 4.0 ISM maximum gill net mesh size
	1.d	Seasonal maximum size limit and 3.75 or 4.0 ISM maximum gill net mesh size
Season Closure	2.a	No season closure
	2.b	Statewide season closure October 29–December 31
	2.c	Statewide season closure November 7–December 31
	2.d	Regional, North/South, season closure North Oct. 28–Dec. 31 South Oct. 30–Dec. 31
	2.e	Regional, North/South, season closure North Nov. 7–Dec. 31 South Nov. 10–Dec. 31
Trip Limit	3	
Day of Week Closure	4	
Combinations	5.a–r	See Table 2.13
Stop Net Fishery Management	6.a	Manage stop net fishery with same management measures applied as the rest of the fishery
	6.b	Stop Net specific catch cap
Seasonal Catch Limit	7.a	Status quo – no seasonal catch limit
	7.b	Statewide seasonal catch limit
	7.c	Regional, North/South, seasonal catch limit
Area Closures	8	
Limited Entry	9	
Adaptive Management	10	

RECOMMENDATION

DMF Recommendation:

The DMF recommends the following options that are projected to rebuild the striped mullet spawning stock biomass (SSB) to a level between the threshold and target:

Option 5.n Combination of Measures

- Saturday-Sunday closure (Jan. 1-Sept. 30) (Table 2.18)
- Saturday-Monday closure (Oct. 1-Dec. 31) (Table 2.18)

Option 6.a Manage stop net fishery with same management measures applied as the rest of the fishery

Option 10: Adaptive Management Framework

Advisory Committees Recommendations and Public Comment: see Appendix 4

APPENDIX 3. CHARACTERIZATION AND MANAGEMENT OF THE NORTH CAROLINA RECREATIONAL STRIPED MULLET FISHERY

ISSUE

Review available data and characterize the North Carolina recreational striped mullet fishery. Recommend potential non-quantifiable management measures in support of sustainable harvest objectives.

ORIGINATION

DMF

BACKGROUND

Striped mullet are not typically targeted by recreational anglers using hook and line though, striped mullet (*Mugil cephalus*) and white mullet (*M. curema*) are commonly used as bait fish by recreational anglers targeting a wide variety of inshore and offshore species (Nickerson 1984; NCDMF 2020). Juvenile mullet, referred to as finger mullet, caught by cast net are commonly used for bait by recreational anglers and are generally available in the summer and fall with the majority caught in July, August, September, and October (NCDMF 2020). Larger mullet are used as cut bait by anglers fishing from boats, piers, and the beach and are a popular bait used for targeting red drum (*Sciaenops ocellatus*).

The 2006 Striped Mullet FMP (NCDMF 2006) characterized the cast net fishery for bait mullet and examined management measures to reduce discarding of bait mullet and prevent recreational cast netters from harvesting large amounts of bait mullet in North Carolina to sell in other states. The FMP established a possession limit of 200 mullets (white and striped in aggregate) per person per day for recreational purposes. A possession limit in the recreational fishery allows Marine Patrol to distinguish between commercial and recreational fishing operations and enforce accordingly. Marine Fisheries Commission Rule 15A NCAC 03M .0502 was amended to include section (a) “it is unlawful to possess more than 200 mullet per person per day for recreational purposes” and went into effect July 1, 2006. There are no other measures directly limiting the recreational harvest of striped mullet.

The 2022 stock assessment concluded the striped mullet stock was overfished and overfishing is occurring. Development of recreational harvest estimates are described in the stock assessment report (NCDMF 2022). Briefly, annual estimates of recreational harvest (A, B1, A + B1) and associated percent standard error (PSE) values for striped mullet, white mullet, and mullet genus (striped or white mullet not identified to species) were obtained from the Marine Recreational Information Program (MRIP). Annual estimates of the average individual weight of harvested striped mullet were also obtained from MRIP. Estimates of live releases were not considered for inclusion in the stock assessment because mullet are primarily captured by recreational anglers for use as live bait and releases are assumed to have no associated post-release mortality and the assessment model only considers dead fish.

This paper further characterizes the recreational striped mullet fishery, available data, and data needs. Because estimates of recreational harvest are highly uncertain, management measures resulting in quantifiable harvest reductions cannot be recommended. Non-quantifiable management measures to support sustainable harvest and allow for recreational access to meet fishery needs are discussed.

AUTHORITY

N.C. General Statute
G.S. 113-134 RULES
G.S. 113-182 REGULATION OF FISHING AND FISHERIES
G.S. 113-182.1 FISHERY MANAGEMENT PLANS
G.S. 113-221.1. PROCLAMATIONS; EMERGENCY REVIEW
G.S. 143B-289.52 MARINE FISHERIES COMMISSION-POWERS AND DUTIES

N.C. Rule
15A NCAC 03M .0502 MULLET
15A NCAC 03M .0101 MUTILATED FINFISH
15A NCAC 03H .0103 PROCLAMATIONS, GENERAL

DISCUSSION

Collection of Recreational Data

North Carolina conducts three fishery-dependent surveys to collect recreational harvest data. MRIP is the primary survey used to collect data on angler harvest from the ocean 0-3 miles from the coast and inside waters from the Virginia border south to the South Carolina border, excluding the Albemarle Sound. The Recreational Commercial Gear License (RCGL) Survey was conducted from 2002-2008 by the DMF to collect data from recreational fishermen who are licensed to harvest recreational limits of finfish using commercial gears. The third survey, which began in November 2010, is a monthly mail survey conducted to determine participation and effort of Coastal Recreational Fishing License (CRFL) holders who fish using cast nets and seines.

Marine Recreational Information Program

The MRIP is a national program administered through NOAA Fisheries that uses several surveys to estimate catch and effort data at a regional level. The Access Point Angler Intercept Survey (APAIS) provides the catch rates and species composition from anglers fishing in estuarine or marine waters (not freshwater). Anglers who have completed a fishing trip are intercepted and interviewed to gather catch and demographic data, including fishing mode (charter boat, private/rental boat, beach/bank, and man-made structures), area fished, and wave (each two-month sampling period). The MRIP implemented the Fishing Effort Survey (FES) in 2018, an improved methodology of the prior effort survey (Coastal Household Telephone Survey). The data from the APAIS and FES are combined to provide estimates of the total number of fish caught, released, and harvested. Additionally, information is collected on the weight of the harvest, total number of trips, and the number of people participating in marine recreational fishing. Additional information on MRIP is available through the NOAA MRIP Website.

Striped mullet landings reported through MRIP are available at the species level through direct observation; however, releases are not observed and therefore are only available at the genus level, which includes both striped mullet and white mullet. Juvenile striped mullet and white mullet are not easily distinguished by recreational anglers, and harvest levels reported through MRIP at the species level are imprecise for both striped mullet and white mullet. To estimate species-level recreational harvest of striped mullet more accurately, the sum of recreational harvest reported for striped mullet and a proportion (29%) of the recreational harvest reported at the mullet genus level are used. This proportion was derived from a study by the DMF, indicating that about 29% of mullet harvested using cast nets are striped mullet (NCDMF 2006). The option to record harvest at the genus level for unobserved harvest of mullet only became available in 2002, therefore, MRIP estimates for recreational striped mullet harvest prior to 2002 are unreliable. Additionally,

recreational harvest is estimated by the number of fish harvested rather than in pounds because most mullet reported by anglers are not observed or weighed.

Estimates for recreational harvest of striped mullet peaked in 2002 and 2003 at about six million and four million fish harvested, respectively (Table 3.1). This increase coincides with an increase in commercial harvest (see Commercial Fishery section) and appears to be the result of increased striped mullet abundance. From 2004 to 2017, recreational harvest fluctuated between roughly 1 million and 1.8 million fish, then dropped to around 500 thousand fish harvested per year until 2021 when harvest increased to about 1.5 million fish (Table 3.1). The decline in harvest from 2018-2020 was likely the result of decreased striped mullet abundance and management measures that significantly shortend the recreational fishing season for southern flounder (*Paralichthys lethostigma)*, a fishery where live finger mullet are a popular bait.

Table 3.1. Recreational harvest (number of fish landed) of striped mullet and mullet genus estimated from MRIP sampling for 2002 to 2021. Type A harvest is observed while Type B1 harvest is reported by the angler and never observed. Proportional standard error (PSE) values greater than 50 indicate an imprecise estimate (highlighted gray).

	Striped Mullet		Mullet Genus		Striped Mullet from Mullet Genus (29%)	Striped Mullet + Mullet Genus
Year	Harvest (A+B1)	PSE	Harvest (B1)	PSE	Harvest (B1)	Striped Mullet Total Harvest
2002	4,668,427	18.0	4,480,197	36.3	1,299,257	5,967,684
2003	3,368,881	29.6	2,487,885	20.4	721,487	4,090,368
2004	5,496	101.7	4,790,382	16.1	1,389,211	1,394,707
2005	10,795	61.5	4,487,719	21.4	1,301,439	1,312,234
2006	15,706	63.5	3,599,098	21.4	1,043,738	1,059,444
2007	301,004	81.3	5,052,995	22.3	1,465,369	1,766,373
2008	3,458	65.0	4,097,156	14.4	1,188,175	1,191,633
2009	83,480	90.6	3,736,571	14.3	1,083,606	1,167,086
2010	126,250	44.7	4,113,171	14.3	1,192,820	1,319,070
2011	80,267	28.6	3,653,514	14.3	1,059,519	1,139,786
2012	351,960	79.5	3,510,395	16.3	1,018,015	1,369,975
2013	150,020	53.9	4,493,166	20.5	1,303,018	1,453,038
2014	50,381	67.0	4,490,722	26.2	1,302,309	1,352,690
2015	142,696	64.5	4,405,800	21.5	1,277,682	1,420,378
2016	29,965	50.6	5,039,891	55.6	1,461,568	1,491,533
2017	37,791	43.9	5,170,318	55.2	1,499,392	1,537,183
2018	35,565	59.3	1,564,676	31.7	453,756	489,321
2019	324,986	52.0	817,596	25.3	237,103	562,089
2020	323,102	43.2	719,908	23.2	208,773	531,875
2021	1,194,213	73.6	1,002,195	31.6	290,637	1,484,850

Recreational striped mullet harvest increases begginning in May and June, coinciding with increasing recreational fishing effort, and peaks in September and October (Table 3.2, Figure 3.1). A cast net study conducted by the DMF in 2002 and 2003 found the composition of cast net catches was primarily white mullet but in November, striped mullet were 74% of the catch (NCDMF 2006). White mullet were a higher proportion of the catch at ocean or inlet stations compared to estuarine stations which had a higher percentage of striped mullet.

Table 3.2. Recreational harvest (number of fish landed) of striped mullet and mullet genus by wave estimated from MRIP sampling, 2002-2021. Striped mullet assumed as 29% of mullet genus.

Year	Wave	Striped Mullet Harvest (A+B1)	Mullet Genus Harvest (B1)	Striped Mullet from Mullet Genus (29%) Harvest (B1)	Striped Mullet + Mullet Genus Striped Mullet Total Harvest
2017	Jan/Feb	.	.	.	.
2017	Mar/Apr	.	82,931	24,050	24,050
2017	May/Jun	27,708	284,430	82,485	110,193
2017	Jul/Aug	8,505	354,629	102,842	111,347
2017	Sep/Oct	1,579	4,432,737	1,285,494	1,287,073
2017	Nov/Dec	.	15,590	4,521	4,521
2018	Jan/Feb	.	.	.	.
2018	Mar/Apr	.	.	.	.
2018	May/Jun	2,239	136,595	39,613	41,852
2018	Jul/Aug	18,993	750,891	217,758	236,751
2018	Sep/Oct	13,505	457,709	132,736	146,241
2018	Nov/Dec	828	219,480	63,649	64,477
2019	Jan/Feb	.	.	.	.
2019	Mar/Apr	.	32,700	9,483	9,483
2019	May/Jun	11,773	86,637	25,125	36,898
2019	Jul/Aug	82,801	280,921	81,467	164,268
2019	Sep/Oct	217,317	367,020	106,436	323,753
2019	Nov/Dec	13,096	50,318	14,592	27,688
2020	Jan/Feb	1,648	1,540	447	2,095
2020	Mar/Apr	.	21,050	6,105	6,105
2020	May/Jun	6,308	78,303	22,708	29,016
2020	Jul/Aug	40,470	239,694	69,511	109,981
2020	Sep/Oct	274,675	370,617	107,479	382,154
2020	Nov/Dec	.	8,704	2,524	2,524
2021	Jan/Feb	.	6,340	1,839	1,839
2021	Mar/Apr	7,087	.	.	7,087
2021	May/Jun	1,336	144,319	41,853	43,189
2021	Jul/Aug	21,670	292,846	84,925	106,595
2021	Sep/Oct	1,164,119	558,690	162,020	1,326,139
2021	Nov/Dec	.	.	.	.

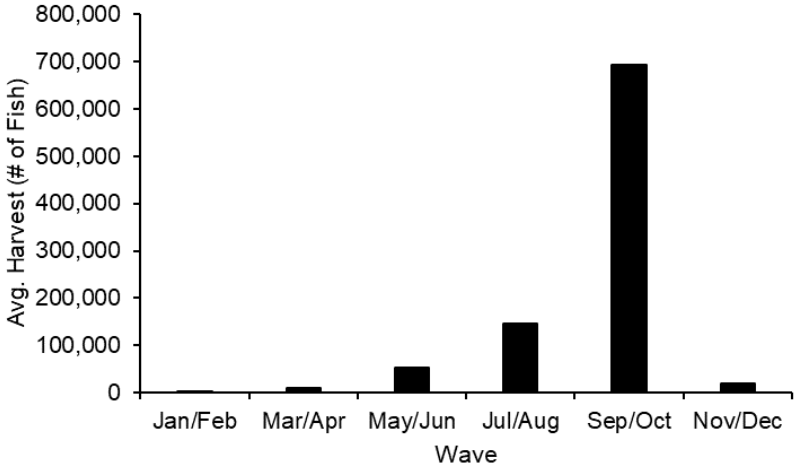

Figure 3.1. Average number of striped mullet harvested by the recreational fishery by wave based on MRIP estimates for 2017 to 2021.

The average length of striped mullet encountered in the North Carolina MRIP survey has ranged from a minimum of 7.2 inches (182 mm) in 2009 to a maximum of 13.6 inches (345 mm) in 2005 (Table 3.3). Because of small sample sizes, average lengths in almost all years of the time series are associated with high degrees of imprecision and are not considered reliable for characterizing recreational mullet harvest. Typically, only the largest mullet harvested by anglers are available to be sampled by MRIP staff. Most mullet harvested for use as bait are released prior to returning to the dock. The cast net survey conducted by DMF found striped mullet in cast net samples ranging from 1.9-15.3 inches FL (50-390 mm) with 76% of the fish from 2.8-5.5 inches FL (70-140 mm; NCDMF 2006; Figure 3.2). White mullet from cast net samples ranged from 1.6-7.4 inches FL (40-190 mm) with 98% of the fish between 2.4-5.9 inches FL (60-50 mm). Sub-adult and adult striped mullet were occasionally caught in the independent samples, but no sub-adult or adult white mullet were captured.

Table 3.3. Average length and weight of individual striped mullet intercepted by APAIS interviewers in North Carolina, 2002–2021. Proportional standard error (PSE) values greater than 50 indicate an imprecise estimate (highlighted gray).

Year	Avg Length (in)	PSE	Avg Weight (lb)	PSE
2002	8.2	26.0	0.4	30.2
2003	9.2	44.9	0.4	48.8
2004	10.0	143.8	0.4	143.8
2005	13.6	87.2	1.3	88.1
2006	11.9	86.4	0.9	83.1
2007	10.6	113.5	0.7	110.4
2008	10.8	90.9	0.7	90.6
2009	7.2	122.9	0.2	110.1
2010	10.4	63.7	0.9	73.2
2011	10.7	41.4	0.7	48.0
2012	10.5	112.5	0.7	112.8
2013	10.8	74.9	0.9	76.8
2014	12.9	96.4	1.1	97.0
2015	12.4	91.7	1.3	94.9
2016	11.9	71.7	0.9	72.3
2017	10.8	62.3	0.7	61.8
2018	10.9	83.3	0.7	82.0
2019	12.5	73.9	1.1	77.0
2020	13.4	63.1	1.5	67.8
2021	7.8	100.6	0.2	92.1

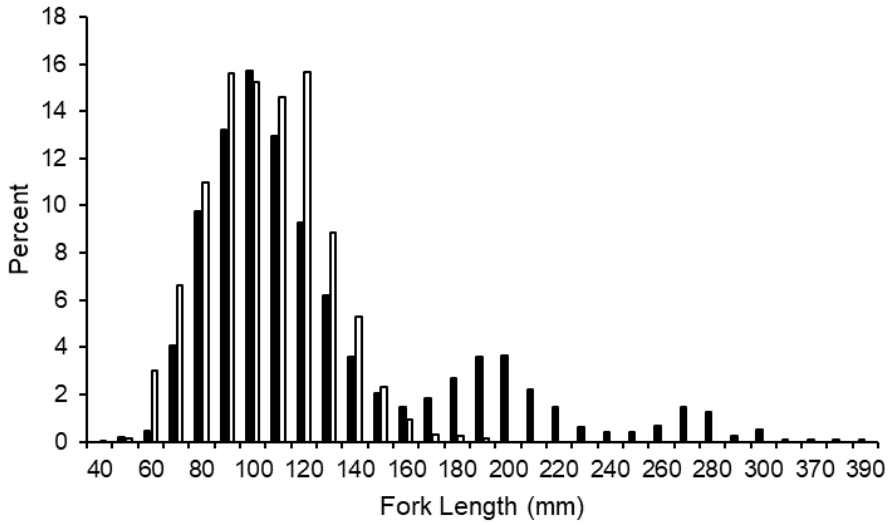

Figure 3.2. Length-frequency distributions of striped mullet (black bars) and white mullet (white bars) collected in the DMF fisheries-independent cast net study, 2002-2003.

Recreational Commercial Gear Landings

Harvest data from the Recreational Commercial Gear License (RCGL) survey were collected from 2002 to 2008. The program was discontinued in 2009 due to a lack of funding and the minimal contributions from RCGL to overall harvest. From 2002 to 2008, it is estimated that RCGL holders harvested an average of 41,512 pounds per year (Table 3.4). Estimated landings of striped mullet by RCGL holders peaked in 2002 and 2008, the first and final years of the survey. See Amendment 1 to the Striped Mullet Fishery Management Plan for a detailed summary of RCGL landings and effort (NCDMF 2015). Since the discontinuation of the RCGL survey in 2008, the number of RCGL issued each year has declined. In 2008, 5,503 RCGL were issued and in 2021, 2,143 RCGL were issued (NCDMF 2022a). It is unlikely harvest from this license type has increased substantially, particularly as additional restrictions have been placed on the use of gill nets.

Table 3.4. North Carolina RCGL number of striped mullet harvested, pounds harvested, number released, and total number caught. Estimates are from a RCGL survey conducted from 2002-2008.

Year	Number Harvested	Pounds Harvested	Number Released	Total Number
2002	66,305	64,213	6,549	72,854
2003	28,757	24,774	3,514	32,270
2004	34,736	35,947	2,875	37,611
2005	35,888	36,314	3,492	39,380
2006	38,175	37,385	5,352	43,527
2007	35,472	40,168	7,449	42,921
2008	51,465	51,785	9,207	60,672

Coastal Recreational Fishing License Survey

In October 2011, the DMF began a mail survey to develop catch and effort estimates for recreational cast net and seine use. The mail survey was established as a direct response to a lack of precision in MRIP estimates for difficult to sample or overlooked recreational fisheries and activities. The survey does not distinguish between striped and white mullet and all data should

be interpreted with caution because the ratio of striped mullet to white mullet in the recreational catch differs between seasons and areas of the state. Estimates from the DMF CRFL mail survey vary by month but generally peak between July and October, consistent with MRIP harvest estimates. The mail survey is a good source of recreational mullet effort, catch, and harvest information because of the relatively high precision of estimates.

Between 2012 and 2021, estimated annual harvest by cast nets of striped and white mullet from the mail survey ranged from 347,187 fish in 2018 to 942,521 fish in 2015 and the estimated number of trips that harvested mullet ranged from 88,939 trips in 2018 to 206,876 trips in 2015 (Table 3.5).

Additional sampling effort should focus on better characterizing the recreational fishery for striped mullet by contextualizing data collected by the CRFL Mail Survey through fishery-independent sampling. Characterization of cast net fishery catch composition was completed by the DMF in 2002-2003. While these data have been important for understanding the recreational fishery, particularly the proportion of striped mullet in the cast net harvest, updating the study in the context of the current recreational fishery, should be completed. Further sampling should be stratified based on effort, timing and locations reported in the CRFL Mail Survey and, in addition to collecting species composition information, should focus on collecting length and age data.

Table 3.5. Total mullet (striped and white) harvest (numbers of fish), releases, catch and effort from the Coastal Recreational Fishing License Survey by wave, 2012-2021. Proportional standard error (PSE) values greater than 50 indicate an imprecise estimate (highlighted gray).

Year	Wave	Total Effort	PSE	Total Mullet Harvest	PSE	Total Mullet Release	PSE	Total Mullet Catch	PSE
2021	Jan/Feb	10,518	27.9	15,365	61.1	4,615	56.7	19,980	57.7
	Mar/Apr	50,726	29.9	52,766	42.7	14,592	46.4	67,358	42.0
	May/Jun	45,681	11.8	133,646	26.9	34,978	50.6	168,624	26.9
	Jul/Aug	41,346	15.3	254,681	22.8	69,914	24.5	324,594	20.7
	Sep/Oct	65,736	11.4	582,176	24.5	169,786	25.5	751,961	21.1
	Nov/Dec	36,335	14.6	183,488	27.2	57,966	29.4	241,453	26.9
	Total	250,379	9.3	1,222,120	14.2	351,850	15.9	1,573,970	12.8
2020	Jan/Feb	11,690	23.9	8,878	37.9	1,077	53.3	9,955	36.8
	Mar/Apr	11,799	17.5	25,426	29.9	4,549	47.5	29,975	29.7
	May/Jun	24,586	16.9	51,327	21.1	19,058	31.5	70,385	20.6
	Jul/Aug	64,789	14.8	152,144	21.3	78,864	25.8	231,008	19.8
	Sep/Oct	34,501	13.0	254,362	18.0	56,512	18.5	310,874	16.8
	Nov/Dec	26,203	14.9	136,348	19.6	46,406	22.1	182,754	18.7
	Total	173,568	7.6	628,485	10.5	206,466	13.0	834,951	9.9
2019	Jan/Feb	12,139	18.4	27,088	35.1	7,351	33.7	34,439	32.7
	Mar/Apr	9,674	21.4	11,023	37.4	3,517	47.8	14,540	34.7
	May/Jun	44,262	14.5	143,824	21.9	35,856	25.0	179,680	20.9
	Jul/Aug	39,904	14.5	210,967	20.3	122,890	33.6	333,857	20.8
	Sep/Oct	40,143	13.3	219,358	14.8	124,146	22.7	343,504	15.3
	Nov/Dec	16,819	20.1	76,555	30.7	27,125	33.3	103,680	30.0
	Total	162,941	7.1	688,815	10.0	320,885	16.5	1,009,700	10.2
2018	Jan/Feb	4,121	30.4	3,935	65.2	450	70.5	4,385	62.1
	Mar/Apr	8,950	20.8	16,051	41.4	4,560	43.2	20,611	39.5
	May/Jun	32,021	14.3	58,694	25.2	12,577	29.5	71,271	24.8
	Jul/Aug	11,125	20.3	43,317	24.2	13,418	33.4	56,735	24.5
	Sep/Oct	11,832	71.1	139,578	72.5	56,912	85.8	196,490	76.1
	Nov/Dec	20,890	16.3	85,612	18.4	20,987	23.6	106,599	18.4
	Total	88,939	12.1	347,187	30.1	108,904	45.4	456,091	33.5
2017	Jan/Feb	6,178	25.3	7,047	55.9	994	70.9	8,042	56.7
	Mar/Apr	16,513	15.9	36,630	25.7	13,572	30.5	50,202	26.3

Year	Wave	Total Effort	PSE	Total Mullet Harvest	PSE	Total Mullet Release	PSE	Total Mullet Catch	PSE
	May/Jun	37,371	13.2	175,562	20.3	56,093	21.8	231,656	19.4
	Jul/Aug	54,353	13.8	218,395	15.6	89,636	19.3	308,031	15.0
	Sep/Oct	41,186	13.8	195,901	15.9	54,855	24.7	250,756	16.1
	Nov/Dec	27,259	14.4	89,393	18.6	24,847	28.1	114,240	18.9
	Total	182,861	6.7	722,929	8.8	239,998	11.3	962,927	8.7
2016	Jan/Feb	11,910	27.1	6,927	51.1	3,283	73.2	10,210	55.4
	Mar/Apr	13,803	20.5	17,333	44.5	1,238	63.5	18,571	42.0
	May/Jun	39,127	13.7	141,203	25.2	47,699	29.9	188,903	23.6
	Jul/Aug	51,085	11.8	306,614	18.3	109,938	22.3	416,552	17.7
	Sep/Oct	41,325	12.1	173,517	18.6	26,096	21.3	199,613	17.2
	Nov/Dec	34,673	16.3	102,800	26.5	31,637	33.1	134,437	27.0
	Total	191,922	6.4	748,394	10.9	219,892	14.3	968,286	10.7
2015	Jan/Feb	6,730	25.4	19,540	38.2	3,060	52.0	22,600	37.0
	Mar/Apr	13,981	18.5	25,446	28.2	5,880	33.6	31,326	27.9
	May/Jun	50,315	12.1	147,726	17.8	50,052	25.7	197,778	16.9
	Jul/Aug	71,656	10.7	400,123	13.9	156,696	19.1	556,819	14.1
	Sep/Oct	40,078	10.6	232,037	15.4	43,801	19.1	275,837	15.1
	Nov/Dec	24,116	17.8	117,650	21.6	36,550	26.2	154,200	21.9
	Total	206,876	6.0	942,521	8.4	296,039	12.2	1,238,561	8.5
2014	Jan/Feb	5,206	25.0	12,023	46.3	1076	57.9	13,099	44.3
	Mar/Apr	16,131	19.0	13,949	45.0	1,859	60.3	15,807	43.0
	May/Jun	35,945	13.5	110,839	20.8	28,262	22.4	139,101	19.5
	Jul/Aug	52,883	13.7	208,730	18.1	63,626	19.8	272,356	16.8
	Sep/Oct	63,224	12.7	362,912	14.6	136,337	16.4	499,250	13.5
	Nov/Dec	23,867	14.5	74,605	19.7	20,344	26.7	94,949	19.2
	Total	197,257	6.8	783,058	9.4	251,504	11.1	1,034,561	8.9
2013	Jan/Feb	13,053	18.3	57,047	30.0	7,862	36.4	64,909	29.7
	Mar/Apr	9,079	23.4	20,839	41.4	4,021	49.4	24,860	41.4
	May/Jun	24,541	11.8	65,072	24.4	21,957	30.5	87,030	24.8
	Jul/Aug	41,197	11.3	324,616	16.2	121,012	21.7	445,628	15.9
	Sep/Oct	25,872	16.3	159,790	20.9	39,065	26.1	198,855	19.8
	Nov/Dec	25,544	15.3	83,943	21.1	35,592	31.0	119,534	21.5
	Total	139,286	6.3	711,307	10.1	229,509	13.9	940,816	9.9
2012	Jan/Feb	10,484	22.1	23,346	32.8	9,050	42.3	32,395	32.4
	Mar/Apr	9,734	19.8	17,055	32.0	3,931	57.2	20,986	31.8
	May/Jun	20,903	12.5	84,180	25.7	26,845	32.9	111,025	23.9
	Jul/Aug	32,810	13.3	181,667	19.6	76,701	26.0	258,368	18.3
	Sep/Oct	30,377	11.2	292,859	13.0	72,004	16.1	364,862	12.6
	Nov/Dec	21,315	15.8	94,155	21.1	31,676	26.7	125,831	20.7
	Total	125,623	6.2	693,262	8.9	220,205	12.2	913,467	8.6

Non-Quantifiable Management Options

Because of uncertainty in recreational harvest estimates, it is not possible to calculate harvest reductions from any specific management measure. Assumptions about species composition and imprecision of harvest estimates at the wave (two month) level prevent quantifying harvest reductions from season closures and bag limits. A lack of length composition information prevents calculation of harvest reductions from size limits. However, stock assessment sensitivity runs using alternative proportions of striped mullet in recreational landings had very little effect on model outputs and stock status (NCDMF 2022b). Regardless of recreational fishery magnitude or importance, implementing management on the commercial fishery without limiting recreational harvest could shift effort and have the potential to complicate enforcement. For example, the commercial striped mullet fishery supplies significant amounts of live and dead mullet to bait shops, which are purchased by recreational anglers for use as bait. If limits are put on commercial

harvest, recreational anglers could increase directed effort for mullet to continue meeting the need for bait.

Whether recreational harvest reductions are quantifiable or not, sustainability objectives should be consistent between commercial and recreational fisheries management. Management options can be developed for the recreational fishery allowing for traditional resource use while supporting sustainability objectives.

If management measures like size limits, season closures, or day of week closures are adopted for the commercial fishery the same measures could be applied equally to the recreational fishery. However, given differing resource uses and fishery characteristics between the commercial and recreational fisheries, it is likely unnecessary to manage the sectors jointly. Using available data for guidance, specific management measures for the recreational fishery should be considered allowing for traditional use while supporting sustainability objectives.

Bag and Size Limits

The 200 fish bag limit established in the Striped Mullet FMP does little to limit recreational harvest (Table 3.6). Most recreational trips that harvest mullet harvest fewer than 25 fish (Table 3.6). Reducing the bag limit further could prevent excessive recreational harvest of finger mullet while continuing to meet fishery demands. In addition, a vessel limit could be implemented in addition to an individual bag limit to prevent excessive harvest and waste. Cast net sampling indicates most finger mullet captured in cast nets are white mullet, and sub-adult and adult white mullet are rarely encountered in North Carolina waters (NCDMF 2006). A recreational bag limit of 50 fish and vessel limit of 100 fish would be sufficient to meet the needs of 97% of anglers who harvest mullet recreationally (Table 3.6) and most of the harvest would likely be white mullet. Members of the Striped Mullet FMP AC were in favor of managing the recreational striped mullet fishery separate from the commercial fishery and suggested reducing the bag limit as a good approach. Specifically, members of the AC supported reducing the bag limit somewhere in the range of 50-100 fish per person per day and expressed support for measures similar to those used to manage the Florida recreational mullet fishery including a 50 fish bag limit and vessel limit of 100 fish per vessel from February 1 through August 31 and 50 fish per vessel from September 1 through January 31.

Implementing a reduced bag limit for mullet over a certain size would specifically prevent excessive harvest of striped mullet and could be implemented specifically during the spawning season to reduce harvest on the spawning stock while allowing continued harvest of finger mullet. For example, implementing a bag limit on mullet greater than 8-inches (Figure 3.2), would still allow harvest of finger mullet, which are primarily white mullet and prevent excessive recreational harvest of larger mullet. A bag limit, somewhere in the range of 10-25 mullet greater than 8-inches would allow continued use of striped mullet as cut bait. There was not strong support for size specific bag limits from members of the FMP AC. Because of difficulty catching larger mullet in cast nets, AC members felt minimal harvest of these larger fish occurred but wanted to be able to catch these fish in large quantities when they were available for use as cut bait.

Table 3.6. Frequency and percentage of recreational trips harvesting mullet by harvest bin, 2002-2021.

Number Harvested	Frequency	Percent
1-25	2,644	85
26-50	386	12
51-75	34	1
56-100	19	1
101-150	8	<0.1
151-200	5	<0.1
200+	7	<0.1
Total	3,103	100

Option 1. Recreational Vessel and Bag Limit

a. Status Quo
- \+ No new regulations
- \+ Allows continuation of fishery that mostly harvests white mullet
- – Does not reduce harvest of striped mullet
- – No preferential protection for largest fish

b. Reduce Recreational Bag Limit (100 fish)
- \+ Limits striped mullet harvest
- \+ Allows continuation of fishery that mostly harvests white mullet
- – No preferential protection for largest fish
- – Discarding could occur

c. Reduce Recreational Bag Limit (100 fish) and Implement Vessel Limit (400 fish)
- \+ Limits striped mullet harvest
- \+ Allows continuation of fishery that mostly harvests white mullet
- – No preferential protection for largest fish
- – Discarding could occur

d. Bag Limit (10, 15, 20, 25, etc.) for Fish Over 8-Inches
- \+ Provides some reduction in striped mullet harvest
- \+ Allows continuation of fishery that mostly harvests white mullet
- \+ Directs harvest to finger mullet which may experience high natural mortality
- \+ Provides preferential protection for largest fish
- \+ Allow larger mullet to be harvested for personal consumption or cut bait
- – Limits use of larger mullet for personal consumption and cut bait
- – Discarding could occur

e. Seasonal (October-December) Bag Limit (10, 15, 20, 25, etc.) for Fish Over 8-Inches
- \+ Provides some reduction in striped mullet harvest
- \+ Allows continuation of fishery that mostly harvests white mullet
- \+ Directs harvest to finger mullet which may experience high natural mortality
- \+ Provides preferential protection for largest fish
- \+ Allow larger mullet to be harvested for personal consumption or cut bait
- \+ Limits harvest during spawning season
- – Limits use of larger mullet for personal consumption and cut bait
- – Discarding could occur

For Hire Vessel operations often harvest mullet ahead of time for their customers to use as bait during charter and head boat trips. Because For Hire licenses allow vessels in North Carolina to carry six or more passengers, For Hire Vessel operations may use more mullet as bait during fishing trips than typical recreational fishing vessels. If a vessel limit for mullet is implemented, it could be applied equally to both private vessel trips and For Hire Vessel trips; however, this would not allow for traditional use of mullet in the For Hire fishery. Implementing a vessel limit specific to For Hire Vessels (as defined in G.S. § 113-174) while engaged in For-Hire Vessel operations, would limit excessive recreational harvest of striped mullet while continuing to meet fishery demands. A similar strategy is currently used to manage the For Hire cobia fishery in North Carolina.

Alternatively, the individual bag limit could be applied to all passengers on board and the vessel limit could be suspended during For Hire Vessel operations, allowing for traditional use of the fishery while limiting harvest. In this scenario, the maximum number of mullet allowed to be held onboard for use as bait prior to the beginning of a trip, during a trip, or after a trip is completed would be the individual bag limit multiplied by the number of customers allowed on the vessel. During a trip, the number of mullet in possession to be harvested could not exceed the individual bag limit multiplied by the number of anglers onboard the vessel during the trip. The For Hire Vessel trip would be defined as a period of time in which fishing is conducted, beginning when the vessel leaves port and ending when the vessel returns to port. A similar strategy has been implemented by the Atlantic States Marine Fisheries Commission's Addendum III to Amendment 1 to the Interstate Fishery Management Plan for Atlantic Croaker to allow For Hire Vessel operations to use live Atlantic croaker as bait.

The DMF initially recommended a 50 fish individual recreational bag limit with an exception for For Hire Vessel Operations to possess a bag limit for the number of anglers they are licensed to carry, including in advance of a trip. Input from the ACs suggested there was not strong support for reducing the 200 fish bag limit; however, a reduced bag limit would limit effort shifting from the commercial bait fishery to the recreational fishery because of management measures that may reduce commercial bait harvest. Reducing the recreational bag limit also creates consistency in meeting sustainability objectives across sectors. In consideration of input from the regional ACs, the Division changed its recommendation to options 1.c and 2.c, which would implement a 100 fish individual bag limit and a 400 fish vessel limit with an exception for For Hire Vessel Operations to possess a bag limit for the number of anglers fishing up to the 400-fish maximum, including in advance of a trip (Table 3.7). This option limits effort from expanding into the recreational fishery while continuing to allow traditional use of the resource.

<u>Option 2. For Hire Vessel and Bag limit</u>

a. For Hire Vessel Limit (500 fish, etc.)

+ Provides some reduction in striped mullet harvest
+ Allows continuation of fishery that mostly harvests white mullet
+ Allows for traditional use of fishery while engaged in For Hire Vessel operation
– No preferential protection for largest fish
– Discarding could occur

b. Exception for For Hire Vessel Operations to Possess a Bag Limit for the Number of Anglers They are Licensed to Carry (Including in Advance of a Trip).

+ Provides some reduction in striped mullet harvest
+ Allows continuation of fishery that mostly harvests white mullet
+ Allows for traditional use of fishery while engaged in For-Hire Vessel operation
– No preferential protection for largest fish

– Discarding could occur

c. Exception for For Hire Vessel Operations to Possess a Bag Limit for the Number of Anglers Fishing Up to the 400-fish Maximum (Including in Advance of a Trip).

+ Provides some reduction in striped mullet harvest
+ Allows continuation of fishery that mostly harvests white mullet
+ Allows for traditional use of fishery while engaged in For-Hire Vessel operation
– No preferential protection for largest fish
– Discarding could occur

d. Mirror Option 1 management decision

Adaptive Management

See Appendix 2. If adaptive management is adopted as part of Amendment 2, the specifications would apply to the commercial and recreational fisheries for mullet.

Table 3.7. Management options for recreational harvest of striped mullet.

Topic	Option	Description
Vessel and Bag Limit Options	1.a	Status Quo
	1.b	Reduce Recreational Bag Limit (100 fish)
	1.c*	Reduce Recreational Bag Limit (100 fish) and Implement Vessel Limit (400 fish)
	1.d	Bag limit (10, 15, 20, 25, etc.) for Fish Over 8-inches
	1.e	Seasonal (October-December) Bag Limit (10, 15, 20, 25, etc.) for Fish Over 8-inches
For Hire Vessel Operations Options	2.a	For Hire Vessel Limit (500 fish, etc.)
	2.b	Exception for For Hire Vessel Operations to Possess a Bag Limit for the Number of Anglers They are Licensed to Carry (Including in Advance of a Trip)
	2.c*	Exception for For Hire Vessel Operations to Possess a Bag Limit for the Number of Anglers Fishing Up to the 400-fish maximum (Including in Advance of a Trip)
	2.d	Mirror Option 1 Management Decision

*DMF recommendation

PROPOSED RULE(S)

No rule changes are necessary. Existing MFC rule 15A NCAC 03M .0502(b) delegates authority to the Fisheries Director to issue a proclamation to implement any of the management options proposed in Amendment 2.

"Mullet" Rule (15A NCAC 03M .0502)

Existing MFC rule 15A NCAC 03M .0502(b), "Mullet", delegates authority to the Fisheries Director to issue a proclamation to implement any of the management options proposed in Amendment 2. The Fisheries Director, consistent with the variable conditions provided in 15A NCAC 03H .0103 including compliance with FMPs, may impose any of the following restrictions on the taking of mullet:

(1) specify time;
(2) specify area;
(3) specify means and methods;
(4) specify season;
(5) specify size; and
(6) specify quantity, except as provided in Paragraph (a) of this Rule.

Paragraph (a) of the rule sets a fixed maximum possession limit of 200 mullet per person per day for recreational purposes. However, given the current stock status this rule will likely be amended in the second round of the periodic review of rules (G.S. § 150B-21.3A) in the late 2020s, to remove the recreational bag limit of 200 mullet. If changes to the bag limit are needed before that time, the Fisheries Director has authority to suspend this portion of the rule (15A NCAC 03I .0102). Potentially amending the rule to remove the bag limit during the next periodic review of the rule would simplify the process for implementing management measures for the Striped Mullet FMP.

"Mutilated Finfish" Rule (15A NCAC 03M .0101)

The MFC originally adopted the "Mutilated Finfish" rule (15A NCAC 03M .0101) in 1991 with the intent of providing added resource protection for finfish species subject to a size or bag limit. In response to the 200 fish bag limit for mullet, in July 2006, the rule was amended to add mullet as an exception, otherwise the use of mullet as cut bait would not have been allowed to continue. At that time, overfishing of the striped mullet stock was not occurring and the 200 fish bag limit was high enough there was little concern about enforceability.

However, the rule did not provide flexibility to manage variable conditions for species commonly used as cut bait, particularly when new regulations implemented to meet sustainability objectives (i.e., size or bag limits) make species subject to this rule. The MFC proposed amendments to the April 1, 2019 version of the rule in August 2022 to read:

15A NCAC 03M .0101 MUTILATED FINFISH

It shall be unlawful to possess aboard a vessel or while engaged in fishing any species of finfish that is subject to a ~~size or harvest restriction~~ possession limit, including size limit, recreational bag limit, commercial trip limit, or season, without having head and tail attached, unless otherwise specified in a rule of the Marine Fisheries Commission or a proclamation issued pursuant to a rule of the Marine Fisheries Commission. ~~except:~~

~~(1) mullet when used for bait;~~
~~(2) hickory shad when used for bait, provided that not more than two hickory shad per vessel or fishing operation may be cut for bait at any one time; and~~
~~(3) tuna possessed in a commercial fishing operation as provided in rule .0520 of this Subchapter.~~

The use of mullet as cut bait is an enforcement issue, not a conservation issue but given the updated stock status for striped mullet and the need to implement conservation measures to rebuild the striped mullet stock, removing the mullet exception from the “Mutilated Finfish” rule is justified to support enforcement of sustainability measures like bag or size limits within the context of the “Mullet” rule and any proclamation issued under its authority. The use of mullet as cut bait should continue, to allow for traditional use and to meet stakeholder preferences.

In June 2023, the N.C. Rules Review Commission (RRC) objected to the amendments proposed to the "Mutilated Finfish" rule for unclear or ambiguous language (G.S. § 150B-21.9(a)(2)). In

October 2023, the RRC returned the "Mutilated Finfish" rule to the MFC in accordance with the requirements of Section 21.2.(m) of Session Law 2023-134. The law change resulted in a situation where the MFC was unable to address the RRC's earlier objection within the prescribed time limit. Nothing from that action would prevent a new proposed amendment to be pursued.

The amended "Mutilated Finfish" rule would have allowed the Fisheries Director to use proclamation authority that is set forth in other MFC rules (like the "Mullet" rule) to allow the use of any species as cut bait, subject to the Fisheries Director's discretion consistent with the variable conditions provided in 15A NCAC 03H .0103, including compliance with FMPs. This option would simplify the rule by including all requirements for a specific species within the same rule or proclamation.

RECOMMENDATION

DMF Recommendation:

Option 1.c: Recreational Individual Bag Limit of 100 Fish and Vessel Limit of 400 Fish

Option 2.c: Exception for For Hire Vessel Operations to Possess a Bag Limit for the Number of Anglers Fishing Up to the 400-fish Maximum (Including in Advance of a Trip)

Advisory Committees Recommendations and Public Comment: see Appendix 4

Appendix 4: Summary of management recommendations and comment

Issue Paper	DMF	Northern Regional Advisory Committee	Southern Regional Advisory Committee	Finfish Standing Advisory Committee	Public
Appendix 2: Sustainable Harvest	Option 5.n Option 6.a Option 10	Option 5.a Option 6.a Abstain from making any motion regarding adaptive management	Approve DMF recommendation 5.n, 6.b and 10 for the commercial fishery. With the staff looking to adjust the roe season north and south for equitable reduction	Option 5.a with no catch cap for stop net (Option 6.a Approve division recommendation for adaptive management (Option 10)	Concerns about overfishing. General support for gill net restrictions, seasonal closures, and trip limits to provide protection to the spawning stock. Some support for region specific regulations. Suggestions to account for economic impacts of regulation.
Appendix 3: Recreational Fishery	Option 1.c Option 2.c	Abstain from making any motion regarding recreational fishery management	Approve options 1.b and 2.b for the recreational fishery	Option 1.a	Support for managing recreational and commercial fisheries separately. General questions related to the need to manage the recreational fishery at all.

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Feasibility and Utility of a Shrimp Trawl Observer Program to Estimate Discards

January 23, 2024

I. SUBJECT

Though the need is widely recognized, characterizing the nature, composition, and magnitude of discards in the shrimp trawl fishery has proven difficult (Diamond et al. 2000; Davies et al. 2009; Wang et al. 2019). These difficulties are generally attributed to inadequate monitoring of many pertinent fishery characteristics including actual discard levels, effort of the directed fishery, variable fishing behavior, distribution and abundance of discarded 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. 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 discarded species is through an onboard observer program (Kennelly 1995; Babcock et al. 2003; Suuronen and Gilman 2020; Curtis and Carretta 2020). This information paper investigates the feasibility and utility of a long-term shrimp trawl observer program for the estimation of discards in the North Carolina shrimp trawl fishery.

II. ORIGINATION

The North Carolina Shrimp Fishery Management Plan Amendment 2 was adopted by the North Carolina Marine Fisheries Commission at their February 2022 business meeting. Amendment 2 includes the specific recommendation to investigate the feasibility and utility of a long-term shrimp trawl observer program to gain a better understanding of the current magnitude and composition of discards in the shrimp trawl fishery across all strata (e.g., season, area, and gear).

III. BACKGROUND

Nationally and internationally, observer programs are used to monitor the catch in different fisheries using a multitude of gears and covering a wide range of species. The purpose of an observer program in general is to observe, document, and characterize the catch in a fishery. The catch often consists of target species and incidental species. Individuals from both groups may be either harvested or discarded. Discarded catch may consist of unwanted or unmarketable species, protected species, or managed species that are either too large, too small, or are caught in numbers over the harvest limit. When fisheries managers are interested in quantifying the discarded portion of the catch, the best method of doing so is to deploy trained observers on commercial fishing vessels. Depending on how common one or multiple species of interest are in the catch will inform how much coverage an observer program should aim to achieve. For relatively common species, a low level of observer coverage will typically suffice, however for rare event species a higher level of observer coverage is desired.

Several observer programs have been established by state and federal management agencies. The National Oceanic and Atmospheric Administration (NOAA) operates several observer programs for varying fisheries, each with their own observer coverage goals or targets. Some examples of NOAA and state observer programs in southeast US are:

- NOAA Pelagic Observer Program
  - monitors the pelagic longline fishery in Atlantic Ocean waters
  - eight percent observer coverage target for the fishery
  - https://www.fisheries.noaa.gov/southeast/fisheries-observers/southeast-pelagic-observer-program
- NOAA Southeast Shark Bottom Longline Observer Program
  - monitors the shark bottom longline fishery in Atlantic Ocean waters
  - observer coverage ranges from four to six percent
  - https://www.fisheries.noaa.gov/southeast/fisheries-observers/southeast-shark-bottom-longline-observer-program
- NOAA Shrimp Observer Program
  - monitors shrimp trawl fishery in the Gulf of Mexico and South Atlantic Ocean
  - observer coverage is about two percent
  - https://www.fisheries.noaa.gov/southeast/fisheries-observers/gulf-mexico-reef-fish-and-shrimp-observer-program
- NOAA Northeast Fishery Observer Program
  - monitors multiple fisheries in Atlantic Ocean waters
  - Coverage targets are established annually based on the desired precision level and available funding but range from 0% to 100% depending on the fishery
  - https://www.fisheries.noaa.gov/new-england-mid-atlantic/fisheries-observers/northeast-fisheries-observer-program
- NCDMF Estuarine Gill Net Observer Program
  - monitors estuarine anchored gill net fishery
  - minimum of seven percent observer coverage and a target of 10 percent for anchored large mesh gill nets (≥ 5-inch stretch mesh)
  - minimum of one percent observer coverage and a target of two percent for anchored small mesh gill nets (< 5-inch stretch mesh)
  - https://www.deq.nc.gov/about/divisions/marine-fisheries/science-and-statistics/observer-program

Generally, data from observer programs can have many uses including as inputs in stock assessments, collecting biological samples for research, exploring new fisheries, informing adaptive management, and documenting endangered species interactions. Data from the programs listed above have been used in multiple stock assessments. For example, recent stock assessments for Spanish mackerel (SEDAR 2022), Atlantic croaker (ASMFC 2017a), and spot (ASMFC 2017b) have used data from the NOAA Shrimp Observer Program. Additionally, the stock assessment for southern flounder in the South Atlantic used data from both the NOAA Shrimp Observer Program and the division's Estuarine Gill Net Observer Program (Flowers et al. 2019). Data from the division's Estuarine Gill Net Observer Program has also been used in stock assessments for spotted seatrout (NCDMF 2022a) and striped bass (Lee et al. 2022) and to monitor fishery interactions with endangered sea turtles and sturgeons.

The North Carolina Division of Marine Fisheries (NCDMF) has conducted limited studies on shrimp trawl vessels using observers to characterize discards in the shrimp trawl fishery (e.g., Brown 2015, 2016, 2017, and 2018). However, participation was voluntary, and the limited scale

and scope of these studies make them inadequate for reliably quantifying discards in the shrimp trawl fishery.

Additional information on methods for estimating discards and determining the appropriate level of observer coverage for an observer program can be found in Appendix 1 of Amendment 2 to the N.C. Shrimp Fishery Management Plan (NCDMF 2022b).

IV. AUTHORITY

G.S. 113-132 JURISDICTION OF FISHERIES AGENCIES
G.S. 113-134 RULES
G.S. 113-134.1 JURISDICTION OVER MARINE RESOURCES IN ATLANTIC OCEAN
G.S. 113-182 REGULATION OF FISHING AND FISHERIES
G.S. 113-182.1 FISHERY MANAGEMENT PLANS
G.S. 113-221.1. PROCLAMATIONS; EMERGENCY REVIEW
G.S. 143B-289.52 MARINE FISHERIES COMMISSION-POWERS AND DUTIES
15A NCAC 03H .0103 PROCLAMATIONS, GENERAL
15A NCAC 03I .0113 BIOLOGICAL SAMPLING

V. DISCUSSION

Fishery Effort Characterization

Commercial shrimp trawl effort data available to explore the resources needed at different levels of observer coverage currently collected through the North Carolina Trip Ticket Program (NCTTP) includes the number of trips and trip duration (includes travel days in addition to days fished). Additionally, the duration of a trip is not always determined prior to the start of the trip. A fishing trip may be shorter or longer than anticipated due to weather, mechanical issues, crew issues, good fishing conditions, or poor fishing conditions. For these reasons, the number of trips is more realistic to use to explore the resources needed to initiate and operate a long-term shrimp trawl observer program.

In examining differing levels of observer coverage, analysis is separated by otter and skimmer trawls and further stratified into six areas based on NCTTP waterbody definitions. The areas are Estuarine North, Estuarine Central, Estuarine South, Pamlico Sound, and ocean waters north and south of Cape Hatteras (0-3 miles). Estuarine North includes internal Coastal Fishing Waters north of Core Sound, excluding Pamlico Sound. Estuarine Central includes internal Coastal Fishing Waters from Core Sound through Bogue Sound. Estuarine South includes internal Coastal Fishing Waters south of Bogue Sound. Pamlico Sound includes the waters of Pamlico Sound and its bays and tributaries. Ocean North of Hatteras includes Atlantic Ocean waters north of Cape Hatteras. Ocean South of Hatteras includes Atlantic Ocean waters south of Cape Hatteras. Effort with skimmer trawls only occurs in estuarine waters.

In addition to the annual number of trips, averages were calculated using two different sets of base years, 2013 to 2022 and 2018 to 2022. These base year options were chosen because they capture different effort regimes in the shrimp trawl fishery. From 2013 to 2022, overall effort was more

variable with higher effort in the early years and lower effort in the later years. To represent the current fishery, 2018 to 2022 was chosen as effort has been lower but stable during this period. From 2013 to 2022, the annual total number of otter trawl trips ranged from a low of 2,790 in 2022 to a high of 7,788 in 2017 (Table 1). The peak areas for otter trawl effort are Pamlico Sound and ocean waters south of Cape Hatteras. For the base years of 2013 to 2022, the average number of otter trawl trips was 5,494, higher than the base years of 2018 to 2022 where the average number of trips was 4,651. The main driver of this difference is a decrease in effort in Pamlico Sound in recent years. Effort in Pamlico Sound in 2020 represents a decrease of 50% from the time series high in 2017 (2,559 trips). Further from 2020 to 2021, effort in Pamlico Sound decreased by 26% and from 2020 to 2022 effort decreased by 54%. Effort in 2022 was a 77% decrease from the time series high in 2017.

Table 1. Total number of trips by year and area for commercial otter trawls, 2013 to 2022.

	Number of Otter Trawl Trips by Area						
Year	Estuarine North	Estuarine Central	Estuarine South	Pamlico Sound	Ocean North of Hatteras	Ocean South of Hatteras	Total Trips
2013	400	753	1,267	1,681	5	1,594	5,700
2014	424	837	588	1,615	1	1,138	4,603
2015	621	632	753	2,259	5	1,795	6,065
2016	593	799	992	2,389	113	2,644	7,530
2017	622	797	926	2,559	172	2,712	7,788
2018	558	511	616	2,149	89	1,011	4,934
2019	494	341	604	1,278	333	2,198	5,248
2020	572	450	821	1,284	249	1,914	5,290
2021	732	652	611	944	351	1,702	4,992
2022	336	233	622	584	121	894	2,790
Average 2013-2022	535	601	780	1,674	144	1,760	5,494
Average 2018-2022	538	437	655	1,248	229	1,544	4,651

Examining the monthly trend in trips shows the period from July through December accounts for approximately 80% of the annual effort on average in the commercial otter trawl fishery regardless of the base years used (Figure 1). When looking at individual areas in estuarine waters, this pattern generally holds true. A slightly different pattern is seen in ocean waters. In the Ocean North of Hatteras area, over 85% of the effort occurs from November through January and in the Ocean South of Hatteras area, approximately 60% of the effort occurs from September through December with a lower but steady amount of effort occurring from January through August. Observer coverage in each area will need to be spread throughout the year in proportion to the number of trips occurring in each area by month to accurately characterize the otter trawl fishery.

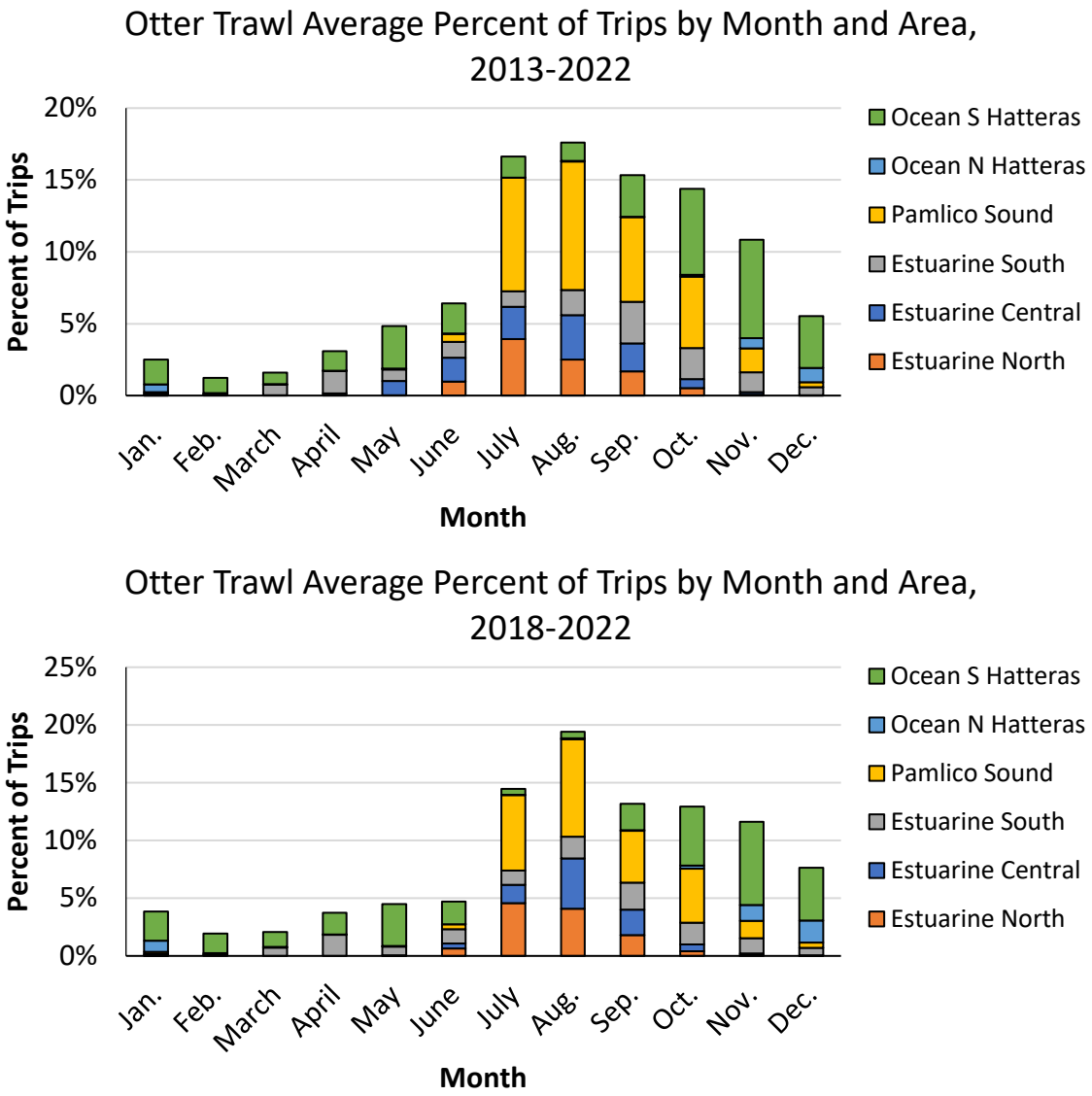

Figure 1. Average percentage of otter trawl trips by month for the base years of 2013 to 2022 (top) and 2018 to 2022 (bottom). The percentage for each area within a month reflects its proportion of total trips for the year. For example, Pamlico Sound (yellow bar) in August accounts for 9% of the annual trips on average from 2013 to 2022. The combined area percents within a month add up to the overall contribution of trips for that month. For example, the month of August accounts for 17.6% of the annual trips on average from 2013 to 2022.

From 2013 to 2022, the total number of commercial skimmer trawl trips ranged from a low of 151 in 2021 to a high of 1,245 in 2016 (Table 2). The peak areas for skimmer trawl effort have varied, with Estuarine Central accounting for most of the effort from 2013 to 2017, and from 2018 to 2022 effort was more evenly distributed between Estuarine Central, Estuarine South, and Pamlico Sound. For the base years of 2013 to 2022, the average number of skimmer trawl trips was 637, roughly twice as much as the base years of 2018 to 2022 where the average number of trips was

314. The main driver of this difference is a decrease in effort in the Estuarine Central area in recent years. Effort in the Estuarine Central area in 2020 represents a decrease of 87% from the time series high in 2016 (849 trips). Further from 2020 to 2021, effort in the Estuarine Central area decreased by 51% and from 2020 to 2022 effort decreased by 36%. Effort in 2022 was a 92% decrease from the time series high in 2016.

Table 2. Total number of trips by year and area for commercial skimmer trawls, 2013 to 2022.

	Number of Skimmer Trawl Trips by Area				
Year	Estuarine North	Estuarine Central	Estuarine South	Pamlico Sound	Total Trips
2013	60	737	371	26	1,194
2014	63	519	112	15	709
2015	75	733	145	33	986
2016	56	849	261	79	1,245
2017	31	331	108	196	666
2018	26	183	70	164	443
2019	1	79	90	148	318
2020	25	112	77	245	459
2021	1	55	23	72	151
2022	1	72	104	21	198
Average 2013-2022	34	367	136	100	637
Average 2018-2022	11	100	73	130	314

Similar to otter trawls, the period from July through November accounts for over 90% of the annual effort in the commercial skimmer trawl fishery (Figure 2). When looking at the Estuarine Central, Estuarine South, and Pamlico Sound areas, this pattern holds true. A slightly different pattern is seen in Estuarine North waters, where most effort occurs from June through September. Like with otter trawls, observer coverage for skimmer trawls in each area will need to be spread throughout the year in proportion to the number of trips occurring in each area by month to accurately characterize the skimmer trawl fishery.

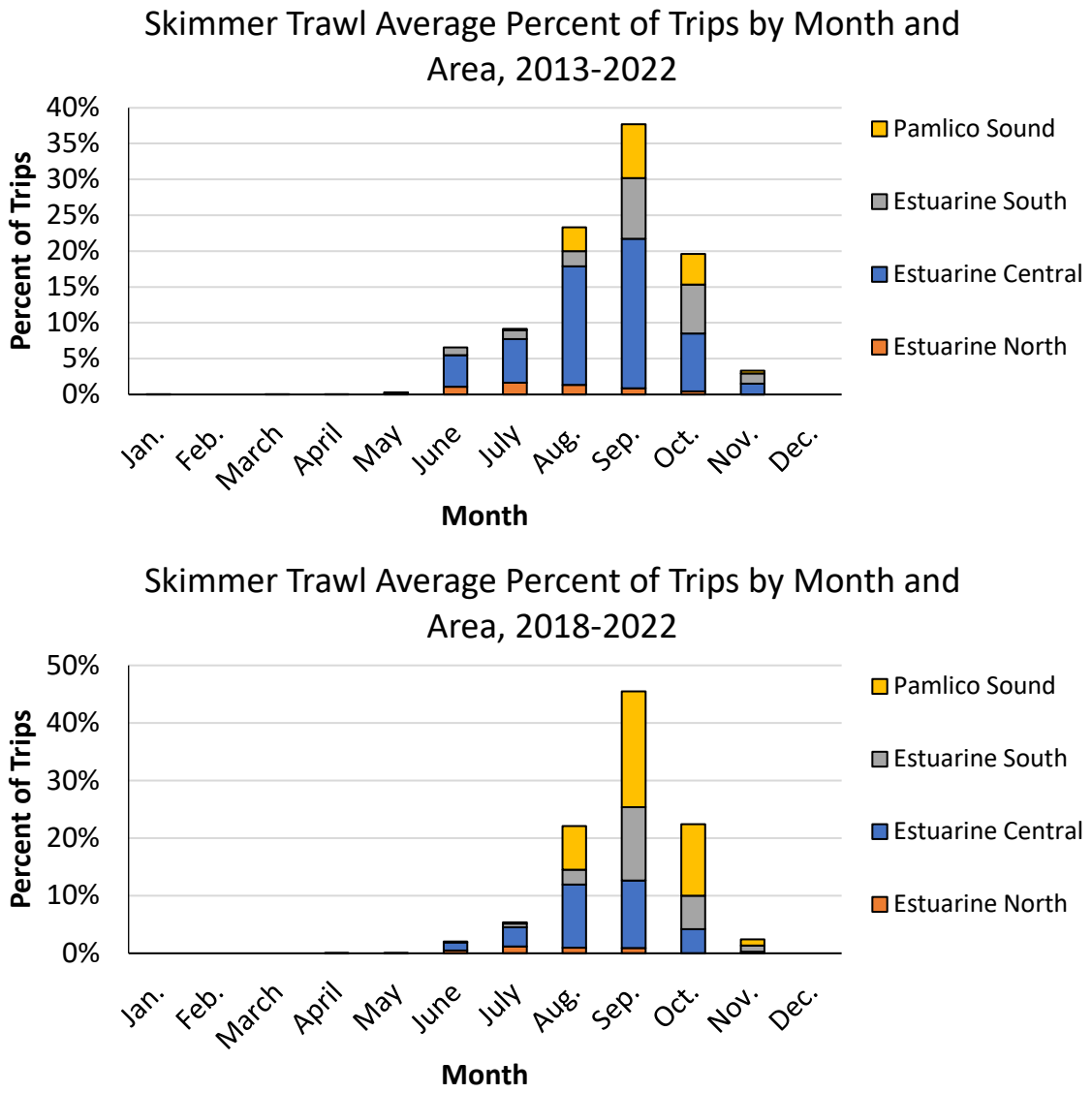

Figure 2. Average percentage of otter trawl trips by month for the base years of 2013 to 2022 and 2018 to 2022. The percentage for each area within a month reflects its proportion of total trips for the year. For example, Estuarine Central (blue bar) in August accounts for 16.5% of the annual trips on average from 2013 to 2022. The combined area percents within a month add up to the overall contribution of trips for that month. For example, the month of August accounts for 23.3% of the annual trips on average from 2013 to 2022.

Observer Program

Having no legal mandates in place regarding the percentage of shrimp trawl trips to observe allows for some flexibility in how the shrimp trawl observer program may operate. Using a static number of annual trips to establish annual observer trip targets (soft target) simplifies program logistics compared to annually updating the number of trips to observe based on effort from the previous

year or group of years (hard target). Using the soft target approach means there will be some variability in the percentage of trips observed annually but it allows for resource needs to be less variable from year to year (e.g., the number of temporary staff or funds needed each year). As fishery trends shift, the soft target can be adjusted as needed (dependent on available funds).

To examine the requirements of different observer coverage levels, annual values are presented along with average values using two different sets of base years, 2013 to 2022 and 2018 to 2022. These base year options were chosen to estimate observer coverage using a fixed number of observed trips rather than varying observer effort annually to reach a specific percentage.

The number of trips to observe using the 2013 to 2022 base year average, ranges from 275 trips (5% coverage) to 1,099 trips (20% coverage) needed for otter trawls (Table 3) and 32 trips (5% coverage) to 128 trips (20% coverage) needed for skimmer trawls (Table 4).

Table 3. Number of observed commercial otter trawl trips needed annually and using different averages for varying levels of observer coverage, 2013 to 2022.

		Observed Trips Needed			
Gear	Year	5% Coverage	10% Coverage	15% Coverage	20% Coverage
Otter Trawl	2013	285	570	855	1,140
	2014	231	461	691	921
	2015	304	607	910	1,213
	2016	377	753	1,130	1,506
	2017	390	779	1,169	1,558
	2018	247	494	741	987
	2019	263	525	788	1,050
	2020	265	529	794	1,058
	2021	250	500	749	999
	2022	140	279	419	558
	Average 2013-2022	275	550	825	1,099
	Average 2018-2022	233	466	698	931

Table 4. Number of observed commercial skimmer trawl trips needed annually and using different averages for varying levels of observer coverage, 2013 to 2022.

		Observed Trips Needed			
Gear	Year	5% Coverage	10% Coverage	15% Coverage	20% Coverage
Skimmer Trawl	2013	60	120	180	239
	2014	36	71	107	142
	2015	50	99	148	198
	2016	63	125	187	249
	2017	34	67	100	134
	2018	23	45	67	89
	2019	16	32	48	64
	2020	23	46	69	92
	2021	8	16	23	31
	2022	10	20	30	40
	Average 2013-2022	32	64	96	128
	Average 2018-2022	16	32	48	63

The results of applying the static number of trips approach can be seen in Table 5 (otter trawls) and Table 6 (skimmer trawls). For otter trawls, using the 2013 to 2022 average number of trips to establish observer coverage targets results in coverage targets being met in six to eight of the 10 years in the time series, depending on the target coverage level. The 2018 to 2022 average for trips results in coverage targets being met in two to four of the 10 years in the time series (Table 5). A similar pattern is seen for skimmer trawls where the 2013 to 2022 average number of trips results in coverage targets being met in five to seven years in the 10-year time series and the 2018 to 2022 average results in coverage targets being met in three years in the 10-year time series, regardless of the coverage target (Table 6).

Overall, using the 2013 to 2022 average performed better than the 2018 to 2022 average in reaching coverage goals across the years examined. The 2013 to 2022 period has both high effort and low effort years where the 2018 to 2022 period consists of low effort years, so it makes sense that observer coverage targets are more frequently met using the 2013 to 2022 average. This shows how annual fluctuations in effort in the shrimp fishery affect the estimated coverage using a static number of trips based on different base year scenarios and highlights the difficulty of using the effort in one year to estimate the number of observed trips needed the following year.

Table 5. Annual percent observer coverage using 2013 to 2022 base year and 2018 to 2022 base year average trip targets for commercial otter trawl trips and the number of years the target observer coverage would have been met using each group of base years. The observed trip percentages in each column are the product of dividing the specified base year average number of observed trips needed from Table 3 by the total number of trips for each year.

			2013-2022 Average Trips				2018-2022 Average Trips			
Gear	Year	Total Trips	5% Coverage (275 Trips)	10% Coverage (550 Trips)	15% Coverage (825 Trips)	20% Coverage (1,099 Trips)	5% Coverage (233 Trips)	10% Coverage (466 Trips)	15% Coverage (698 Trips)	20% Coverage (931 Trips)
Otter Trawl	2013	5,700	5%	10%	14%	19%	4%	8%	12%	16%
	2014	4,603	6%	12%	18%	24%	5%	10%	15%	20%
	2015	6,065	5%	9%	14%	18%	4%	8%	12%	15%
	2016	7,530	4%	7%	11%	15%	3%	6%	9%	12%
	2017	7,788	4%	7%	11%	14%	3%	6%	9%	12%
	2018	4,934	6%	11%	17%	22%	5%	9%	14%	19%
	2019	5,248	5%	10%	16%	21%	4%	9%	13%	18%
	2020	5,290	5%	10%	16%	21%	4%	9%	13%	18%
	2021	4,992	6%	11%	17%	22%	5%	9%	14%	19%
	2022	2,790	10%	20%	30%	39%	8%	17%	25%	33%
Number of Years Meeting Coverage Target			8	7	6	6	4	2	2	2

Table 6. Annual percent observer coverage using 2013 to 2022 base year and 2018 to 2022 base year average trip targets for commercial skimmer trawl trips and the number of years the target observer coverage would have been met using each group of base years. The observed trip percentages in each column are the product of dividing the specified base year average number of observed trips needed from Table 4 by the total number of trips for each year.

			2013-2022 Average Trips				2018-2022 Average Trips			
Gear	Year	Total Trips	5% Coverage (32 Trips)	10% Coverage (64 Trips)	15% Coverage (96 Trips)	20% Coverage (128 Trips)	5% Coverage (16 Trips)	10% Coverage (32 Trips)	15% Coverage (48 Trips)	20% Coverage (63 Trips)
Skimmer Trawl	2013	1,194	3%	5%	8%	11%	1%	3%	4%	5%
	2014	709	5%	9%	14%	18%	2%	5%	7%	9%
	2015	986	3%	6%	10%	13%	2%	3%	5%	6%
	2016	1,245	3%	5%	8%	10%	1%	3%	4%	5%
	2017	666	5%	10%	14%	19%	2%	5%	7%	9%
	2018	443	7%	14%	22%	29%	4%	7%	11%	14%
	2019	318	10%	20%	30%	40%	5%	10%	15%	20%
	2020	459	7%	14%	21%	28%	3%	7%	10%	14%
	2021	151	21%	42%	64%	85%	11%	21%	32%	42%
	2022	198	16%	32%	48%	65%	8%	16%	24%	32%
Number of Years Meeting Coverage Target			7	6	5	5	3	3	3	3

Logbook Program

Using the number of trips to characterize effort in the shrimp trawl fishery may be insufficient to calculate reliable discard estimates. The NCDMF, along with most other agencies, does not collect more detailed effort data (e.g., number of fishing days, number of tows made during a trip or per day, total headrope fished, number of nets fished, tow time); 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 discards. Gear characteristics [i.e., number of nets, headrope length, bycatch reduction device (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 2014).

To collect this information a mandatory logbook program is required to record gear and fishing information not currently captured by the NCDMF Trip Ticket Program. Specifically, to aid in estimating total discards, the logbook should capture information such as: number of fishing days, number of nets fished per tow, total headrope fished per tow, number of tows, individual tow times, type and placement of BRDs, type and placement of TED, and tailbag mesh size. These data will be used to better estimate total discards in the shrimp trawl fishery.

Program Costs

The estimated cost for a commercial shrimp trawl observer program varies by the level of observer coverage desired. Dividing the roll out of the Shrimp Trawl Observer Program into phases allows the necessary infrastructure to be developed and operational prior to implementing the observer and logbook requirements in the fishery. Phase 1 is developing the necessary IT infrastructure such

as a call-in system and a database for electronic and paper logbooks. Phase 2 is the implementation of the observer and logbook requirements in the fishery.

Information Technology (IT)

The phase 1 cost for IT development of the support systems is estimated at $681,560 (Table 7). This includes developing the call-in system and the support staff needed to develop the user interfaces for the databases for the call-in system and the electronic and paper logbooks. The estimated cost for phase 2, IT maintenance of the support systems, is estimated at $193,520 annually (Table 8). This includes maintenance costs for the physical infrastructure of the call-in system and support staff needed to maintain and modify the database user interfaces for the call-in system and the electronic and paper logbook.

Table 7. Estimated phase 1 IT costs to develop support systems for the observer and logbook programs.

	Phase 1: Development Costs		
Category	Number	Unit Cost	Total Cost
Develop Call-In System	1	$50,000	$50,000
Call-In System Maintenance	1	$45,000	$45,000
System Developer (Call-In System)	2,080	$69/hr.	$143,520
System Developer (Electronic Logbook)	2,080	$69/hr.	$143,520
Business Analyst (Electronic Logbook)	3,120	$50/hr.	$156,000
System Developer (Paper Logbook)	2,080	$69/hr.	$143,520
Total			**$681,560**

Table 8. Estimated phase 2 IT annual cost to maintain support systems for the observer and logbook programs.

	Phase 2: Annual Maintenance Costs		
Category	Number	Unit Cost	Total Cost
Call-In System Maintenance (physical infrastructure)	1	$45,000	$45,000
System Developer (Call-In and Electronic Logbook Systems Maintenance)	2,080	$69/hr.	$143,520
Software Maintenance Contract (Paper Logbook)	1	$5,000	$5,000
Total			**$193,520**

Observer Program

The estimated annual cost to implement an observer program for the shrimp trawl fishery varies depending on the observer coverage level (Table 9). At five percent coverage, the estimated annual cost is $758,730 and increases to $2,479,382 for 20% observer coverage.

Table 9. Estimated phase 2 annual cost to implement and maintain the observer program at various levels of observer coverage in the shrimp trawl fishery using the average number of trips for 2013 to 2022.

Category	5% Coverage	10% Coverage	15% Coverage	20% Coverage
Supplies	$65,000	$123,500	$182,000	$234,000
Travel	$170,940	$327,894	$486,402	$643,356
Staff	$522,790	$914,046	$1,305,110	$1,602,026
Total	**$758,730**	**$1,365,440**	**$1,973,512**	**$2,479,382**

Logbook Program

The estimated annual cost to administer the logbook program is $446,726 (Table 10). This includes the cost to print paper logbooks and support staff to enter and verify logbook data and to track logbook submissions. The cost for the logbook program does not change due to observer coverage levels because the program will be fleetwide.

Table 10. Estimated phase 2 annual cost to implement and maintain the logbook program for the shrimp trawl fishery.

Category	Number of Staff	Unit Cost	Estimated Cost
Logbook Printing	-	-	$15,000
Operational Cost	-	-	$46,000
Staff			$385,726
Total			**$446,726**

Combined Program

The estimated cost for phase 1 is $681,560. This covers the initial development costs for the call-in system and database for the electronic and paper logbooks. The estimated total annual cost for phase 2 ranges from approximately $1,398,976 for five percent observer coverage to $3,119,628 for 20% observer coverage using the 2013 to 2022 average number of trips as the target (Table 11).

Table 11. Estimated observer program costs by implementation phase for the commercial shrimp trawl fishery using the 2013 to 2022 average number of trips.

Program Area	Phase 1	Phase 2			
		5% Coverage	10% Coverage	15% Coverage	20% Coverage
IT	$ 681,560	$ 193,520	$ 193,520	$ 193,520	$ 193,520
Observer	$ -	$ 758,730	$ 1,365,440	$ 1,973,512	$ 2,479,382
Logbook	$ -	$ 446,726	$ 446,726	$ 446,726	$ 446,726
Total	**$ 681,560**	**$ 1,398,976**	**$ 2,005,686**	**$ 2,613,758**	**$ 3,119,628**

Much of the cost for both the observer and logbook programs is for new positions needed to carry out the work. The number of new positions needed for a shrimp trawl observer program ranges from ten positions (five percent coverage) to 36 positions (20% coverage; Table 12). As coverage increases so does the number of positions due to the large amount of effort in the shrimp trawl fishery and increase in the number of observed trips to meet coverage targets (Tables 3 and 4). Five new positions are needed for the logbook program (Table 12). This brings the overall number of new positions for a combined observer and logbook program to a range of 15 (5% coverage) to 41 (20% coverage) positions.

Table 12. Total number of positions needed for the observer and logbook programs by position type for varying levels of observer coverage in the commercial shrimp trawl fishery using the average number of trips for 2013 to 2022.

		Number of New Positions Needed			
Program	Position Type	5%	10%	15%	20%
Observer	Permanent Technician I	1	4	4	4
	Permanent Technician II	1	1	2	3
	6-month Temporary Technician I	6	12	19	26
	Permanent Biologist I	1	1	2	2
	Permanent Biologist II	1	1	1	1
	Total	10	19	28	36
Logbook	Data Entry Clerk	1	1	1	1
	Data Control Clerk	1	1	1	1
	Port Agent	2	2	2	2
	Biologist II	1	1	1	1
	Total	5	5	5	5
	Grand Total	**15**	**24**	**33**	**41**

The reliance on 6-month temporary positions as observer coverage increases is due to approximately 52% of all shrimp trawl trips occurring from July through September and 30% of trips occurring from October through December on average from 2013 to 2022 (Figure 3). The concentration of over 80% of the effort during these months makes it more efficient and cost effective to use temporary staff instead of permanent staff.

Figure 3. Average percent of shrimp trawl trips (otter and skimmer combined) per month, 2013-2022.

Benefits of a Shrimp Trawl Observer and Logbook Program

Establishing a long-term observer and logbook program for the shrimp trawl fishery will allow fisheries managers to quantify population losses of discarded species due to fishing activities. Despite the previous use of data from the Southeast Shrimp Observer Program, better information on discards from shrimp trawls has been identified as a data need for stock assessments of Atlantic croaker, southern flounder, spot, and weakfish (ASMFC 2016, 2017a, 2017b; NCDMF 2022c) which are species that have been documented as discards in the North Carolina shrimp trawl fishery (Brown 2015, 2016, 2017, 2018). Additionally, as the data time-series is established, if desired, it may be possible to develop management measures or triggers based on observed discard levels to limit effort in the shrimp trawl fishery in specific areas and/or seasons to reduce discard losses of ecologically, recreationally, or commercially important species.

Another benefit of a shrimp trawl observer program is the ability to better monitor for the presence and severity of black gill disease in North Carolina shrimp populations as well as the presence of invasive species like the Asian tiger shrimp.

Challenges of a Shrimp Trawl Observer and Logbook Program

The main challenge to establishing a long-term shrimp trawl observer and logbook program is cost. With phase 1 costs estimated at $681,560 and annual phase 2 estimated costs ranging from $1,398,976 (five percent observer coverage) to $3,119,628 (20% observer coverage) the division is unable to absorb this cost into its existing budget. The estuarine anchored gill net observer program is directly funded by commercial license receipts under N.C. General Statute 113-173.1 to manage the state's Incidental Take Permits for endangered sea turtles and sturgeons. To ensure the success and utility of the program, a long-term funding source for the shrimp trawl observer program must be secured. Funding the program for one year or a few years will not achieve the

goals of the program. Discard estimates in one year are only applicable to that year and cannot be used to estimate discards in previous or future years. Long-term funding of the program is the only means to generate reliable discard estimates that can be incorporated into stock assessments and management decisions for discarded species and the shrimp trawl fishery.

Additional costs associated with implementing an observer and logbook program that are not accounted for in this paper include:

- Enforcement
- Office space/rent

VI. SUMMARY FINDINGS

Starting a shrimp trawl observer program is feasible, provided long-term funding is secured. Potential funding sources for a combined observer and logbook program include funds appropriated by the General Assembly, the Commercial Fishing Resource Fund, commercial fishing license receipts, and Coastal Recreational Fishing License funds. Funding the program using short-term funds from competitive grants may work as proof of concept but is not sustainable long-term. The utility of an observer program is improved the longer it operates and collects data. For discard estimates to be useful to a stock assessment they need to cover as much of the time series as possible and produce annual estimates of discard losses. Hence, the limited studies previously performed by the division (e.g., Brown 2015, 2016, 2017, and 2018) are inadequate for quantifying discards in the shrimp trawl fishery.

Due to the variable nature of effort, species abundance, and species distributions, discard estimates are specific to the conditions encountered during the study period and are not representative of other years or areas. Therefore, the observer program must be continual and participation in the program must be mandatory for fishermen/vessel operators, to generate reliable estimates of annual discards in the commercial shrimp trawl fishery (like with NCDMF's observer program for the estuarine anchored gill net fishery). Likely stratifications for a shrimp trawl fishery observer program 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 as larger vessels are more likely to have multi-day trips compared to smaller vessels. One issue to consider is some smaller vessels, which make up the largest portion of the fleet, may not have room onboard for an observer and their equipment.

The division recommends both a shrimp trawl observer and logbook program be pursued, and effort made to secure funding for the program long-term. Establishing these programs will allow the division to fill a data gap for many managed and unmanaged species and account for shrimp trawl discards in stock assessments. Accounting for discard losses is vital for fisheries managers to set accurate harvest limits and determining stock status. In fisheries where discard losses are a large portion of the catch, including or excluding discard losses can impact fishing mortality and biomass-based reference points as does the survival rate of the discarded catch (Guillen et al. 2014). Ultimately, accounting for these impacts will allow for a better understanding of stock conditions and more effective management for several species.

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Prepared by Jason Rock
Jason.Rock@deq.nc.gov
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PROTECTION OF CRITICAL SEA GRASS HABITAT THROUGH SHRIMP TRAWL AREA CLOSURES

January 31, 2024

ISSUE

Providing additional protection for critical sea grass habitat through shrimp trawl area closures.

II. ORIGINATION

The North Carolina Shrimp Fishery Management Plan (FMP) Amendment 2 and the North Carolina Marine Fisheries Commission (NCMFC).

III. BACKGROUND

In February 2022, the NCMFC adopted the Shrimp Fishery Management Plan Amendment 2. With the adoption of Amendment 2 several management strategies were implemented to further reduce bycatch of non-target species and minimize ecosystem impacts (NCDMF 2022). The commission's management strategy included adaptive management for future action to address issues related to submerged aquatic vegetation (SAV) identified through Department collaboration with the Coastal Habitat Protection Plan (CHPP) support staff, the Habitat and Water Quality Advisory Committee (AC), and stakeholder groups. Adaptive management combines management and monitoring, with the aim of improving decision-making over time as more information becomes available. Adaptive management uses an iterative learning process to improve management outcomes, allows flexibility in decision making, and incorporates new information to accommodate alternative and/or additional actions (Holling 1978; Allan and Stankey 2009; Smith et al. 2013). In the context of North Carolina FMPs, adaptive management is an optional management framework that allows for specific management changes to be implemented between FMP reviews under specified conditions to accomplish the goal and objectives of the plan.

This issue paper uses the adaptive management strategy adopted in Amendment 2 to further protect SAV habitat in North Carolina, by identifying unprotected SAV habitat using updated imagery and providing additional protection through shrimp trawl area closures. As new imagery becomes available, shrimp trawl lines may be created or adjusted to encompass additional SAV habitat via revision of existing proclamations (NCMFC Rule 15A NCAC 03L .0101) or suspending of rules via proclamation (NCMFC Rule 15A NCAC 03I .0102). The Atlantic State Marine Fisheries Commission (ASMFC) SAV policy encourages state agencies to implement regular statewide SAV monitoring programs every five years to identify changes in SAV health and abundance (Havel and ASMFC 2018). Additionally, the South Atlantic Fishery Management Council (SAFMC) strongly recommends that a comprehensive adaptive management strategy be developed as a long-term protection strategy (SAMFC 2014). The 2021 Amendment to the CHPP recommends coast-wide monitoring occur every five years to evaluate the success of management actions and determine contributing relationships between changes in SAV species extent, distribution, and composition (Field et al 2020; NCDEQ 2021). The Albemarle-Pamlico National Estuary Partnership coordinates annual aerial and ground-based monitoring statewide on a rotating schedule during the spring and fall each year.

North Carolina is home to the largest documented polyhaline and mesohaline (brackish) SAV ecosystem on the Atlantic seaboard of North America (Bartenfelder et al. 2022). NCMFC Rule 15A NCAC 03I .0101 (4)(i) defines SAV as fish habitat dominated by one or more species of underwater vascular plants and occurs in subtidal and intertidal zones. SAV habitat provides refuge, forage, corridor, spawning, and nursery areas for many organisms including flounder (*Paralichthys* spp.), red drum (*Sciaenops ocellatus*), spotted seatrout (*Cynoscion nebulosus*), snapper, grouper, bay scallops (*Argopecten irradians*), blue crab (*Callinectes sapidus*), and penaeid shrimp (NCDMF 2021). Fish and invertebrate use of SAV differs spatially and temporally due to distribution ranges, time of recruitment, and life histories as well as seasonal abundance patterns of SAV (Micheli and Peterson 1999; Minello 1999; NOAA 2001; NCDEQ 2016). The SAFMC designated SAV as Essential Fish Habitat (EFH) for shrimp, snapper and grouper species, and spiny lobster (*Panulirus argus*), and Essential Fish Habitat Areas of Particular Concern for shrimp and snapper and grouper species (SAFMC 2021). The Mid-Atlantic Fishery Management Council designated SAV as Habitat Areas of Particular Concerns for summer flounder (*P. dentatus*; MAFMC 2016).

Field sampling of Strategic Habitat Areas (SHAs) in regions 3 and 4 (Core Sound through Brunswick County) found that SHAs had a greater abundance of SAV dependent species [Penaeid shrimp, southern flounder (*P. lethostigma*), red drum, silver perch (*Bidyanus bidyanus*), blue crab, etc.], as well as SAV (NCDMF 2023), supporting the critical importance of SAV for fishery species (Deaton et al. 2023). SAV also provides other important ecosystem functions such as increasing structural complexity, sediment and shoreline stabilization, improving water quality, primary productivity, nutrient cycling, and carbon sequestration. Beyond its ecological value, SAV provides significant market and nonmarket value to the state of North Carolina (Sutherland et al. 2021). In the Albemarle-Pamlico estuary alone, a five percent decadal loss in SAV is estimated to account for $8.6 million in losses a year in commercial fishing, recreational fishing, property value, and carbon sequestration. For a complete review of habitat requirements, species composition, ecological and biological functions, fish use, and status of SAV habitat see the North Carolina CHPP source document (NCDEQ 2016) and the 2021 Amendment (NCDEQ 2021).

In North Carolina, beds of SAV occur in subtidal and intertidal areas of sheltered estuarine and riverine waters where there is suitable sediment, adequate light reaching the bottom, and moderate to negligible current disturbance (Ferguson and Wood 1994; Thayer et al. 1984). SAV habitat is primarily located in shallow subtidal water (<6 feet) and individual species vary in their occurrence as salinity, depth, and water clarity change (NCDEQ 2016, 2021). The distribution, abundance, and density of SAV varies seasonally and annually (Dawes et al. 1995; Fonseca et al. 1998; SAFMC 1998; Thayer et al. 1984). Therefore, historical as well as current occurrences need to be considered to determine locations of viable seagrass habitat (SAFMC 1998).

Since the 1980s various mapping and monitoring projects have been conducted by several universities and state and federal agencies to document the extent of SAV in North Carolina (NCDMF 2021). More recently, aerial survey and ground-based monitoring data were collected in the high salinity waters from Manteo to Wrightsville Beach from 2020 to 2021. These maps were merged with previous data to comprise the historical or maximum known extent of SAV along North Carolina's coast (commonly referred to as the SAV mosaic). The 2021 Amendment to the CHPP divides the mosaic into nine SAV regions to best represent regional variability of

waterbodies. For a complete review of coastal habitat mapping and SAV monitoring, see Amendment 1 to the CHPP (NCDEQ 2021).

While there are several major threats to SAV (i.e., eutrophication, sedimentation, pollution, coastal development, climate change, etc.), impacts from mobile bottom disturbing fishing gears is of particular concern. It has been well documented that bottom disturbing gears such as trawls can significantly reduce habitat complexity and community composition from the physical disruption of the habitat to the removal of species (Dorsey and Pederson 1998; Auster 1998; NCDMF 1999; SAFMC 2014; Hiddink et al. 2017; Sciberras et al. 2018; Barnette 2001; NRC 2002; NCDEQ 2016, 2021). Otter trawls, the primary fishing gear used to harvest shrimp in NC, are conical nets pulled behind vessels along the benthos (Stewart and Dietz 2021; NCDMF 2022). Shearing or cutting of SAV leaves, flowers, or seeds, and uprooting of the plant may occur from the sweep of the net or the digging of the trawl doors into the sediment (ASMFC 2000). Skimmer trawls, another common gear used to harvest shrimp in North Carolina, uses metal skids to keep frames with attached nets off the bottom as they are fished. However, damage to the bottom can still occur if the gear is improperly tuned or designed (Hein and Meier 1995). Additionally, skimmer trawls are effectively fished in shallow waters, raising concerns with propeller scarring. Both gears increase turbidity, which can slow the growth of primary (algae and 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). For a comprehensive review of the impact of trawling in North Carolina waters, see NCDMF (1999, 2014, 2022), and NCDEQ (2016, 2021).

IV. AUTHORITY

North Carolina General Statutes
§ 113134 RULES
§ 113-173 RECREATIONAL COMMERCIAL GEAR LICENSE
§ 113182 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

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

Specific habitat protections for SAV have been implemented as part of FMPs for shrimp (NCDMF 2006, 2015, 2022), bay scallop (NCDMF 2007, 2015), hard clam (NCDMF 2008, 2017), and blue crab (NCDMF 1998; 2020). In addition, the 2006 Shrimp FMP 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 was prohibited

in the Albemarle and Currituck sounds due to user conflicts, but the prohibition also provided ancillary protections for SAV habitat (NCMFC Rule 15A NCAC 03J .0104). Trawling and dredging is prohibited in SAV beds on the eastern side of Pamlico, Core, and Back sounds through a trawl net prohibited area designation (NCMFC 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). With the adoption of Amendment 2 to the Shrimp FMP, trawling in Bogue Sound was further restricted to the IWW only to protect SAV habitat while continuing to allow shrimp trawling. SAV in the New River is also protected within no trawl areas below the Highway 172 Bridge. Crab Spawning Sanctuaries (NCMFC Rule 15A NCAC 03L .0205) and inlet trawling restrictions (NCMFC 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. All trawling was permanently prohibited in Crab Spawning Sanctuaries with the adoption of Amendment 2 to the Shrimp FMP; prior to its adoption, trawling was limited to November through February. See Shrimp Fishery Management FMP Amendment 2 (NCDMF 2022) for additional area restrictions that prohibit trawls in North Carolina's coastal and estuarine waters.

Because the current understanding of SAV distribution is based on historic mapping efforts (1981-2021), maps may not represent the actual, real-time extent of SAV for a given year but represent potential SAV habitat. Unsworth et al. (2018) notes seagrass conservation targets should incorporate future potential distribution of seagrasses and account for physiological responses to shifting environmental conditions that may result in species range-changes, localized invasions and extinctions, and shifts in structure and function of SAV habitat. Therefore, any shrimp trawl closures implemented to protect SAV must be broad enough to capture potential SAV habitat distribution.

One method to promote protection and recovery of SAV habitat is the creation of management buffers around important habitats. The overall goal of a buffer is to achieve sustainable use of natural resources that benefit both local communities and resources, while limiting the impact of destructive activities that take place outside of a protected area (Sanderson and Bird 1998; Martino 2011; Ebregt and Greve 2000). Terrestrial buffers are used by the North Carolina Environmental Management and Coastal Resources commissions to protect wetlands and water quality (NCDEQ 2016). In the marine environment, buffers have been used in conjunction with Marine Protected Areas (MPA) to protect important marine and coastal ecosystems as well as create migration corridors. Increasing connectivity between SAV habitats and other essential fish habitats can further reduce habitat fragmentation (edge effect) which can negatively impact community structure and nursery value (Benitez-Malvido and Arroyo-Rodriguez 2008). As a part of the Hard Clam FMP, adaptive management is used to modify mechanical clam harvest areas (MCHAs) to allow a buffer between dredged areas and SAV and oyster beds (NCDMF 2008, 2017). Similar buffers between open shrimp trawl areas and the maximum known extent of SAV habitat should be established as a means of protecting SAV habitat. More expansive closures are needed to reduce the impact of turbidity and sedimentation associated with bottom disturbing gear. Excessive sedimentation from bottom disturbing fishing gear and propeller wash can bury SAV. Increased turbidity further reduces water clarity, SAV growth, productivity, and survival (NCDEQ 2016). Furthermore, buffers that are expanded to make use of existing navigation aids, landmarks, or management boundaries accomplish the goal of increased buffers while also helping to promote compliance and simplify enforcement.

The 2021 Amendment to the CHPP cites the need to further protect and restore SAV as new mapping data become available (NCDEQ 2021). At the time of the amendment, the maximum extent of SAV along North Carolina's coast was 191,155 acres (1981-2015). With the additional mapping data from 2020 to 2021, the maximum known extent of SAV habitat is approximately 196,190 acres (Table 1; Figure 1). While closing areas of critical SAV habitat allows for calculation of how much additional habitat will be protected from direct physical disturbance from shrimp trawls, overall and additional benefits to SAV are difficult to quantify. In the absence of shrimp trawls, SAV growth may continue to be impaired by poor water quality, climate change, disease, or other natural disturbances. It's important to note that while broad scale closures are often better for conservation and biodiversity (Ebregt and Greve 2000), their creation may prevent trawling in productive areas with no SAV and disproportionately impact some user groups (i.e., small vessels, Recreational Commercial Gear License holders). The division does not have shrimp trawl effort data specific for each SAV region; thus, the precise economic impacts to the shrimp trawl fishery cannot be estimated but effort was made to balance SAV habitat protection and impacts to fishermen when determining closure boundaries.

VI. MANAGEMENT OPTIONS AND IMPACTS

(+ Potential positive impact of action)
(- Potential negative impact of action)

SAV Region 1 – Currituck Sound and Back Bay

Region 1 extends from Back Bay south to Point Harbor and encompasses all of Currituck Sound. Based on the most recent SAV mosaic (1981-2021), there are 21,613 acres of known SAV habitat in this region (Table 1; Figure 1). Shrimp trawling is prohibited throughout Currituck Sound [NCMFC Rule 15A NCAC 03J .0104(b)(3)]; no additional shrimp trawl closures are needed to protect SAV habitat in this region.

SAV Region 2 – Albemarle / Roanoke Sound

Region 2 extends from the Albemarle Sound to the Melvin R. Daniels Bridge (HWY 64) in the Roanoke Sound and includes the Alligator River and portions of the Croatan Sound (Figure 1). There are 12,872 acres of known SAV habitat in this region of which 42.1% is unprotected (Table 1). Shrimp trawling is prohibited in the Albemarle Sound, and throughout much of Roanoke Sound [NCMFC Rule 15A NCAC 03J .0104(b)(3)]. Special secondary nursery areas (SSNA) are designated in Kitty Hawk/ Buzzards, and Shallowbag bays. While these SSNAs have not opened since 2017, establishing shrimp trawl prohibited areas will provide permanent protection to known SAV habitat within these SSNAs.

Shallow water and other impediments limit trawling in this region; however, there is a considerable amount of unprotected SAV habitat in waters surrounding Colington and Roanoke islands. Creating a new no shrimp trawl line from Weir Point to the Manns Harbor Bridge will protect SAV habitat along the western shoreline of Roanoke Island and increase connectivity (Figure 2). Further restricting trawling to the Roanoke Sound Channel will increase connectivity between SAV habitats and create clear boundaries for enforcement (Figure 2). Allowing trawling within 100 feet on either side of the channel will allow trawlers space to safely maneuver their vessels and reduce user group conflict. While broad shrimp trawl closures may further limit small

commercial and recreational vessels, they provide the greatest protection to SAV habitat. Complementary closures in Region 5 (Roanoke Sound to Ocracoke Inlet) should be considered in conjunction with closures in Region 2 to create a continuous closed area of SAV habitats across these regions (Figure 5).

1. Prohibit shrimp trawling along the western shoreline of Roanoke Island from Weir Point to the Manns Harbor Bridge.
   + Decrease damage to SAV from shrimp trawls and allow potential for SAV recovery in formerly occupied areas
   + Creates continuous closed areas between SAV habitats among regions
   - Decreases some traditional shrimp trawling areas
   - SAV mapping reflects maximum known extent, so creation of broad no shrimp trawl areas may prevent shrimp trawling in areas that currently do not have SAV

2. Limit shrimp trawling to main channel only (100 ft either side) of the Roanoke Sound Channel.
   + Decrease damage to SAV from shrimp trawls and allow potential for SAV recovery in formerly occupied areas
   + Creates continuous closed areas between SAV habitats among regions
   + Provides access to fishermen and has minimal impact to soft bottom habitats that are dredged for navigation
   - Decreases some traditional shrimp trawling areas
   - Modification of existing closure lines could cause confusion
   - SAV mapping reflects maximum known extent, so creation of broad no shrimp trawl areas may prevent shrimp trawling in areas that currently do not have SAV

SAV Region 3 – Tar-Pamlico and Neuse rivers

Region 3 stretches across three counties (Beaufort, Pamlico, and Carteret) and encompasses the Pungo, Tar-Pamlico, Neuse, and Bay rivers and their tributaries (Figures 1 and 3). There are 4,581 acres of known SAV habitat within this region, of which 11.6% is unprotected (Table 1). In the Pungo River, shrimp trawling is prohibited upstream of a line from Currituck Point running southwesterly to Wades Point [NCMFC Rule 15A NCAC 03R .0114(A)]. All waters upstream of a line running from the entrance of Goose Creek northeasterly to Wades Point are closed to trawling in the Tar-Pamlico River [NCMFC Rule 15A NCAC 03R .0114(B)]. In the Neuse River, shrimp trawling is prohibited upstream of a line running northerly from Cherry Point to Wilkinson Point [NCMFC Rule 15A NCAC 03R .0114(C)]. Most of the tributaries and bays in this region are designated as primary and secondary nursery areas; however, trawling is allowed in Bay River as well as parts of Goose Creek, Clubfoot Creek, Adams Creek, South River, and Turnagain Bay.

Shrimp trawling is prohibited in designated pot areas in the Pamlico, Bay, and Neuse rivers from June 1 to November 30 in less than six feet of water [NCMFC Rules 15A NCAC 03J .0104(b)(6), 03J .0301(a)(2), and 03R .0107(a)(5)(6)(7)(8)]. Establishing permanent shrimp trawl closures in select designated pot areas where SAV is known to occur will provide permanent protection to SAV habitat and further reduce conflict between shrimp trawls and crab pots. Permanent shrimp trawl closures are recommended for designated pot areas in Vandemere Creek, Shell Bay, White Perch Bay, Bonner Bay, Fisherman's Bay, Turnagain Bay, and South River (Figure 3).

3. Prohibit shrimp trawling year-round in designated pot areas in Vandemere Creek, Shell Bay, White Perch Bay, Bonner Bay, Fisherman's Bay, Turnagain Bay, and South River.
   + Decrease damage to SAV from shrimp trawls and allow for SAV recovery in formerly occupied areas
   + Provides additional protection to critical shell bottom habitat
   + Minimal impact to fishermen since areas are not used extensively
   + Reduce gear conflicts between trawls and crab pots
   - Decreases some traditional shrimp trawling areas
   - SAV mapping reflects maximum known extent, so creation of broad no shrimp trawl areas may prevent shrimp trawling in areas that currently do not have SAV

SAV Region 4 – Pamlico Sound

Region 4 encompasses most of Pamlico Sound, spanning from the Manns Harbor Bridge (HWY 64) to the mouth of Neuse River and Cedar Island (Figures 1 and 4). The eastern side of Pamlico Sound (Outer Banks) is in SAV Region 5 and connected to SAV Regions 2, 3, and 6. There are 712 acres of known SAV habitat in Region 4, of which 68.8% is unprotected (Table 1). Stumpy Point Bay is closed to trawling from Drain Point to a line running westerly to Kazer Point [NCMFC Rule 15A NCAC 03R .0106(2)]. Most of the feeder creeks and bays along the Hyde County shoreline are classified as Primary Nursey Areas (PNA) and Secondary Nursery Areas (SNA). It is unlawful to use trawl nets in PNAs and SNAs (NCMFC Rule 15A NCAC 03N .0104 and .0105). Trawling is also prohibited in three military danger zones and restricted areas located near the mouths of Long Shoal and Bay rivers as well as Piney Island.

SAV habitat has been documented along the northwestern shoreline of Dare County from Manns Harbor to Callaghan Creek and from Long Wretch Creek to Stumpy Point (Figure 4). Establishing straight-line closures along the shoreline would protect known SAV habitat, simplify enforcement, and have minimal impact to fishermen in the Croatan Sound (Figure 4). Expanding the Stumpy Point shrimp trawl closure to include the area from Drain Point to Sandy Point will further protect SAV habitat south of Wild Boar Point. Additional closures in Sandy, Parched Corn, Berrys, East Bluff, and West Bluff bays as well as the mouths of Burrus, Middletown, Back, Brooks, and Middle creeks should also be considered (Figure 4). Establishing prescribed area closures along the western Hyde County shoreline will further protect SAV habitat and simplify enforcement (Figure 4).

4. Create and expand existing closures along the western shoreline of Dare and Hyde counties to include the bays and tributaries from Manns Harbor to West Bluff Bay.
   + Decrease damage to SAV from shrimp trawls and allow for SAV recovery in formerly occupied areas
   + Minimal impact to fishermen since areas are not used extensively
   + Reduce gear conflicts between trawls and crab pots
   - Decreases some traditional shrimp trawling areas
   - SAV mapping reflects maximum known extent, so creation of broad no shrimp trawl areas may prevent shrimp trawling in areas that currently do not have SAV

SAV Region 5 – Roanoke Sound to Ocracoke Inlet

Region 5 extends from the Manns Harbor Bridge (HWY 64) south to Ocracoke Inlet and includes portions of the Roanoke and Pamlico sounds (Figures 1 and 5). There are 103,856 acres of known SAV habitat within this region; the largest acreage of SAV habitat in North Carolina (Table 1). Much of the eastern side of the Pamlico Sound is closed to trawling to protect SAV habitat (15A NCAC 03R .0106 (1)). Shrimp trawling is prohibited in the Wanchese Marshes Seed Oyster Management Area [NCMFC Rule 15A NCAC 03R .0116(2)]. Oregon, Hatteras, and Ocracoke inlets are designated as crab spawning sanctuaries. Amendment 2 to the Shrimp FMP permanently closed all crab spawning sanctuaries to trawling (NCDMF 2022; Proclamation SH-1-2023).

Because of their proximity and connection, shrimp trawl closures in SAV regions 2 and 5 should complement each other to increase connectivity as well as simplify enforcement and compliance. Therefore, shrimp trawling should be further restricted to within 100 feet on either side of the channel running from the southeastern shore of Wanchese to the Bodie Island marshes (Figure 5). Along the western shore of Roanoke Island, shrimp trawl closures should extend south of the Manns Harbor Bridge to the Wanchese Seed Oyster Management Area at Cedar Bush Bay to align with proposed closures in Region 2 (Figure 5). To protect the remaining SAV habitat along the western shoreline of the Outer Banks, the existing trawl net prohibited area should be extended to the west behind Salvo and Buxton Harbor (Figure 5).

5. Limit shrimp trawling to main channel only (100 ft either side) southeastern shore of Wanchese to the Bodie Island marshes.
   + Decrease damage to SAV from shrimp trawls and allow for SAV recovery in formerly occupied areas
   + Creates continuous closed areas between SAV habitats among regions
   + Provides access to fishermen and has minimal impact to soft bottom habitats that are dredged for navigation
   - Decreases some traditional shrimp trawling areas
   - SAV mapping reflects maximum known extent, so creation of broad no shrimp trawl areas may prevent shrimp trawling in areas that currently do not have SAV

6. Prohibit trawling along the western shore of Roanoke Island from the Manns Harbor Bridge to northern most tip of the Wanchese Seed Oyster Management Area.
   + Decrease damage to SAV from shrimp trawls and allow for SAV recovery in formerly occupied areas
   + Creates continuous closed areas between SAV habitats among regions
   + Provides access to fishermen and has minimal impact to soft bottom habitats that are dredged for navigation
   - Decreases some traditional shrimp trawling areas
   - Modification of existing closure lines could cause confusion
   - SAV mapping reflects maximum known extent, so creation of broad no shrimp trawl areas may prevent shrimp trawling in areas that currently do not have SAV

7. Modify the existing trawl net prohibited area along the Outer Banks to include portions of the western shoreline behind Salvo and Buxton Harbor.

+ Decrease damage to SAV from shrimp trawls and allow for SAV recovery in formerly occupied areas
+ Creates continuous closed areas between SAV habitats among regions
+ Minimal impact to fishermen since areas are not used extensively
- Modification of existing closure lines could cause confusion
- SAV mapping reflects maximum known extent, so creation of broad no shrimp trawl areas may prevent shrimp trawling in areas that currently do not have SAV

SAV Region 6 – Core Sound

Region 6 contains the second largest known SAV habitat within the state; however, the vast majority of SAV in this region is unprotected (Figures 1 and 6). There are 37,645 acres of known SAV and SAV habitat, of which 35.5% is unprotected (Table 1). The area on the eastern side of Core Sound is designated as a no trawl area by NCMFC Rule 15A NCAC 03R .0106 (1) and is in place to protect SAV but can be opened to peeler crab trawling by proclamation [NCMFC Rule 15A NCAC 03J .0104 (4)]. On the mainland side of Core Sound, Jarrett Bay, Brett Bay, Nelson Bay, Thorofare-Barry Bay, and Cedar Island Bay are designated as SSNAs; however, they have not opened since 2018 (Proclamation SH-6-2018). Prior to the adoption of Amendment 2 to the Shrimp FMP, West Bay was managed in conjunction with SSNAs, last opening in 2017 (NCDMF 2022). SSNA openings based on division sampling were eliminated as a part of Amendment 2; thus, openings in West Bay no longer occur. All other tributaries and bays in Core Sound are designated as PNAs. Ophelia and Drum inlets are designated as crab spawning sanctuaries and are closed to trawling.

Limiting shrimp trawling to the MCHA in Core Sound (Figure 6) will increase connectivity between SAV habitats among regions as well as simplify enforcement and compliance.

8. Prohibit trawling in Core Sound, and its tributaries except for the MCHA.
   + Decrease damage to SAV habitat from shrimp trawls
   + Creates continuous closed areas between SAV habitats among regions
   + Provides access to resource and has minimal impact to soft bottom habitats that are impacted by other fisheries and or dredged for navigation
   - Decreases some traditional shrimp trawling areas
   - SAV mapping reflects maximum known extent, so creation of broad no shrimp trawl areas may prevent shrimp trawling in areas that currently do not have SAV
   - Modification of existing closure lines could cause confusion

SAV Region 7 – Back Sound to Sanders Island

Region 7 stretches across Carteret and Onslow counites and comprises 12,265 acres of known SAV habitat, of which 45.4% is unprotected (Table 1; Figures 1 and 7). Amendment 2 to the Shrimp FMP prohibited trawling in Bogue Sound except for the IWW and permanently closed crab spawning sanctuaries located at Barden, Beaufort, and Bogue inlets to trawling. The North River SSNA may be open to trawling at the Director's discretion; however, it has not opened since 2000 (Proclamation SH-14-2000). The bays and tributaries that surround the North River, Newport River, White Oak River, Bear Creek, and Queens Creek are designated as either PNAs or SNAs, and are closed to trawling.

Due to the patchy distribution of SAV in this region, it is difficult to designate areas where trawling could occur without overlapping SAV habitat. Broader shrimp trawl closures providing a buffer between open areas and SAV habitat should be considered, particularly along the shoreline of the Straits and Back Sound (Figure 7). Further limiting trawling to the North River MCHA will protect SAV along the shoreline and continue to allow shrimp trawling and have minimal impact to soft bottom habitats that are impacted by other fisheries or dredged for navigation (Figure 7). Additional shrimp trawl closures are recommended along the eastern shoreline of Newport River off Russells and Wading creeks. While SAV is less extensive in the White Oak River, additional shrimp trawl below the Highway 24 Bridge should be considered (Figure 7). Further limiting trawling to the IWW from Cedar Point to Sanders Island will provide additional protection to SAV habitat and increase connectivity among regions (Figure 7).

9. Prohibit shrimp trawling in the Straits, Back Sound, and their tributaries.
   + Decrease damage to SAV from shrimp trawls and allow for SAV recovery in formerly occupied areas
   + Creates continuous closed areas between regions and SAV habitats
   + Provides additional protection to critical shell bottom habitat
   + Minimal impact to fishermen since areas are not used extensively
   - Decreases some traditional shrimp trawling areas
   - Modification of existing closure lines could cause confusion
   - SAV mapping reflects maximum known extent, so creation of broad no shrimp trawl areas may prevent shrimp trawling in areas that currently do not have SAV

10. Modify existing or create new shrimp trawl closure lines in the North and Newport rivers.
   + Decrease damage to SAV from shrimp trawls and allow for SAV recovery in formerly occupied areas
   + Creates continuous closed areas between regions and SAV habitats
   + Provides access to resource and has minimal impact to soft bottom habitats that are impacted by other fisheries and or dredged for navigation
   - Decreases some traditional shrimp trawling areas
   - SAV mapping reflects maximum known extent, so creation of broad no shrimp trawl areas may prevent shrimp trawling in areas that currently do not have SAV
   - Modification of existing closure lines could cause confusion

11. Limit shrimp trawling to IWW from Cedar Point to Sanders Island.
   + Decrease damage to SAV from shrimp trawls and allow for SAV recovery in formerly occupied areas
   + Creates continuous closed areas between regions and SAV habitats
   + Provides access to resource and has minimal impact to soft bottom habitats that are dredged for navigation
   - Decreases some traditional shrimp trawling areas
   - Modification of existing closure lines could cause confusion
   - SAV mapping reflects maximum known extent, so creation of broad no shrimp trawl areas may prevent shrimp trawling in areas that currently do not have SAV

SAV Region 8 – Brown's Inlet to Snow's Cut

Region 8 extends from Brown's Inlet to Carolina Beach (Snow's Cut) and encompasses the New River and Topsail, Stump, and Middle Sounds (Figures 1 and 8). Within this region there are 2,646 acres of known SAV habitat, of which 17.9% is unprotected (Table 1). The majority of SAV habitat in the region is in the New River and along the IWW (Stump and Topsail sounds) and is largely protected under existing rules and proclamations. In the New River, 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. The waters upstream of the Highway 172 bridge are designated as SSNA and can be opened to the use of skimmer trawls only from September 1 to November 30. Below the Highway 172 Bridge, trawling is prohibited in all bays and tributary creeks and additional areas were closed to match the MCHA in 2017 to protect SAV (Proclamation SH-2-2017).

Trawling is restricted to the main channel throughout the IWW (Figure 8). The area from Marker #105 to the Wrightsville Beach drawbridge was closed to trawling following the adoption of the 2006 Shrimp FMP. Within the waters from Rich Inlet to Carolina Beach, the division maintains six shellfish management areas (SMA) as well as an oyster sanctuary at the mouth of Hewlett's Creek, all of which are closed to trawling. The remainder of the feeder creeks and bays along the IWW are classified as PNAs or SNAs and are closed to trawling. Trawling is further prohibited in the crab spawning sanctuaries located at Browns, New, Topsail, Rich, Masonboro, and Carolina Beach inlets.

The current no shrimp trawl lines in the New River MCHA could be modified to fully encompass documented SAV habitat at Hall and Roses points (Figure 8). While depth limits effort in these areas, the existing lines could be refined via revision of existing proclamations. Above the Highway 172 Bridge, the creation of new shrimp trawl closure lines would be needed to protect SAV habitat at the mouths of Stones and Everett creeks as well as Pollocks Point. Establishing straight-line closures using channel markers and landmarks would simplify enforcement and compliance. Additional closures could be implemented to protect SAV Habitat between Wards and Lowes points (Figure 8). Outside of the New River, no additional shrimp trawl closures are needed along the IWW.

12. Modify existing or create new shrimp trawl closure lines in the New River.
    + Decrease damage to SAV from shrimp trawls and allow for SAV recovery in formerly occupied areas
    + Minimal impact to fishermen since areas are not used extensively
    + Identifying clear boundaries could prevent damage gear and habitat
    - Decreases some traditional shrimp trawling areas
    - Modification of existing closure lines could cause confusion
    - SAV mapping reflects maximum known extent, so creation of broad no shrimp trawl areas may prevent shrimp trawling in areas that currently do not have SAV

SAV Region 9 – Cape Fear River to NC-SC Stateline

Region 9 spans across New Hanover and Brunswick counties and encompasses the Cape Fear River and the IWW to the NC-SC Stateline (Figure 1). 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. Trawling, and all other boating activity, is prohibited in the military restricted area at the Sunny Point Military Ocean Terminal. Trawling in the SSNA behind Kure Beach was prohibited following rule changes implemented in the May 2021 Revision to Amendment 1 that re-designated it as a permanent SNA (NCDMF 2021). 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 (NCDMF 2006). Trawling is further prohibited in the crab spawning sanctuary at the Cape Fear River Inlet.

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 areas and are closed to trawling. 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. Following rule changes implemented in the May 2021 Revision to Amendment 1, the Lockwood Folly River and Saucepan Creek SSNAs were re-designated as permanent SNAs (NCDMF 2021). With the adoption of Amendment 2, the Carolina Boat Basin was closed to trawling (NCDMF 2022). The remainder of the feeder creeks and bays along the IWW are classified as PNAs or SNAs and are closed to trawling. Trawling is prohibited in crab spawning sanctuaries located at Shallotte River Inlet, Lockwood Folly Inlet, and Tubbs Inlet.

Elevated tidal heights in the southern portion of the state increase turbidity and light attenuation, limiting SAV growth in the region. No additional shrimp trawl closures are recommended in Region 9 due to the absence of documented SAV habitat.

VII. RECOMMENDATIONS

NCDMF: Implement shrimp trawl closures specified in this paper to further protect SAV and SAV habitat from physical damage, turbidity, and sedimentation.

The 2021 Amendment to the CHPP cites the need to further protect and restore SAV as new mapping data become available (NCDEQ 2021). The 2022 Shrimp FMP Amendment 2 adopted a strategy to provide recommendations for future action through adaptive management to address SAV issues identified through collaboration of the Division, CHPP support staff, Habitat and Water Quality AC, and stakeholder groups. In support of the CHPP, NCDMF recommends creating management buffers to protect SAV habitat from physical disturbance, turbidity, and sedimentation by implementing broad, region specific shrimp trawl closures. Specifically, the NCDMF recommends management options 1-12. The division also recommends that issue paper be referred to the regional and Shellfish/Crustation ACs for further input before making final recommendations to the MFC.

Habitat and Water Quality AC: Endorse the division's recommendations to protect existing and prospective SAV habitat. In portions of proposed closure areas where SAV cannot be supported, the division should work with stakeholders to maximize SAV protection while reducing impact on stakeholder to maximize SAV protection while reducing impact on stakeholder use. A

commitment should be made to quantify the status of SAV habitat in NC and a monitoring program to measure progress of these programs.

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Prepared by Chris B. Stewart, Chris.Stewart@ncdenr.gov, 910-796-7370
August 1, 2023
November 8, 2023
November 28, 2023
December 20, 2023
January 31, 2024

Tables

Table 1. The known historic extent of mapped submerged aquatic vegetation (SAV) in North Carolina, 1981-2021.

			Historic Extent SAV Habitat		Unprotected SAV Habitat	
Region	Salinity Zone	SAV Region Name	Acres	Percent (%)	Acres	Percent (%)
1	Low	Currituck Sound & Back Bay	21,613	11.3	81	0.4
2	Low	Albemarle Sound	12,872	6.7	5,422	42.1
3	Low	Tar-Pamlico & Neuse rivers	4,581	2.4	530	11.6
4	High	Pamlico Sound	712	0.4	490	68.8
5	High	Roanoke Sound to Ocracoke Inlet	101,739	53.2	19,693	19.4
6	High	Core Sound	36,862	19.3	13,095	35.5
7	High	Back Sound to Sanders Island	10,826	5.7	4,916	45.4
8	High	Brown’s Inlet to Snow's Cut	1,950	1	348	17.9
9	High/Low	Cape Fear River to SC line	0	0	0	0.0
Total			191,155		44,576	

Figures

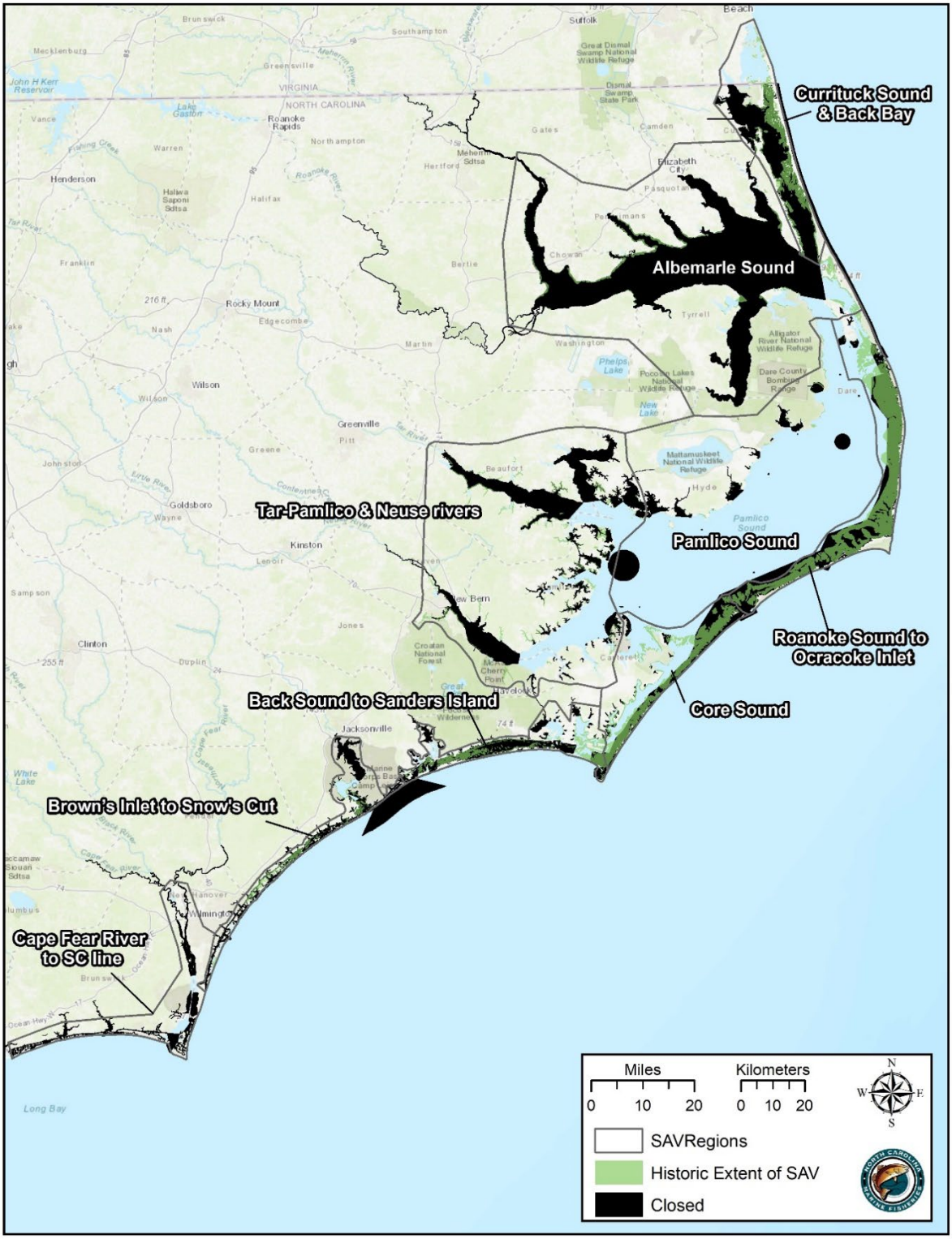

Figure 1. Historic extent of submerged aquatic vegetation (SAV) habitat mapped in North Carolina, 1981 to 2021.

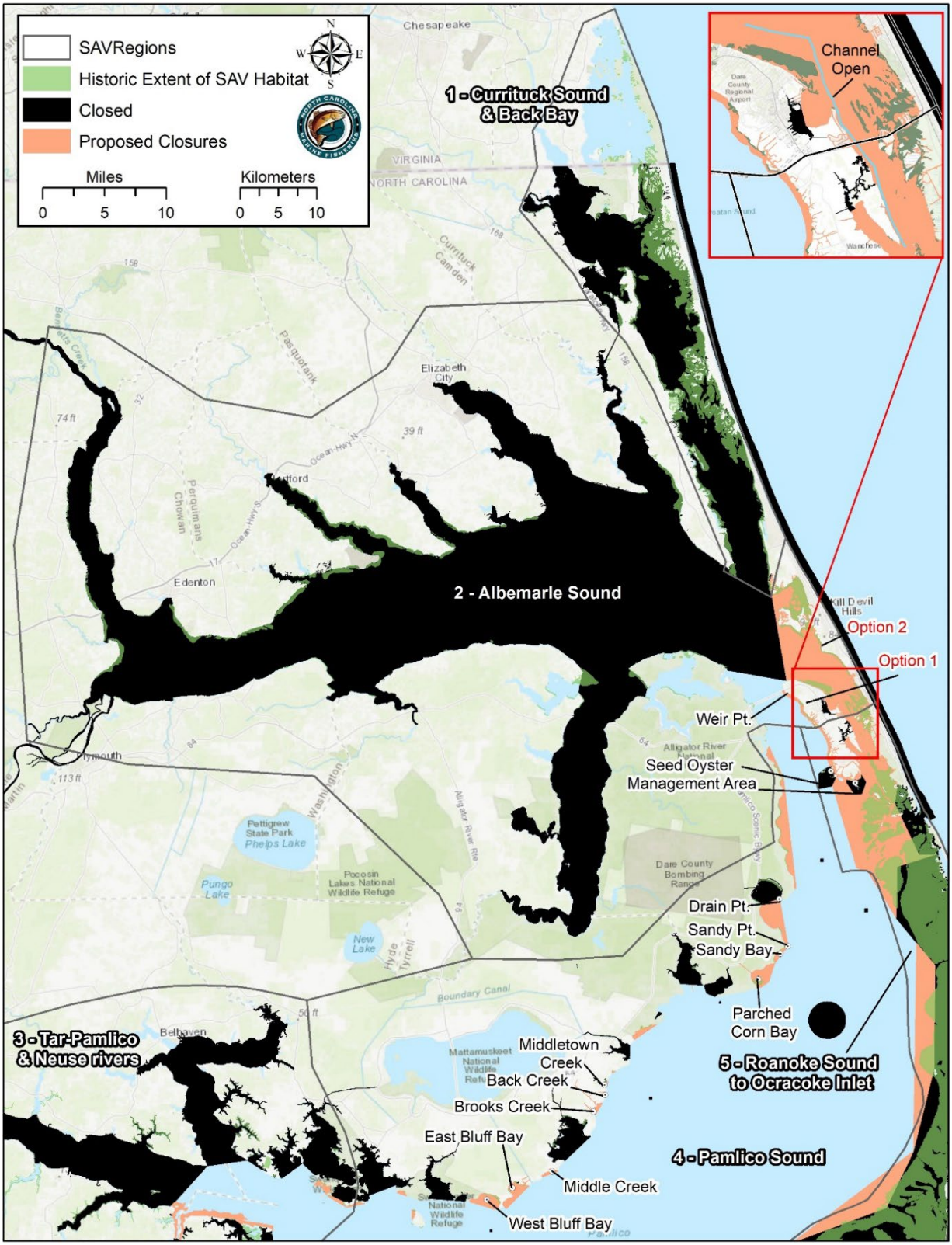

Figure 2. Proposed shrimp trawl closures in the Roanoke Sound (SAV Region 2) to protect submerged aquatic vegetation (SAV).

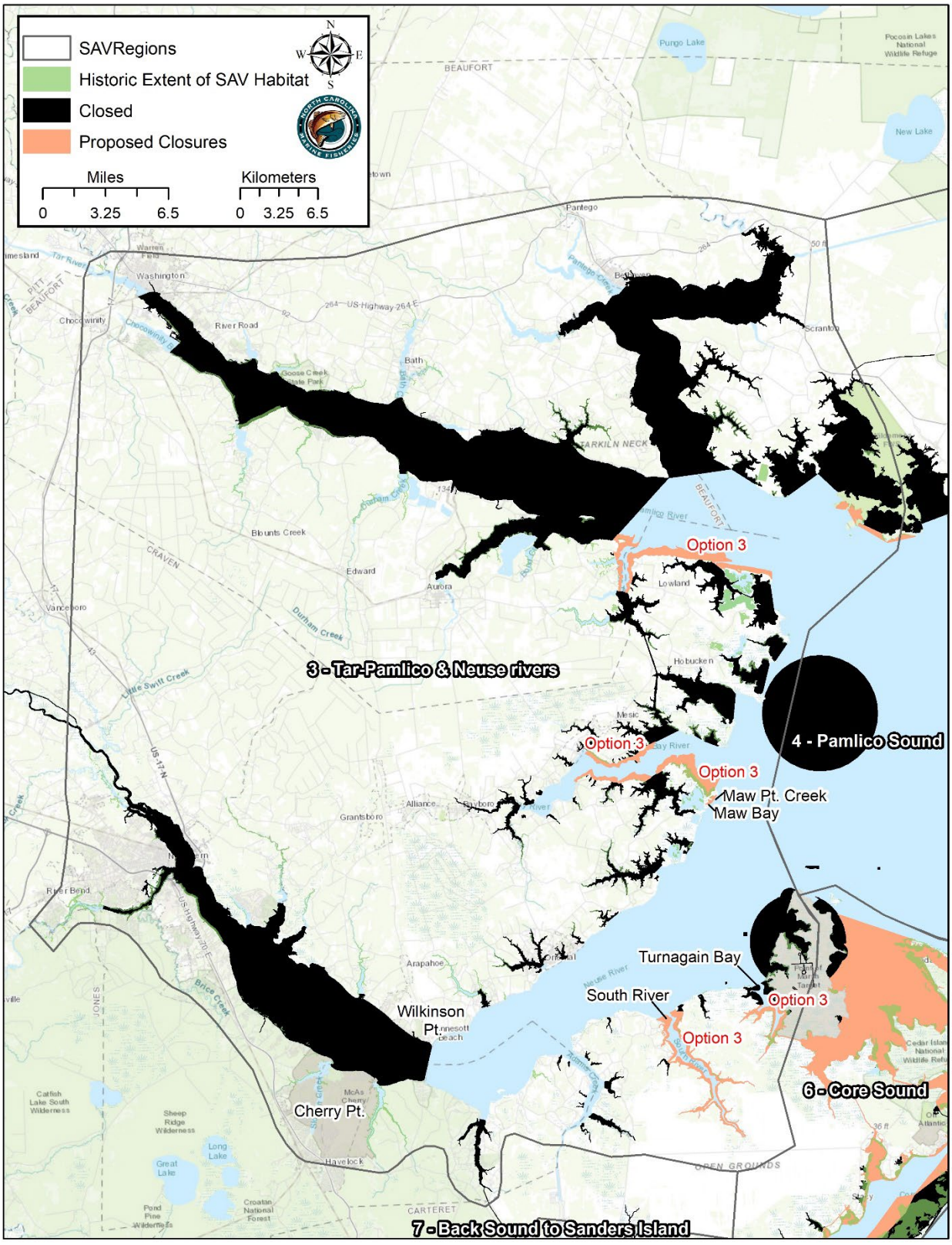

Figure 3. Proposed shrimp trawl closures in the Tar-Pamlico and Neuse rivers (SAV Region 3) to protect submerged aquatic vegetation (SAV).

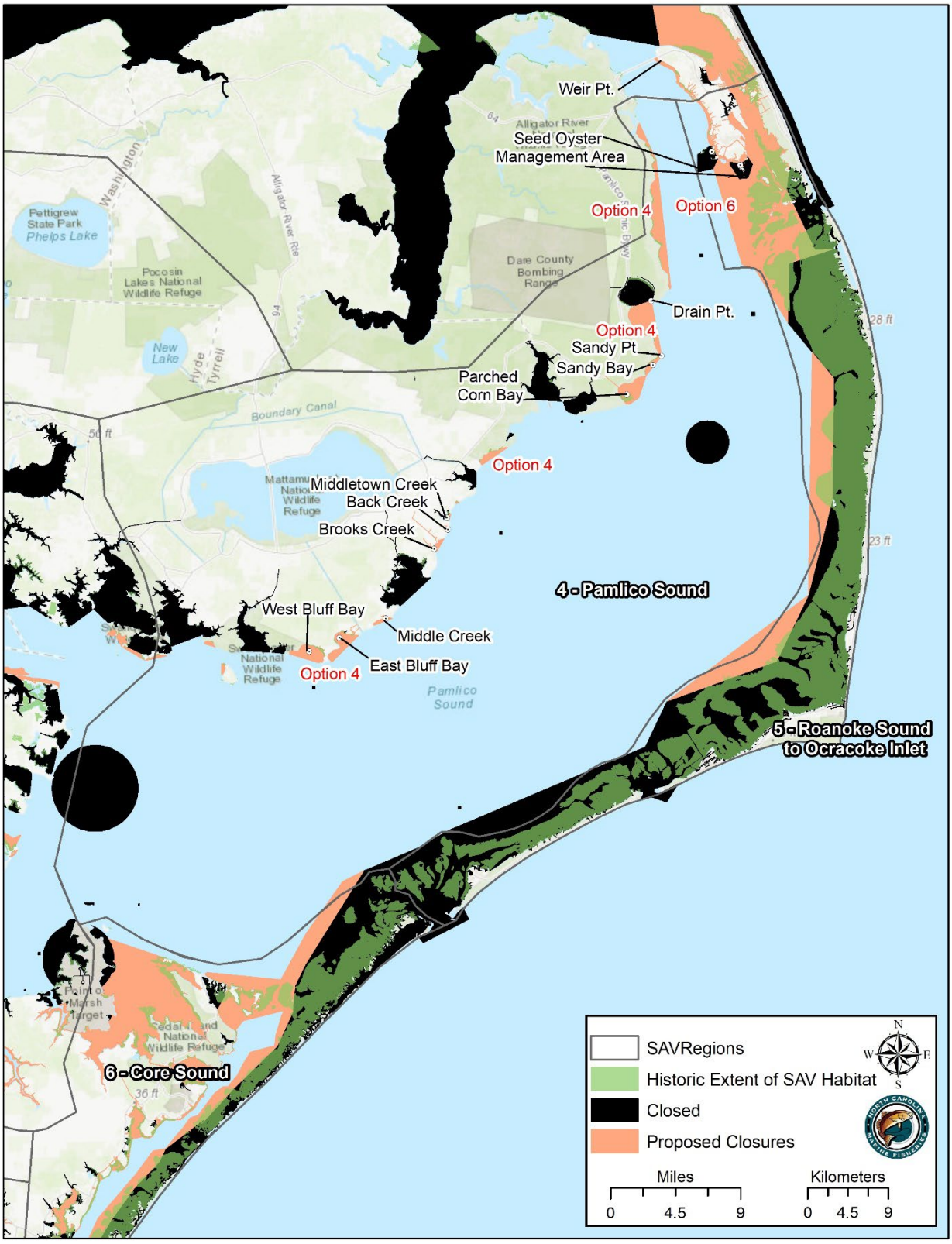

Figure 4. Proposed shrimp trawl closures in the Pamlico Sound (SAV Region 4) to protect submerged aquatic vegetation (SAV).

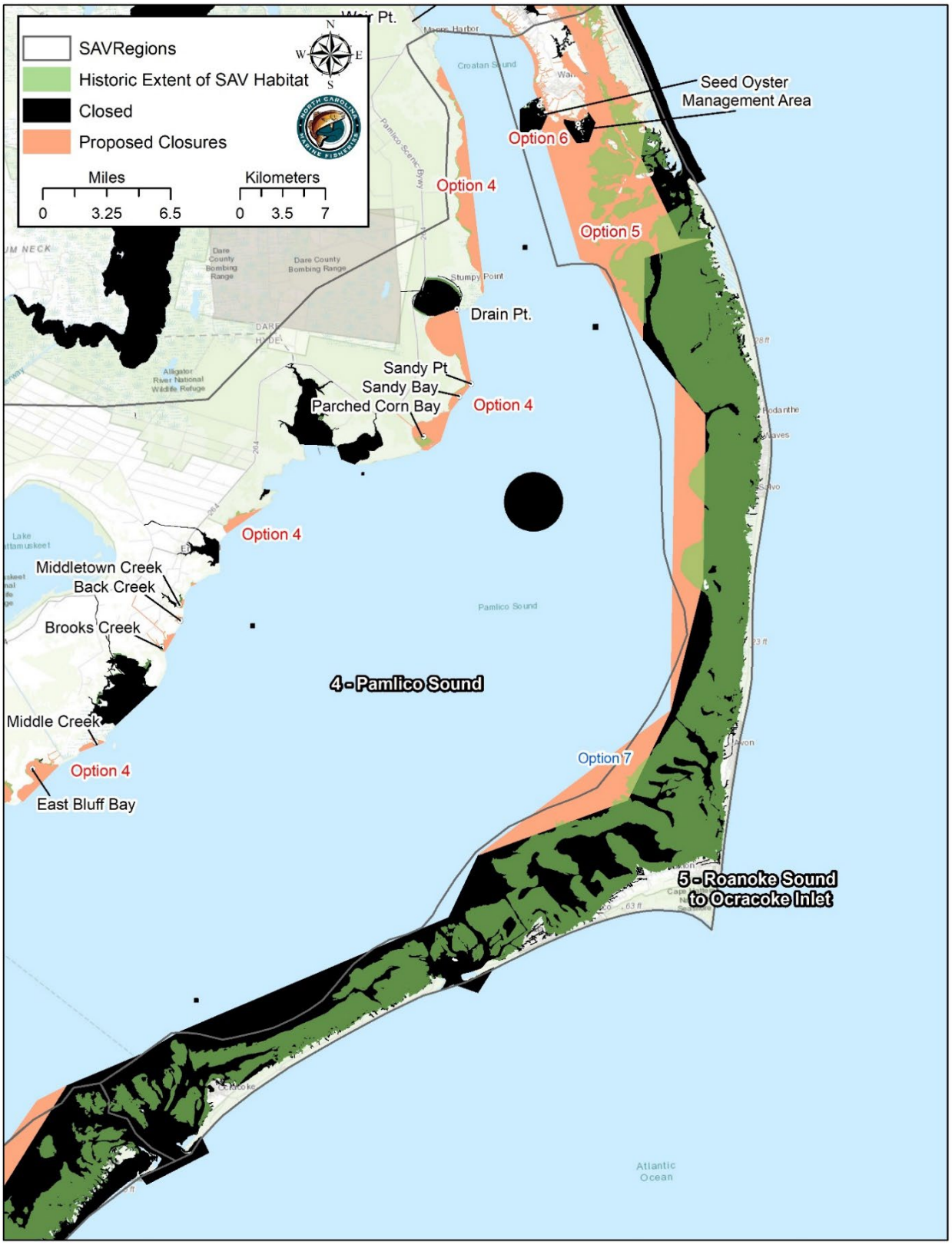

Figure 5. Proposed shrimp trawl closures from Roanoke Sound to Ocracoke Inlet (SAV Region 5) to protect submerged aquatic vegetation (SAV).

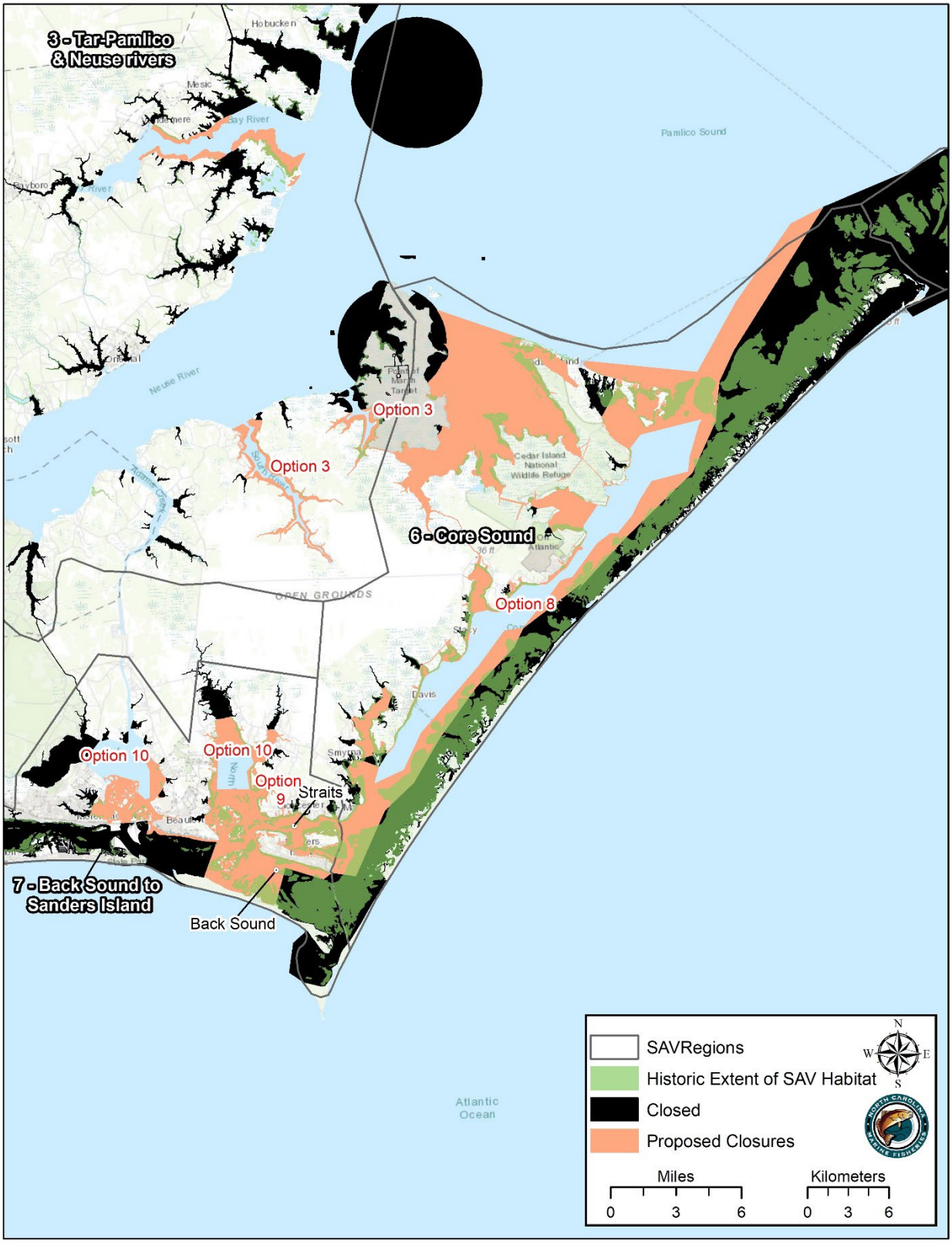

Figure 6. Proposed shrimp trawl closures in the Core Sound (SAV Region 6) to protect submerged aquatic vegetation (SAV).

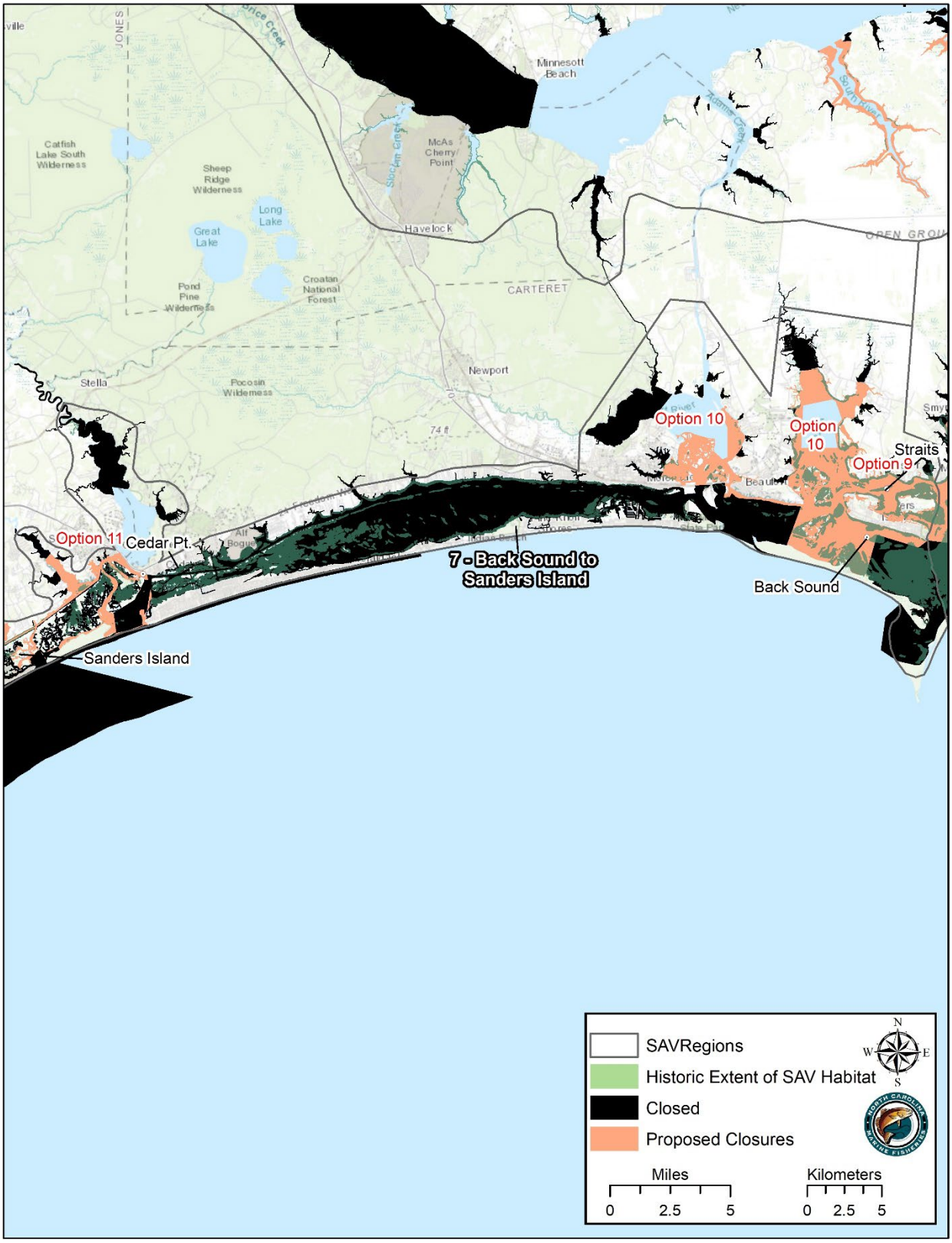

Figure 7. Proposed shrimp trawl closures from Back Sound to Sanders Island (SAV Region 7) to protect submerged aquatic vegetation (SAV).

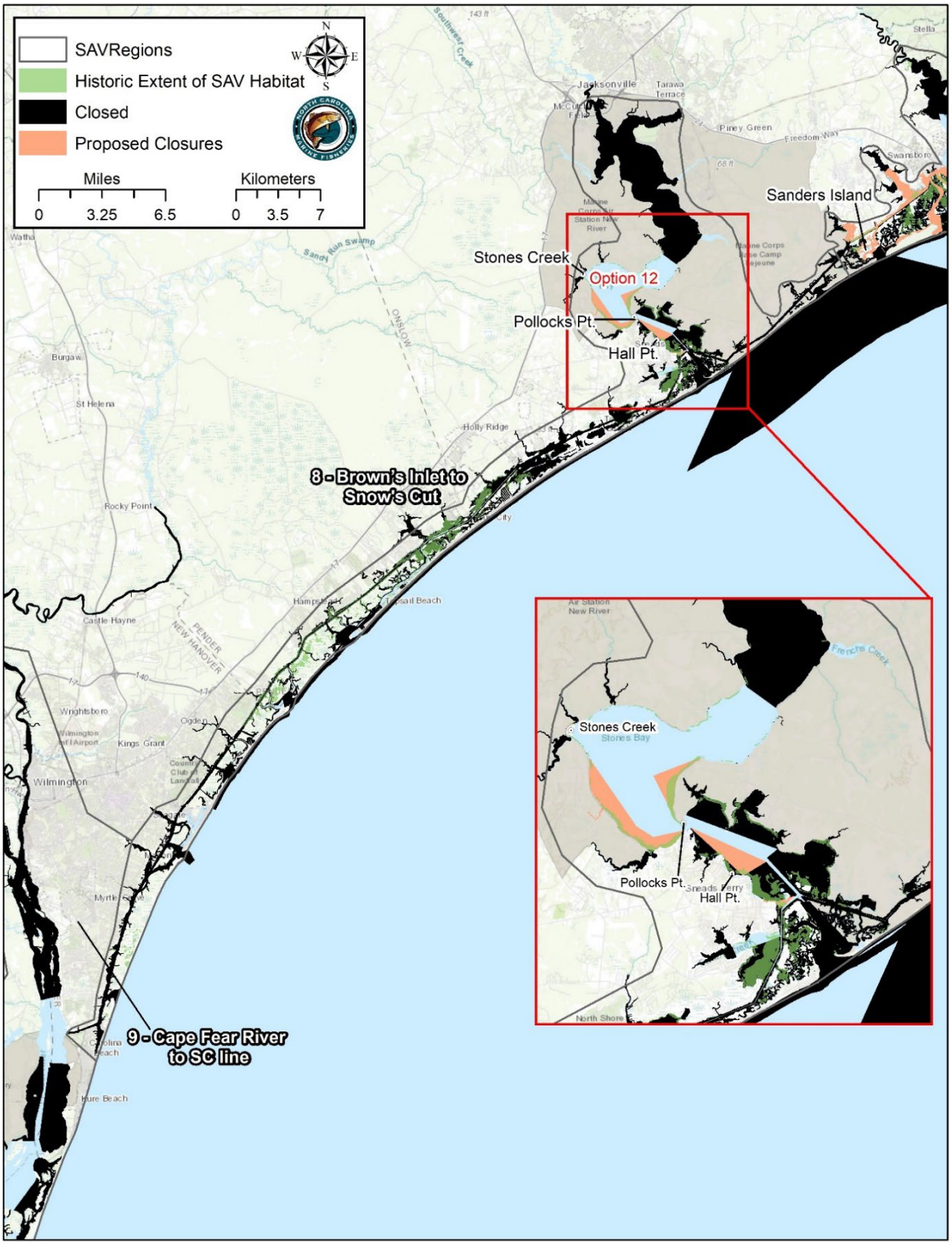

Figure 8. Proposed shrimp trawl closures from Brown's Inlet to Snow's Cut (SAV Region 8) to protect submerged aquatic vegetation (SAV).

January 26, 2024

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 rulemaking in support of the Periodic Review and Expiration of Existing Rules per N.C.G.S. § 150B-21.3A. Request the MFC vote on its preferred management option and associated proposed rulemaking language for two issues under development in the 2024-2025 Rulemaking Cycle.

Findings
- Periodic Review and Readoption of Rules – Requirements
  - North Carolina N.C.G.S. § 150B-21.3A, enacted in 2013, requires state agencies to review existing rules every 10 years in accordance with a prescribed process that includes a report phase, followed by rule readoption. For 15A NCAC 03 (Marine Fisheries), the MFC completed the initial rule readoption process.
  - For 15A NCAC 18A (Sanitation), the MFC has 79 rules remaining for readoption. On January 16, 2020, the Rules Review Commission (RRC) approved the readoption schedule of June 30, 2024, for these rules. The MFC gave final approval of these rules at its November 2023 business meeting and the rules were submitted to the RRC in December 2023, so the process is on track.
  - For the second iteration of the periodic review requirements, the RRC approved the report deadlines effective June 1, 2023. For the MFC rules, the final reports will be due in early 2027. DMF staff will provide further information to the MFC as that time approaches.
- There are two rulemaking issues under development for the 2024-2025 Rulemaking Cycle. At its February 2024 business meeting, the MFC will be asked to vote on its preferred management option for each issue so the required fiscal analyses can be developed, and the formal rulemaking process can be ready to begin at the MFC's August 2024 business meeting.

Action Needed
The MFC will be asked to vote on its preferred management option and associated proposed rulemaking language for the "False Albacore Management Issue Paper" and the "Pot Marking Requirements Issue Paper" so the rulemaking development process can continue for the 2024-2025 Rulemaking Cycle.

Recommendations

- 2024-2025 Annual Rulemaking Cycle:
    - "False Albacore Management Issue Paper": the DMF recommends Option 2, do not adopt a rule at this time but formally monitor false albacore landings and provide a landings summary (including trends in the fishery, length frequency distributions, and any changes in management that may occur at the state and federal level) to the MFC at its annual August business meeting.
    - "Pot Marking Requirements Issue Paper": the DMF recommends Option 2, amend the rule to simplify pot buoy marking requirements by requiring only one of three ways to mark pot buoys, not two ways.
- For more information, please refer to the rulemaking section of the briefing materials.

2023-2024 Rulemaking Cycle Update (103 rules)

At its May 2023 business meeting, the MFC approved Notice of Text for Rulemaking to begin the process for 103 rules. A summary of the proposed rules by subject is provided below. A table showing the timing of the steps in the process is included in the rulemaking section of the briefing materials. The proposed rules were published in the August 1, 2023, issue of the *N.C. Register*, beginning the public comment process, and a news release was issued.

The MFC accepted public comments on the proposed rules from August 1 through 5 p.m. October 2, 2023. Two written public comments were submitted about the rules that are described with the corresponding subjects below. A public hearing was held via WebEx with a listening station at the DMF's Central District Office in Morehead City on August 16 at 6 p.m. One member of the public provided comments that are described with the corresponding subject below.

The MFC received the public comments at its November 2023 business meeting and voted to give final approval of 83 of the 103 rules that are related to shellfish plants and inspections. The 83 proposed rules have an earliest effective date of April 1, 2024, except for rules automatically subject to legislative review per Session Law 2019-198 and N.C.G.S. § 14-4.1. Rules that are subject would likely be available for review during the 2024 short session. The remaining 20 rules will be addressed at the MFC's May or August 2024 business meeting.

READOPTION OF SHELLFISH PLANT AND INSPECTION RULES IN 15A NCAC 18A .0300 THROUGH .0800 (85 rules)
Pursuant to N.C.G.S. § 150B-21.3A, this package of 85 rules in 15A NCAC 03K and 18A is proposed for the readoption of one rule with no changes, readoption of 55 rules with amendments, repeal through readoption of 23 rules, amendment of two rules, adoption of three rules, and the repeal of one rule. Proposed changes would help ensure that North Carolina remains in full compliance with national requirements, provide efficiencies for the DMF in the process of implementing and enforcing the rules, and clarify and update the rules for stakeholders.

North Carolina is part of the National Shellfish Sanitation Program (NSSP), which is a federal/state cooperative program designed to "promote and improve the sanitation of shellfish (oysters, clams, mussels, and scallops) moving in interstate commerce" as stated in Section I, page 2 of the NSSP Guide for the Control of Molluscan Shellfish (Guide). DMF staff work together with representatives

from other states, the federal government, and industry through the Interstate Shellfish Sanitation Conference to develop guidelines for all state shellfish programs that are summarized in the Guide. North Carolina must meet the minimum standards included in the Guide for N.C. shellfish to be able to be sold through interstate commerce and protect N.C. shellfish consumers within and outside of the State. The requirements are already being enforced by the DMF consistent with the Guide. Overall, the rules are expected to increase consumer confidence in the safety of N.C. shellfish products, achieve efficiencies in implementing and enforcing the rules, and clarify the requirements for stakeholders. No public comments were submitted about these rules.

DATA COLLECTION AND HARASSMENT PREVENTION FOR THE CONSERVATION OF MARINE AND ESTUARINE RESOURCES (5 rules)
Due to the increasing occurrence and severity of harassment during, and decreasing participation in, DMF data collection initiatives, amendments are proposed to five MFC rules. Proposed amendments set requirements to address harassment by any licensee or person engaged in regulated activity under Chapter 113, Subchapter IV, of the General Statutes (e.g., fishing) of DMF employees that occurs in the process of obtaining data for the conservation of marine and estuarine resources, and data for the protection of public health related to the public health programs that fall under the authority of the MFC. Additional amendments provide the types of data that may be collected. The amendments support the importance of participation by persons engaged in regulated fishing activity in division data collection and provide a safer working environment for division employees. One written public comment was submitted opposing these rules.

OYSTER SANCTUARY RULE CHANGES (1 rule)
Proposed amendments add the boundaries of the two newest oyster sanctuaries (Cedar Island and Gull Shoal) and correct boundaries for three other oyster sanctuaries (Pea Island, Raccoon Island, and Swan Island) where published coordinates were found to be inconsistent with permitted and marked reef boundaries. These changes to permanent rule would protect oysters from bottom disturbing gear so they can serve their intended management function as oyster broodstock sanctuaries, as well as safeguard boaters navigating the sanctuaries; the changes are already in place via the Fisheries Director's proclamation authority (SF-6-2022). Additionally, coordinates for three sanctuaries are proposed to be reorganized to standardize the cardinal directions, for consistency; there are no changes to the overall sanctuaries, nor the coordinate pairs themselves. No public comments were submitted about this rule.

CONFORMING RULE CHANGES FOR SHELLFISH RELAY PROGRAM AND SHELLFISH LEASES AND FRANCHISES (12 rules)
In 2021, the DMF began the process of discontinuing its Shellfish Relay Program (relaying of shellfish from certain polluted areas) due primarily to insufficient resources to run the program and lack of widespread use. The Shellfish Relay Program will end effective May 1, 2024. The MFC received information about the discontinuation of the Shellfish Relay Program at its February 2022 business meeting. DMF identified 11 rules relating to the Shellfish Relay Program that set specific requirements for the relaying of shellfish from certain polluted areas. Changes are proposed to amend portions of rules or repeal rules consistent with rulemaking requirements in the APA. There was one commenter at the public hearing that spoke against phasing out the shellfish relay program.

Additional proposed changes for shellfish lease and franchise requirements are proposed to 15A NCAC 03O .0201 to conform to requirements of Session Law 2019-37 (Act to Provide Further Support to the Shellfish Aquaculture Industry in North Carolina). Specifically, changes incorporate and conform the shellfish production and planting requirements from Session Law 2019-37 for shellfish leases granted before July 1, 2019, and for shellfish leases granted on or after this date. Additional proposed changes require shellfish lease or franchise holders to meet the listed production, marking, and permit requirements for current shellfish leases before being eligible for additional shellfish lease acreage. Doing so would help ensure more efficient and meaningful use of the public trust bottom by preventing persons not in good standing from precluding potential applicants from applying for a shellfish lease in affected areas. One written public comment was submitted opposing shellfish leases, generally.

2024-2025 Rulemaking Cycle (2 rules)

At the MFC's November 2023 business meeting, DMF staff provided a preview of potential rules in the MFC's 2024-2025 annual rulemaking cycle, including management options for false albacore, and pot marking requirements. This cycle is scheduled to begin the rulemaking process at the MFC's August 2024 business meeting; a table of the steps in the process is included in the briefing materials. The MFC's preferred management option and associated proposed language for rulemaking for each issue are needed for development of the required fiscal analyses so the formal rulemaking process can be ready to begin in August. A table summarizing these issues is included in the briefing materials, as are the two issue papers; a summary description is also included here. Proposed rules would have an earliest effective date of May 1, 2025, except for rules automatically subject to legislative review per Session Law 2019-198 and N.C.G.S. § 14-4.1. Rules that are subject would likely be available for review during the 2026 short session.

FALSE ALBACORE MANAGEMENT RULE ADOPTION (1 rule)
The proposed adoption of this rule would provide a mechanism to implement management measures to cap harvest when the false albacore fishery landings exceed a threshold of 200% of average landings from both sectors combined from 2018 to 2022. Harvest restrictions would be implemented if the threshold is exceeded as a means to prevent further expansion of the false albacore fisheries beyond the threshold. Currently, there are no rules in place for management of false albacore in North Carolina.

There is no baseline stock assessment for false albacore and thus, no biological basis for reducing harvest. The only mechanism to monitor false albacore is through annual landings in North Carolina, which is not a measure for sustainability of the stock. While there is no need to manage to meet sustainability requirements, the MFC is seeking proactive management of false albacore to limit expansion of new and existing fisheries. Management options would include commercial trip limits, recreational bag limits, and recreational vessel limits.

POT MARKING REQUIREMENTS RULE AMENDMENTS (1 rule)
Proposed amendments would simplify pot marking requirements for commercial fishermen by requiring only one of three ways to mark pot buoys, not two ways: 1) gear owner's current motorboat registration number; or 2) gear owner's U.S. vessel documentation name; or 3) gear owner's last name and initials. The current rule requires the gear owner's last name and initials be identified on

each buoy as a baseline. Then, if a vessel is used, the identification must also include either the gear owner's current motorboat registration number or the gear owner's U.S. vessel documentation name. There have been no problems with pot identification and pot identification would be sufficient via a single identifier. The proposed amendments would simplify the requirements and grant some relief to commercial fishermen that use pots in their commercial fishing operation.

Division staff will provide a preview of other potential rules in the MFC's 2024-2025 annual rulemaking cycle at its February 2024 business meeting. Subjects under development include rules to implement the Interstate Wildlife Violator Compact Act, as required by N.C.G.S. § 113-300.7; proposed changes to permit rules; and phased-in mandatory reporting for recreational harvest of five species and all commercial harvest regardless of sale, as required by Session Law 2023-137, Section 6.

Background Information

Periodic Review and Expiration of Existing Rules per N.C.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 were codified in a new section of Article 2A of Chapter 150B of the General Statutes in N.C.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 MFC is the agency with the authority for the approval steps prescribed in the process for marine fisheries and crustacea and shellfish sanitation rules.

The review has two parts. The first is a report phase, which has concluded for the first iteration of the periodic review requirements. The second part is 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 had 211 rules in Chapter 03 (Marine Fisheries), of which 172 were subject to readoption, and 164 rules in Chapter 18, Subchapter 18A (Sanitation) that are also subject to readoption.

Rules	2017	2018	2019	2020	2021	2022	2023	2024
Chapter 03 (172 rules)	Report	41 Rules Readopted	2 Rules Readopted	13 Rules Readopted	116 Rules Readopted	6/30/22 deadline		
Subchapter 18A (164 rules)			Report	42 Rules Readopted	42 Rules Readopted	1 Rule Readopted	Rule Readoption (79)	6/30/24 deadline

Figure 1. Marine Fisheries Commission rule readoption schedule to comply with N.C.G.S. § 150B-21.3A, Periodic Review and Expiration of Existing Rules.

For 15A NCAC 03 (Marine Fisheries), the MFC completed the initial rule readoption process. For 15A NCAC 18A (Sanitation), the MFC has 79 rules remaining for readoption. For the second iteration of the periodic review requirements, the RRC approved the report deadlines effective June 1, 2023. For the MFC rules, the final reports will be due in early 2027.

N.C. Marine Fisheries Commission
2023-2024 Annual Rulemaking Cycle

February 2024

Time of Year	Action
February-April 2023	Fiscal analysis of rules prepared by DMF staff and approved by Office of State Budget and Management
May 26, 2023	MFC approved Notice of Text for Rulemaking
Aug. 1, 2023	Publication of proposed rules in the *North Carolina Register*
Aug. 1-Oct. 2, 2023	Public comment period held
Aug. 16, 2023	Public hearing held via WebEx with listening station
Nov. 17, 2023	MFC receives public comments and approves 83 of 103 permanent rules
Jan. 31, 2024	83 rules reviewed by Office of Administrative Hearings/ Rules Review Commission
April 1, 2024	Proposed effective date of rules not subject to legislative review
April 1, 2024	Rulebook supplement available online
2024 legislative session	Possible effective date of rules subject to legislative review per S.L. 2019-198 and G.S. 14-4.1.
May or August 2024	MFC receives reminder of public comments and votes on final approval of remaining 20 of 103 permanent rules, followed by review by Office of Administrative Hearings/Rules Review Commission
June 30, 2024	Readoption deadline for 15A NCAC 18A

N.C. Marine Fisheries Commission
2024-2025 Annual Rulemaking Cycle

February 2024

Time of Year	Action
February-July 2024	Fiscal analysis of rules prepared by DMF staff and approved by Office of State Budget and Management
Aug. 23, 2024	MFC votes on approval of Notice of Text for Rulemaking
Oct. 1, 2024	Publication of proposed rules in the *North Carolina Register*
Oct. 1-Dec. 2, 2024	Public comment period held
November 2024	Public hearing held (details TBD)
February 2025	MFC votes on approval of permanent rules
April 2025	Rules reviewed by Office of Administrative Hearings/ Rules Review Commission
May 1, 2025	Earliest effective date of rules not subject to legislative review
May 1, 2025	Rulebook supplement available online
2026 legislative session	Possible effective date of rules subject to legislative review per S.L. 2019-198 and G.S. 14-4.1.

Issue Paper Title	Issue	Origination	Proposed Rules	Division of Marine Fisheries Recommendation
FALSE ALBACORE MANAGEMENT	Propose a false albacore rule for adoption to be able to cap harvest in the North Carolina false albacore fishery if annual landings increase substantially. This would allow for precautionary management by implementing stopgap management measures for false albacore. The N.C. Marine Fisheries Commission agreed by consensus to use a growth scenario of 200% of status quo, defined as the five-year average of N.C. recreational landings and the five-year average of N.C. commercial landings from 2018-2022, as the basis for developing a proposed rule. The N.C. Division of Marine Fisheries later established, to simplify rulemaking and to avoid allocation issues, the threshold would be based on the recreational and commercial landings combined. Management measures would include commercial trip limits, recreational bag limits, and recreational vessel limits.	N.C. Marine Fisheries Commission	• 15A NCAC 03M .0523	Option 2, do not adopt the rule at this time but formally monitor false albacore landings and provide a landings summary (including trends in the fishery, length frequency distributions, and any changes in management that may occur at the state and federal level) to the N.C. Marine Fisheries Commission at its annual August business meeting.
SIMPLIFY POT MARKING REQUIREMENTS	Proposed amendments would simplify pot marking requirements for commercial fishermen by requiring only one of three ways to mark pot buoys, not two ways: 1) gear owner's current motorboat registration number; or 2) gear owner's U.S. vessel documentation name; or 3) gear owner's last name and initials. The current rule requires the gear owner's last name and initials be identified on each buoy as a baseline. Then, if a vessel is used, the identification must also include either the gear owner's current motorboat registration number or the gear owner's U.S. vessel documentation name. There have been no problems with pot identification and pot identification would be sufficient via a single identifier. The proposed amendments would simplify the requirements and grant some relief to commercial fishermen that use pots in their commercial fishing operation.	N.C. Marine Fisheries Commission	• 15A NCAC 03J .0301	Option 2, amend the rule.

False Albacore Management Issue Paper

February 2, 2024

I. ISSUE

Adopt a rule to cap harvest in the North Carolina false albacore fishery.

II. ORIGINATION

N.C. Marine Fisheries Commission (MFC)

III. BACKGROUND

At its February 2023 business meeting, the MFC passed a motion requesting N.C. Division of Marine Fisheries (DMF) staff develop a proposed rule for false albacore to be able to cap harvest in the North Carolina false albacore fishery if annual landings increase substantially. This would allow for precautionary management by implementing stopgap management measures for false albacore.

N.C. False Albacore Fisheries

False albacore has become a more popular and targeted fishery in recent years in North Carolina, especially for the recreational sector. Participants associated with the fishery have expressed concern to both state and federal level managers about increases in harvest and targeted trips of the species. Coastwide, there are no known commercial or recreational regulations currently in place to directly manage false albacore fisheries at the state or federal level.

Landings from both the commercial and recreational sectors have increased in state waters over the last 10 years (Table 1); however, North Carolina accounts for a relatively small proportion of the overall coastwide landings (Figures 1 & 2). Trends in the number of recreationally harvested and released fish have remained low and stable in the last 10 years (Table 1). Currently, there is not a targeted commercial fishery for false albacore in North Carolina. Due to the opportunistic nature of the fishery, commercial trips typically land less than 50 pounds per trip, with trips exceeding 500 pounds making up approximately 3% of the total number of trips in state and federal waters (Table 2). There is no evidence of size truncation for false albacore in either sector and the majority of fish caught are well above the length where they are at or above 50% mature (13.6 inches fork length) (Cruz-Castán et al. 2019).

Table 1.* Recreational harvest (number of fish landed and weight in pounds) and releases (number of fish) and commercial harvest (weight in pounds) of false albacore from North Carolina for the period 1997–2022. (Source: Marine Recreational Information Program and North Carolina Trip Ticket Program)

	Recreational			Commercial	Total
	Numbers		Weight (lb)		
Year	Landed	# Released	Landed	Weight (lb)	Weight (lb)
1997	31,787	48,106	222,310	370,814	593,124
1998	25,206	75,617	200,843	153,797	354,640
1999	15,895	77,885	90,008	143,359	233,367
2000	13,931	41,591	85,778	106,777	192,555
2001	8,702	78,516	53,955	98,352	152,307
2002	13,717	89,706	61,385	77,798	139,183
2003	12,294	24,662	79,071	86,568	165,639
2004	7,955	62,965	95,088	92,319	187,407
2005	6,937	68,636	69,868	88,741	158,609
2006	3,318	39,902	29,943	106,617	136,560
2007	3,098	115,324	29,494	134,666	164,160
2008	12,377	33,205	76,228	103,743	179,971
2009	17,018	83,454	139,432	146,088	285,520
2010	7,374	66,458	49,290	147,337	196,627
2011	7,807	30,347	55,290	131,549	186,839
2012	18,393	59,160	140,026	157,849	297,875
2013	28,669	108,149	218,471	189,746	408,217
2014	27,469	273,165	189,270	225,797	415,067
2015	22,854	87,239	207,889	164,853	372,742
2016	41,077	145,699	337,841	241,208	579,049
2017	39,214	119,647	334,363	216,557	550,920
2018	47,891	110,716	315,758	204,177	519,935
2019	27,359	80,204	185,093	232,879	417,972
2020	92,899	171,562	594,793	230,685	825,478
2021	17,095	52,787	118,784	105,306	224,090
2022	38,772	127,255	234,923	147,065	381,988
Average	22,658	87,383	162,123	157,579	319,994

*Data subject to change due to continued corrections and modifications to sampling methods.

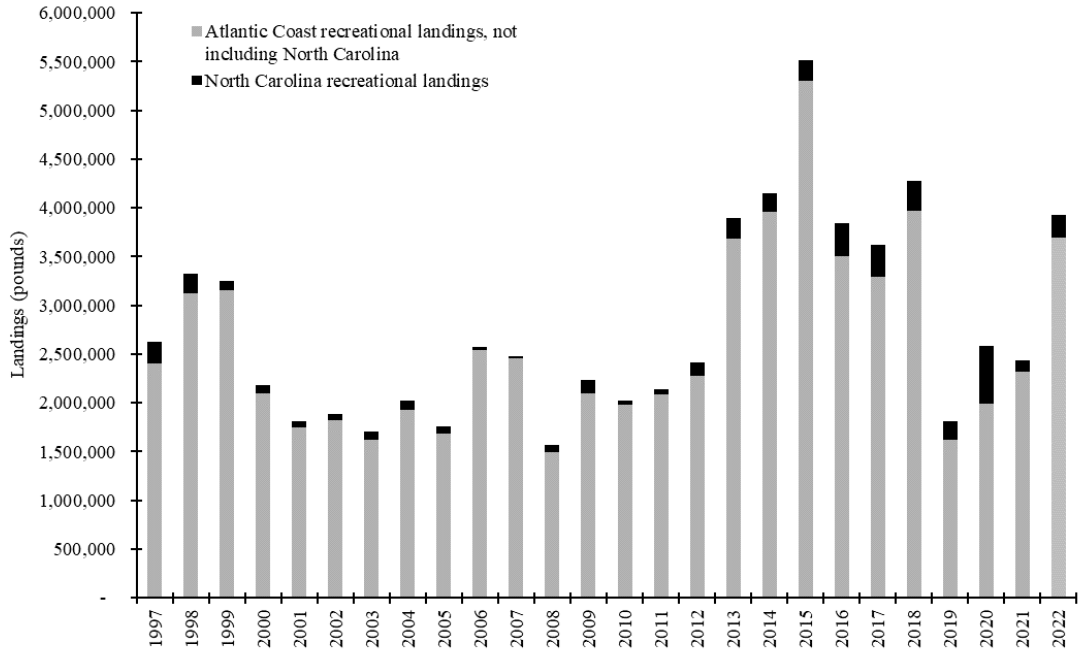

Figure 1. Coastwide and North Carolina recreational false albacore landings (pounds), 1997-2022. (Source: Marine Recreational Information Program)

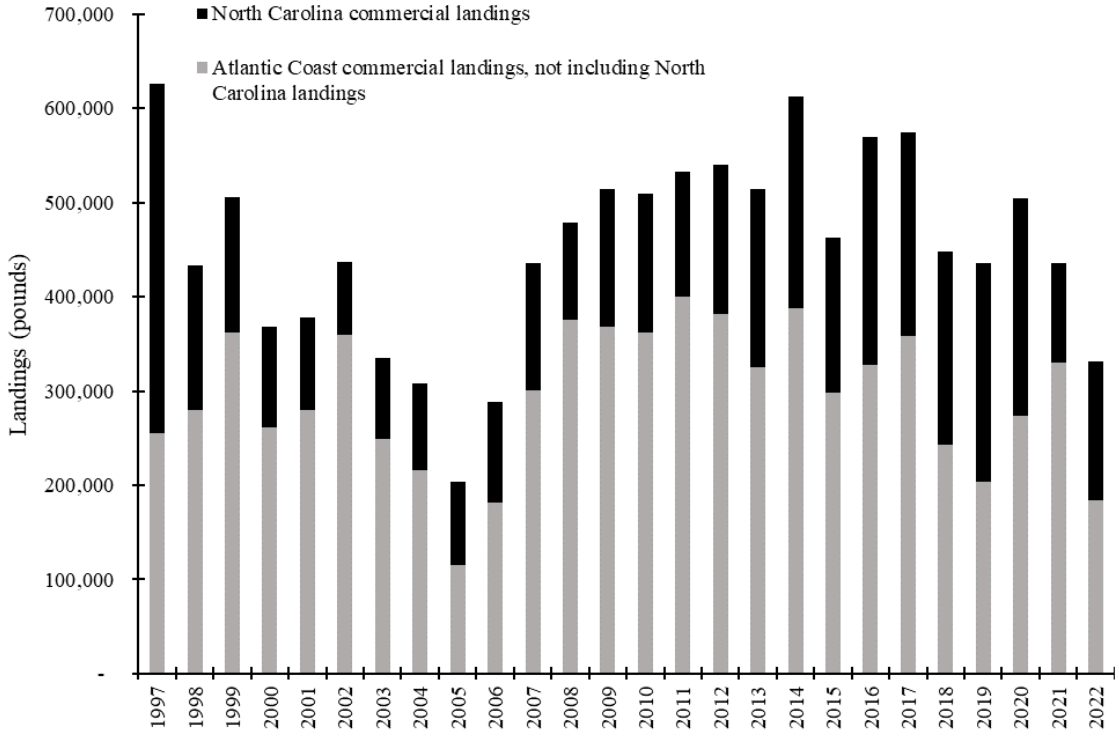

Figure 2. Coastwide and North Carolina commercial false albacore landings (pounds), 1997-2022. (Source: Atlantic Coastal Cooperative Statistics Program and North Carolina Trip Ticket Program)

Table 2. North Carolina commercial false albacore trips percent harvest by gear type (pounds per trip), based on daily landings and gear, 2013–2022. Note: Longline and other gears (trawls, seines, pound nets and spears) not shown individually due to data confidentiality. (Source: North Carolina Trip Ticket Program)

Trip Ranges (Pounds)	Gill Net (Trips)	Gill Net (Percent Trips)	Hook & Line (Trips)	Hook & Line (Percent Trips)	All Gears (Trips)	All Gears (Percent Trips)
≤50	6,692	35%	4,122	22%	10,980	58%
51-100	1,470	8%	1,731	9%	3,225	17%
101-150	666	4%	892	5%	1,581	8%
151-200	377	2%	488	3%	874	5%
201-300	420	2%	506	3%	933	5%
301-400	188	1%	234	1%	428	2%
401-500	143	1%	121	1%	266	1%
501-1,000	275	1%	150	1%	428	2%
>1,000	178	1%	27	0%	214	1%
Total	10,409	55%	8,271	45%	18,929	100%

Interjurisdictional False Albacore Management

Until 2011, false albacore was part of the South Atlantic Fishery Management Council's (SAFMC) Coastal Migratory Pelagics Fishery Management Plan (FMP). Although there were no management measures under the plan, data collection was an important component. Amendment 18 to the plan removed false albacore from the management unit since data would still be collected through current sampling regimes (SAFMC 2011). Based on data available at the time, false albacore did not appear to meet the federal national standard guidance for stocks in need of conservation and management. In North Carolina, false albacore was managed through MFC Rule 15A NCAC 03M .0512 (although no limits were put in place); however, authority to manage under this rule ended when the species was removed from SAFMC's Coastal Migratory Pelagics FMP and subsequently the N.C. FMP for Interjurisdictional Fisheries, which adopts management measures within approved SAFMC, Mid-Atlantic Fishery Management Council (MAFMC), and Atlantic States Marine Fisheries Commission (ASMFC) FMPs by reference as the minimum standard. As of the date of this paper, there are no rules in place for false albacore management in North Carolina. Additionally, the MAFMC did not include false albacore in their Unmanaged Forage [fish] Amendment in 2016 because of their large size and higher trophic level (MAFMC 2017). At the August 2016 MAFMC meeting, Council staff recommended the MAFMC consider developing management actions for the species in the future (including a potential small tunas FMP), due to high public concern for the species, particularly from the recreational sector. Management of false albacore through a small tunas FMP has not been pursued yet by a federal management body.

In December 2022, a paper entitled "Little Tunny White Paper" was presented at the SAFMC business meeting that examined if false albacore meets the Magnuson-Stevens Fishery Management and Conservation Act criteria for a stock in need of conservation and management (50 C.F.R. §600.305(c)(1)). More information on the findings contained in the white paper can be found at the SAFMC webpage for the December 2022 business meeting at which the white paper was presented. Following the presentation of the white paper, the Mackerel Cobia Committee directed Council staff to have the Mackerel Cobia Advisory Panel develop a fishery performance report for false albacore every three years. The report will include international landings, as well as landings along the Atlantic coast in federal versus state waters, catch per unit effort, and length distribution.

The ASMFC Interstate Fisheries Management Policy Board (Policy Board) tasked ASMFC staff in February 2022 to present an options paper on possible paths forward for management of Atlantic bonito and false albacore after concerns were raised regarding increased recreational harvest of juvenile fish in some state waters. Staff presented possible options for developing different paths to management for both Atlantic bonito and false albacore at the May 2023 ASMFC Policy Board meeting. The information also included the states' ability to regulate a species without an ASMFC FMP and timing to implement measures without an ASMFC FMP. It was noted if additional species were added to the ASMFC portfolio, it would increase the workload for ASMFC and state staff, some of which are already

at full capacity. Although some states are interested in management measures for these species, ASMFC's Policy Board decided not to pursue management at the interstate level.

N.C. False Albacore Management

As part of its charge to develop a rule to cap harvest in the North Carolina false albacore fishery, the DMF considered also drafting an "unmanaged species" rule for MFC consideration, for initiating management for false albacore and other species for which there are currently no rules. Some examples of how this issue has been addressed by the federal councils include the MAFMC's Unmanaged Forage Omnibus Amendment (MAFMC 2017), which designated 16 forage species and species groups as ecosystem component species, and the SAFMC's Dolphin Wahoo Amendment 12 (SAFMC 2020), which incorporated bullet and frigate mackerel as ecosystem component species.

The DMF determined there is not a "one size fits all" solution and it will take time and careful consideration to determine the best approach. The DMF will use the next comprehensive review of the N.C. FMP for Interjurisdictional Fisheries, currently scheduled for 2027, to further explore ways to address unmanaged species and emerging fisheries at the state level. However, the N.C. FMP for Interjurisdictional Fisheries would only potentially apply to species managed by the SAFMC, MAFMC, or ASMFC that lack a species-specific MFC rule. Example species could include spiny lobster, longfin squid, and shortfin (*Illex*) squid. A separate rule for species not managed by ASMFC or the federal fishery management councils would also be needed. Example species could include Atlantic cutlassfish, Florida pompano, tripletail, and whelk.

At its August 2022 business meeting the MFC requested staff update information on, and landings of, false albacore to frame potential management options for future consideration. More information on the findings in the information paper can be found at the MFC webpage for the February 2023 business meeting at which the updated information paper was presented. The information paper goes into detail on the life history, state by state landings, and data limitations for false albacore in North Carolina and the western Atlantic.

When the information paper was presented to the MFC at its February 2023 business meeting, the DMF recommended to not pursue state level management at this time, but to continue to monitor trends and collect additional life history data to inform future management. Since North Carolina accounts for a small proportion of the overall coastwide landings and due to the coastwide nature of false albacore, any N.C. management would penalize N.C. fishermen if no other states implemented regulations. Further, there appears to be no biological concern for the false albacore stock since there is no evidence of size truncation in the commercial and recreational fisheries and the majority are well above the length at maturity. The DMF also continued deliberations at the SAFMC and ASMFC meetings in 2023 to determine if coastwide management was warranted under either management body; both deemed it unnecessary at this time and instead decided to monitor landings for any coastwide harvest shifts needing more in-depth review.

At its February 2023 business meeting, the MFC passed a motion requesting staff provide rulemaking language with management options for false albacore starting with status quo and allowing for growth at various percentage points. DMF staff defined "Status quo" for false albacore as the five-year average landings for both recreational and commercial sectors combined from 2018 to 2022 and then applied percentage points of growth to this five-year average (2018-2022) at 125%, 150%, 175%, and 200% of status quo. These percentage points of growth from the five-year average landings illustrate a threshold to implement management measures to limit expansion of new and existing false albacore fisheries in North Carolina. The details on the growth scenarios were provided to the MFC at its May 2023 business meeting and the presentation is provided on the corresponding MFC webpage. By consensus at its May 2023 business meeting, the MFC agreed to use a growth scenario of 200% of status quo, defined as the five-year average of North Carolina recreational landings and the five-year average of North Carolina commercial landings from 2018-2022, as the basis for developing a proposed rule. The DMF later established, to simplify rulemaking and to avoid allocation issues, the threshold would be based on the recreational and commercial landings combined (Figure 3).

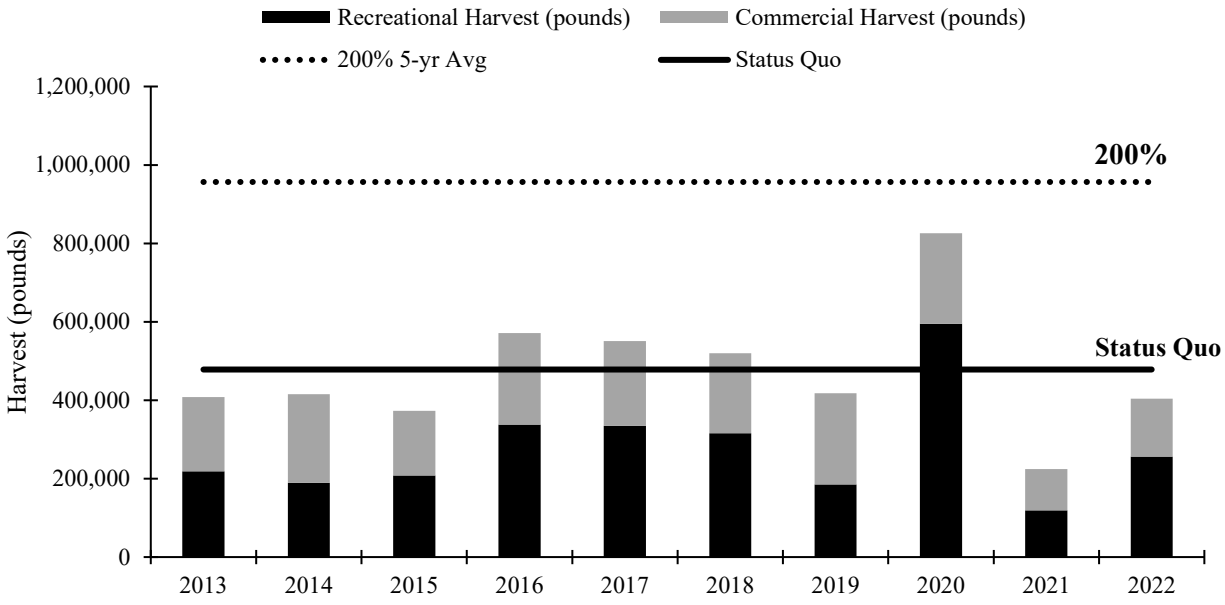

Figure 3. Recreational (black portion of stacked bar) and commercial (gray portion of stacked bar) false albacore harvest (pounds) to the 5-year commercial and recreational combined harvest average (status quo – 2018-2022), with the 200% growth threshold. (Sources: North Carolina Trip Ticket Program and Marine Recreational Information Program)

IV. 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.

V. DISCUSSION

To address the MFC request for precautionary management of false albacore, DMF staff developed a proposed rule to activate management measures to cap harvest when the false albacore fishery landings exceed a threshold of 200% of average landings from both sectors combined from 2018 to 2022. This is shown in the Proposed Rule section of this paper and as Option 3 in the Proposed Management Options section. Harvest reductions would be implemented if the threshold is exceeded as a means to prevent further expansion of the false albacore fisheries beyond the threshold. There is no baseline stock assessment for false albacore and thus, no biological basis for reducing harvest. The only mechanism to monitor false albacore is through annual landings in North Carolina, which is not a measure for sustainability of the stock.

If the proposed rule is not adopted by the MFC, therefore maintaining status quo, annual false albacore landings would still continue to be tracked through the License and Statistics Annual Report, also known as the "Big Book", without the MFC needing to take formal action; but this could result in landings substantially increasing without the MFC and DMF being aware of the trends unless staff monitor landings on a formal basis. This is shown as Option 1 in the Proposed Management Options section of this paper. Also offered is Option 2, which would formally monitor landings on an annual basis without adopting a rule. This could inform the MFC and the DMF if rulemaking authority is necessary. DMF staff would monitor false albacore landings and provide a landings summary (including trends in the fishery, length frequency distributions, and any changes in management that may occur at the state and federal level) to the MFC at its annual August business meeting. This option would result in less workload for DMF staff since there

would be no rule to develop or regulations to enforce. However, there would be no rule in place for the MFC and the DMF to implement management measures if landings substantially increase.

Under the proposed rule (Option 3), the MFC would formally receive an update at its annual August business meeting on false albacore landings through the previous calendar year (Option 2) to monitor whether the 200% threshold of the five-year average has been exceeded. Since there is no biological basis for the threshold and to avoid allocation issues, the combined recreational and commercial landings would determine if the threshold had been exceeded. If landings from the previous calendar year exceed the threshold, a memo would be provided to the MFC containing the DMF justification for false albacore management, including information on whether it is an anomalous annual harvest estimate. Other influencing factors could include expanding markets for bait or food sources, an unusual year for false albacore movement into N.C. waters, or expansion in the number of participants in the fisheries.

Pursuant to the proposed rule, MFC concurrence would be required for the DMF Director to issue a proclamation to implement management measures to reduce harvest of false albacore. The draft proclamation would also be provided to the MFC for their review. The requirement in the proposed rule for MFC concurrence prior to issuance of the proclamation provides a choice to the MFC to implement harvest restrictions or not implement harvest restrictions. This management scenario allows the MFC to consider other factors that may be influencing an increase in landings to the extent that the threshold has been exceeded. A fishery that shows progressive expansion over several years (versus one anomalous spike in landings as occurred with false albacore in 2020) usually has other factors in play to cause the growth of a fishery where a harvest cap would be more useful and appropriate for preventing further expansion of the fishery. If a significant expansion only occurs in one sector, the rule does not allow for implementing regulations for only one sector. Regulations would be implemented for both the commercial and recreational fisheries once the threshold (based on combined landings) is exceeded.

A delayed January 1 start date from the August MFC business meeting would allow over four months to inform the public of the new restrictions. The public would be notified through usual communications by DMF via a news release, broadcast email through the license holder distribution list, and social media posts. MFC meetings are public meetings at which the public can provide input to the MFC, and the MFC also has the option to refer an issue to its standing and regional advisory committees for input. The delayed effective date for implementing a proclamation to be effective on January 1 the year following the year the determination is made would have the added benefit of shortening the time between the effective date of the proclamation (January 1) and the time data from the next calendar year would be available. The previous calendar year's data can be available as early as April 30, with variability from year to year, and would enable DMF staff to determine if the next year's annual landings of false albacore fall below the designated threshold. Expiration of the proclamation would be contingent on when the combined annual landings fall below the threshold and would require MFC concurrence as required by the proposed rule.

A two-way clause for MFC concurrence is built into the proposed rule to account for situations that could occur in the management of the false albacore fishery: concurrence for the proclamation to be issued initially and again for the proclamation to expire. Possible situations are outlined below.

A scenario for MFC concurrence to issue the proclamation is the MFC is informed that the landings exceeded the threshold the previous year. However, it was determined that the landings appear to be an anomalous spike instead of a progressive increase over several years. The MFC chooses not to issue the proclamation to prevent implementing harvest restrictions for what appears to be an anomalous year of landings. The MFC could choose to issue a proclamation in a subsequent year if landings remain above the threshold.

A scenario for MFC concurrence to expire the proclamation is a proclamation is issued to be effective on January 1, 2028, to address the landings exceeding the threshold in 2026. At the August 2028 business meeting, the MFC is informed that landings are below the threshold in 2027. The MFC chooses to not expire the proclamation so that the harvest limits remain in place. In August 2029, the MFC is informed that landings exceeded the threshold again in 2028. The MFC keeping the proclamation in place in 2028 prevents the "yo-yo" pattern of management where harvest limits are implemented and expire on a nearly annual basis.

Another scenario for MFC concurrence is the MFC is given an update at its August business meeting that landings continue to increase while a proclamation is in effect with harvest limits. In this case, if the MFC determines that the increase in landings warrants concern, then the MFC could request the DMF Director issue a proclamation with more

restrictive harvest measures. This proclamation would supersede the previous one and contain management measures deemed appropriate by the DMF to address the MFC concerns. This proclamation would be effective the following January 1. The proposed rule intentionally builds in MFC concurrence since there is no fishery management plan to address adaptive management when landings are variable from year to year.

The proposed rule would use recreational bag limits, recreational vessel limits, and commercial trip limits to restrict harvest if the designated threshold is exceeded. Other management measures to restrict harvest that were considered, but not supported by DMF in the development of the proposed rule, include limits on specific fishing gear, seasons, or size. Restricting specific gear types is not necessary as a first step for management of an unregulated fishery. Fishing seasons are not recommended as a mechanism to constrain harvest due to the incidental nature of the commercial fishery and the catch-and-release nature of the recreational fishery. Additionally, size limits are not recommended since most of the fish harvested are above the size when mature. The DMF considers the use of daily recreational bag and vessel limits, and commercial trip limits as a reasonable first step in managing an unregulated fishery to control harvest.

A daily recreational bag limit could be established to limit the number of fish allowed to be kept by an individual or vessel. A commercial trip limit could also be established to reduce harvest. While bag and trip limits can reduce fishing mortality, it is important to note that restricting trip limits could result in increased discards on days when large catches occur.

Recreational anglers on directed trips landed on average 0.6 fish per trip and daily landings ranged from zero to 18 fish per trip from 2013 to 2022 (Table 3). In 2020, directed recreational trips increased to a 10-year high and the average landings per trip increased to 0.8 fish per person. Implementing recreational bag limits may limit harvest if fishermen begin keeping more than what is kept currently but may increase discards and serve as a target for anglers to retain more fish than normal.

Recreational vessels intercepted by the Marine Recreational Information Program (MRIP) (for-hire and private boat modes combined) had an average of four anglers per vessel; however, the number of anglers ranged from one to 10 from 2013 to 2022. The average number of false albacore harvested from the recreational private and for-hire vessels ranged from 1 to 4 fish, with maximum harvest from 11 to 35 false albacore with usually multiple anglers onboard (Table 4).

Table 3. Recreational mean, minimum and maximum number of fish harvested per person per trip, 2013-2022 (Source: Marine Recreational Information Program).

Year	Average Number per Trip	Minimum Number per Trip	Maximum Number per Trip	Number of Directed Trips
2013	0.3	0	3	17,721
2014	0.5	0	6	10,529
2015	0.5	0	4	38,406
2016	0.4	0	9	25,191
2017	0.4	0	6	37,733
2018	0.6	0	8	26,728
2019	0.6	0	11	64,140
2020	0.8	0	9	68,736
2021	0.5	0	7	20,425
2022	1.1	0	18	28,242

Table 4. Recreational mean, minimum and maximum number of false albacore harvested aboard private and for-hire vessels, 2013-2022. (Source: Marine Recreational Information Program)

Year	Average Number per Vessel	Minimum Number per Vessel	Maximum Number per Vessel
2013	1	0	11
2014	2	0	26
2015	2	0	22
2016	2	0	19
2017	1	0	20
2018	2	0	25
2019	2	0	21
2020	3	0	28
2021	2	0	18
2022	4	0	35

A recreational vessel limit of 30 fish per vessel per day is recommended as an upper boundary in rule in conjunction with a bag limit of 10 fish per person per day. Ten fish per person is a round number that is easy for anglers to remember and is often used when introducing recreational bag limits when regulations are first implemented on a species. For example, this occurred with sheepshead (via proclamation through rule 15A NCAC 03M .0521 since 2015), black drum (via proclamation through rule 15A NCAC 03M .0512 since 2014), and initially for spotted seatrout (via proclamation in 1994 and then in rule 15A NCAC 03M .0504 in 1997), which is currently at a lower 4 fish daily bag limit since 2011. The vessel limit assumes at least three people onboard, with a current maximum average of four people onboard; setting the vessel limit to a 30-fish maximum provides a precautionary approach for the recreational sector, which has shown it can increase annual landings rapidly, as seen in 2020 (Figure 3).

This may seem like a high limit, but it is proposed as an upper boundary not to be exceeded but not necessarily applied in the proclamation. Putting in recreational vessel limits may limit harvest if fishermen begin keeping more than what is kept currently, but may increase discards, and serve as a target for anglers to retain more fish than normal. Vessel limits may also alter angler behavior to avoid more restrictive limits. For example, if a vessel limit were to be more restrictive due to the number of anglers on board, a party of anglers might opt to take two vessels rather than one in order to allow everyone to retain their bag limit. There are instances of vessel limits for certain species differing between recreational private and for-hire vessels (i.e., cobia). This is not an appropriate option for false albacore at this time as it creates confusion and inequities within the recreational sector. Due to the unregulated nature of this fishery, it is not necessary as a first step for management.

The wording in the proposed rule of "per person per day" for the recreational bag limit does not overtly address multi-day recreational trips, but it is consistent with the wording for recreational bag limits in proclamations for king (FF-51-2022) and Spanish (FF-38-2023) mackerel and bluefish (FF-31-2022), which are species that false albacore fishermen often interact with. Since false albacore are often harvested by recreational fishermen pursuing Spanish and king mackerel, the use of "per person per day" would be familiar and easy to remember by fishermen.

Commercially, false albacore is largely an incidental species and landings per trip are generally low. Approximately 58% of overall commercial trips land less than 50 pounds (Table 2); however, there are instances when daily landings exceed 1,000 pounds (Table 2). Daily commercial landings have ranged from one pound to 4,675 pounds from 2013 to 2022. Overall, 97% of commercial trips landed less than 500 pounds from 2013 to 2022. Implementing trip limits may discourage development of a high-volume fishery; however, if the trip limits are set too low, discards may increase. Also, trip limits are not as effective when a gear's discard mortality is high and trip limits may encourage fishermen to retain more fish than normal. A commercial limit of 3,500 pounds per commercial fishing operation per trip is recommended as the upper boundary in rule but, like the recreational daily limits, can be set at a lower amount in the proclamation if the threshold is exceeded in the combined fishery. The highest commercial trip on record is

4,600 pounds, so 3,500 pounds is more precautionary if participation in the commercial fishery was to increase. A precedent is already in place for a 3,500 pound commercial trip limit for Spanish and king mackerel at the opening of their fishing season with reduced daily trip limits from that starting point as the mackerel fisheries reach their annual catch limit (proclamation FF-15-2023). Since false albacore are often harvested by commercial operations pursuing Spanish and king mackerel, a 3,500-pound trip limit is an amount that would be easy to remember by fishermen.

In the context of the MFC's request for the DMF to develop rulemaking language to manage false albacore, the DMF supports the use of recreational bag limits, recreational vessel limits, and commercial trip limits if the fisheries expand. Annual review of false albacore landings would allow for consideration of other influencing factors that may cause the fisheries to exceed the threshold in a calendar year and be considered an anomaly. Other influencing factors could include expanding markets for bait or food sources, an unusual year for false albacore movement into N.C. waters, or expansion in the number of participants in the fisheries.

The proposed rule offers an opportunity for the MFC to implement stopgap management measures for false albacore if annual landings are substantially higher than the past. This would allow for the precautionary management requested by the MFC and it would also consider the uncertainties in false albacore life history and stock status. Although the DMF does not support false albacore management currently, ongoing research on false albacore could provide more insight on the appropriateness of management in North Carolina and the rest of the U.S. Atlantic coast.

VI. PROPOSED RULE

15A NCAC 03M .0523 is proposed for adoption as follows:

15A NCAC 03M .0523 FALSE ALBACORE

(a) If the level of landings of false albacore in a calendar year exceeds 200 percent of the five-year average of North Carolina recreational and commercial landings combined from 2018-2022, the Fisheries Director shall issue a proclamation as set forth in Paragraph (b) of this Rule.

(b) In accordance with Paragraph (a) of this Rule and after prior consent of the Marine Fisheries Commission, the Fisheries Director shall, by proclamation, impose the following requirements on the taking of false albacore:

(1) for recreational purposes, specify a bag limit not to exceed 10 fish per person per day, not to exceed 30 fish per vessel per day; and

(2) for a commercial fishing operation, specify a trip limit not to exceed 3,500 pounds in any one day or trip, whichever is more restrictive.

(c) A proclamation issued in accordance with Paragraphs (a) and (b) of this Rule shall become effective January 1 of the year following the year when the determination is made that a proclamation shall be issued. The proclamation shall expire when the level of landings falls below the landings level in Paragraph (a) of this Rule in a subsequent calendar year and after prior consent of the Marine Fisheries Commission.

History Note: *Authority G.S. 113-134; 113-182; 113-221.1; 143B-289.52;*
Eff. May 1, 2025.

VII. PROPOSED MANAGEMENT OPTIONS

Management Options

(+ Potential positive impact of action)
(- Potential negative impact of action)

Option 1: Status quo – Informal monitoring of annual false albacore landings through the License and Statistics Annual Report ("Big Book")

+ No additional workload for DMF staff
+ No rule development for a coastwide stock with limited data and an unknown stock status
- Annual landings updates that track landings trends are unavailable
- No rule in place for implementing management measures if landings substantially increase

Option 2: Do not adopt rule at this time but formally monitor false albacore landings and provide a landings summary (including trends in the fishery, length frequency distributions, and any changes in management that may occur at the state and federal level) to the MFC at its annual August business meeting.

+ Availability of annual landings updates that track landings trends to inform the MFC if adoption of a rule is necessary
+ No rule development for a coastwide stock with limited data and an unknown stock status
- No rule in place for implementing management measures if landings substantially increase

Option 3: Formally monitor false albacore landings and provide a landings summary (as described in Option 2 above) to the MFC at its annual August business meeting. Adopt rule for precautionary management of false albacore to cap harvest via recreational bag limits, recreational vessel limits, and commercial trip limits when the false albacore fishery landings exceed a threshold of 200% of average landings from both sectors combined from 2018 to 2022. Harvest reductions would be implemented if the threshold is exceeded as a means to prevent further expansion of the false albacore fisheries beyond the threshold, contingent on MFC concurrence.

+ Rule in place for implementing management measures if landings substantially increase
+ Availability of annual landings updates that track landings trends to inform the MFC the landings trigger was reached and if restrictions need to be implemented
+ Process in place to sunset management measures if landings fall below the threshold
- Additional workload for DMF staff
- Rule development for a coastwide stock with limited data and an unknown stock status

Recreational Bag Limits

+ May limit harvest if fishers begin keeping more than they currently do
- May increase discards
- May serve as a target or goal for anglers to retain more than they normally would

Recreational Vessel Limits

+ May limit harvest if anglers begin keeping more than they currently do
- May increase discards
- May serve as a target or goal for anglers to retain more than they normally would
- Anglers may alter behavior to circumvent more restrictive limits

Commercial Trip Limits

+ May limit harvest
+ May discourage high volume targeted fisheries from developing
- May create additional discards if the trip limits are set too low
- Less effective for gears where discard mortality is high
- May serve as a target or goal for fishers to retain more than they normally would

VIII. RECOMMENDATION

The DMF recommends Option 2.

IX. LITERATURE CITED

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Prepared by: McLean Seward, McLean.Seward@deq.nc.gov, 910-796-7289

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SIMPLIFY POT MARKING REQUIREMENTS
ISSUE PAPER

January 5, 2024

I. ISSUE
Simplify marking requirements for pot buoys.

II. ORIGINATION
N.C. Marine Fisheries Commission (MFC)

III. BACKGROUND
At its August 2021 business meeting, the MFC gave approval to begin the rulemaking process for a large package of proposed amendments and readoption of rules under a state-mandated periodic review schedule. One subject in this package covered eight rules related to commercial blue crab harvest and gear regulations. The amendments and readoptions were proposed primarily to conform the rules with existing blue crab management measures previously approved and implemented through Amendment 3 of the Blue Crab Fishery Management Plan. Additional amendments to this group of eight rules updated marking requirements for pot buoys, consistent with proposed amendments to other MFC rules containing gear marking requirements in the larger package of rules.

Requirements for the use of pots are set forth in 15A NCAC 03J .0301, POTS. Originally, the rule required one of three possible forms of identification on each pot buoy: 1) gear owner's current motorboat registration number; 2) gear owner's U.S. vessel documentation name; or 3) gear owner's last name and initials. This rule is one of nine MFC rules that contain similar marking requirements for different types of gears, including gill nets (15A NCAC 03J .0103), trawl nets (15A NCAC 03J .0104), channel nets (15A NCAC 03J .0106), seines (15A NCAC 03J .0110), fyke nets and hoop nets (15A NCAC 03J .0111), recreational use of pots (15A NCAC 03J .0302), trotlines (15A NCAC 03J .0305), and pound nets (15A NCAC 03J .0501). As part of the readoption process, the MFC proposed amendments to make these requirements consistent across rules. As a result, amendments were proposed to the "pots" rule to require the gear owner's last name and initials be identified on each buoy as a baseline. Then, if a vessel is used, the identification must also include either the gear owner's current motorboat registration number or the gear owner's U.S. vessel documentation name. When the proposed changes were developed, N.C. Division of Marine Fisheries Marine Patrol staff estimated many (at least half of) commercial fishermen using pots already met the requirements that were proposed. The proposed changes were promulgated through the rulemaking process set forth in the Administrative Procedure Act and amendments to the "pots" rule became effective March 15, 2023.

At the May 2023 MFC business meeting, a commissioner relayed concerns from commercial fishermen about the new pot marking requirements. Most fishermen that use pots use numerous pots in their commercial fishing operation and use a vessel to deploy and retrieve them. At any point, fishermen may opt to sell their vessel and buy another vessel, which under the new requirements means the buoy for every pot must be changed to reflect the new vessel registration number or vessel name, even if the buoy already has the gear owner's last name and initials. Under the original rule, only one of the three means of identification was required to be marked on the pot buoy (the gear owner's name, vessel number, or vessel name). The changes that became effective March 15, 2023, were not made due to problems with pot identification, rather the changes were made for consistency across gears for marking requirements. The MFC passed a motion at its May 2023 business meeting directing NCDMF staff to restore the "pots" rule to require only one of three possible forms of identification on each pot buoy, not two.

IV. AUTHORITY
N.C.G.S. § 113-134. Rules.
N.C.G.S. § 113-182. Regulation of fishing and fisheries.
N.C.G.S. § 143B-289.52. Marine Fisheries Commission - powers and duties.
N.C.G.S. § 150B-19.1. Requirements for agencies in the rule-making process.

V. DISCUSSION
N.C.G.S. § 150B-19.1, Requirements for agencies in the rule-making process, Subparagraph(a)(2), states an "agency shall seek to reduce the burden upon those persons or entities who must comply with the rule." Since the recent amendments to 15A NCAC 03J .0301 for pot marking requirements were made for consistency across gears and MFC

rules, not due to problems for Marine Patrol or others with the identification of the owner of pots, and since there have been no new problems with pot identification, it is appropriate to grant some relief for marking requirements to commercial fishermen that use pots in their commercial fishing operation by simplifying the requirements.

This relief can be achieved by restoring the original content of 15A NCAC 03J .0301(c) to reflect a choice of three ways for a gear owner to mark their pot: 1) gear owner's current motorboat registration number; or 2) gear owner's U.S. vessel documentation name; or 3) gear owner's last name and initials. The current rule requires the gear owner's last name and initials be identified on each buoy as a baseline. Then, if a vessel is used, the identification must also include either the gear owner's current motorboat registration number or the gear owner's U.S. vessel documentation name. The proposed amendments would essentially change the requirements from "gear owner's name AND gear owner's vessel number OR gear owner's vessel name" to "gear owner's name OR gear owner's vessel number OR gear owner's vessel name", simplifying the requirements for commercial fishermen by requiring only one of three ways to mark pot buoys, not two ways.

The proposed amendments would mean that marking requirements for pots would be different than marking requirements for other gears, and the rulemaking process would have to be undertaken, which takes time. But per Marine Patrol, pot identification would be sufficient with either the gear owner's name, or the gear owner's vessel number, or the gear owner's vessel name, and there would be no impact on enforcement activities. Commercial fishermen that use pots in their commercial fishing operation would be granted some relief with the adoption of the simplified requirements.

VI. PROPOSED RULE(S)

SECTION .0300 - POTS, DREDGES, AND OTHER FISHING DEVICES

15A NCAC 03J .0301 POTS

(a) It shall be unlawful to use pots except during time periods and in areas specified herein:

(1) in Internal Waters from December 1 through May 31, except that:

(A) in the Northern Region designated in 15A NCAC 03R .0118(1) all pots shall be removed from Internal Waters from January 1 through January 31. Fish pots upstream of the U.S. 17 Bridge across Chowan River and upstream of a line across the mouth of Roanoke, Cashie, Middle, and Eastmost Rivers to the Highway 258 Bridge are exempt from this removal requirement.

(B) in the Southern Region designated in 15A NCAC 03R .0118(2) all pots shall be removed from Internal Waters from March 1 through March 15.

(2) in Internal Waters from June 1 through November 30 in the Northern Region designated in 15A NCAC 03R .0118(1):

(A) in areas described in 15A NCAC 03R .0107(a).

(B) to allow for the variable spatial distribution of crustacea and finfish, the Fisheries Director may, by proclamation, specify time periods for and designate the areas described in 15A NCAC 03R .0107(b) or any part thereof, for the use of pots.

(3) in Internal Waters from May 1 through November 30 in the Southern Region designated in 15A NCAC 03R .0118(2), the Fisheries Director may, by proclamation, specify time periods and areas for the use of pots.

(4) in the Atlantic Ocean from May 1 through November 30 the Fisheries Director may, by proclamation, specify time periods and areas for the use of pots.

(b) It shall be unlawful to use pots:

(1) in any navigation channel marked by State or Federal agencies; or

(2) in any turning basin maintained and marked by the North Carolina Ferry Division.

(c) It shall be unlawful to use pots in a commercial fishing operation unless each pot is marked by attaching a floating buoy of any color except any shade of yellow or any shade of hot pink, or any combination of colors that include any shade of yellow or any shade of hot pink. Buoys 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 gear owner's last name and initials~~ One of the following shall be engraved on the attached buoy or identified by attaching engraved metal or plastic tags to the ~~buoy. If a vessel is used, the identification shall also include one of the following:~~buoy:

(1) gear owner's current motor boat registration number;~~ or~~

(2) gear owner's U.S. vessel documentation ~~name.~~name; or

(3) gear owner's last name and initials.

(d) Pots attached to shore or a pier shall be exempt from Subparagraphs (a)(2) and (a)(3) of this Rule.

(e) It shall be unlawful to use shrimp pots with mesh lengths smaller than one and one-fourth inches stretch or five-eighths-inch bar.

(f) It shall be unlawful to use pots to take eels with mesh lengths smaller than one-half inch by one-half inch.

(g) Except for unbaited pots or pots baited with a male crab, it shall be unlawful to use crab pots in Coastal Fishing Waters unless each pot contains no less than three unobstructed escape rings that are at least two and five-sixteenth inches inside diameter and:

(1) for pots with a divider:

(A) two escape rings shall be located on opposite panels of the upper chamber of the pot; and

(B) at least one escape ring shall be located within one full mesh of the corner and one full mesh of the bottom of the divider in the upper chamber of the pot.

(2) for pots without a divider:

(A) two escape rings shall be located on opposite panels of the pot; and

(B) at least one escape ring shall be located within one full mesh of the corner and one full mesh of the bottom of the pot.

For the purpose of this Rule, a "divider" shall mean a panel that separates the crab pot into upper and lower sections.

(h) The Fisheries Director may, by proclamation, impose on a commercial fishing operation and for recreational purposes any of the following restrictions for pots:

(1) specify time;

(2) specify area;

(3) specify means and methods;

(4) specify record keeping and reporting requirements;

(5) specify season, including a closed season for removal of all pots from Internal Waters;

(6) specify species; and

(7) specify quantity.

(i) It shall be unlawful to use more than 150 crab pots per vessel in Newport River.

(j) It shall be unlawful to remove crab pots from the water or remove crabs from crab pots between one hour after sunset and one hour before sunrise.

(k) It shall be unlawful to use pots to take crabs unless the line connecting the pot to the buoy is non-floating.

(l) It shall be unlawful to use pots with leads or leaders to take shrimp. For the purpose of this Rule, "leads" or "leaders" shall mean any fixed or stationary net or device used to direct fish into any gear used to capture fish. Any device with leads or leaders used to capture fish shall not be a pot.

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; May 1, 1997; March 1, 1996; March 1, 1994; October 1, 1992; September 1, 1991;

Temporary Amendment Eff. July 1, 1999;
Amended Eff. August 1, 2000;
Temporary Amendment Eff. September 1, 2000;
Amended Eff. May 1, 2015; April 1, 2014; September 1, 2005; August 1, 2004; August 1, 2002;
Readopted Eff. March 15, ~~2023.~~2023;
Amended Eff. (Pending legislative review pursuant to S.L. 2019-198).

VII. PROPOSED MANAGEMENT OPTIONS

(+ Potential positive impact of action)
(- Potential negative impact of action)

1. *Status quo* – Maintain requirement for two sources of identification on pot buoys.
   - \+ Gear marking requirements remain consistent across gear types
   - \+ Rulemaking process not required
   - \- Relief for marking requirements not granted to commercial fishermen that use pots in their commercial fishing operation despite a lack of any problems with pot identification via a single identifier

2. Amend rule to simplify pot buoy marking requirements by requiring only one of three ways to mark pot buoys, not two ways.
   - \+ Relief granted for marking requirements to commercial fishermen that use pots in their commercial fishing operation
   - \- Marking requirements for pots different than marking requirements for other gears
   - \- Rulemaking process required
   - +/- Pot identification sufficient with either gear owner's name or vessel registration number or vessel name

VIII. RECOMMENDATION

The DMF recommends Option 2.

Prepared by: Catherine Blum
catherine.blum@deq.nc.gov
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