Atlantic States Marine Fisheries Commission

South Atlantic State/Federal Fisheries Management Board

October 25, 2016
10:15 a.m. – 12:15 p.m.
Bar Harbor, Maine

Draft Agenda

The times listed are approximate; the order in which these items will be taken is subject to change; other items may be added as necessary.

1.	Welcome/Call to Order *(J. Estes)*	10:15 a.m.
2.	Board Consent • Approval of Agenda • Approval of Proceedings from August 2016	10:15 a.m.
3.	Public Comment	10:20 a.m.
4.	Consider Draft Cobia FMP Public Information Document for Public Comment *(L. Daniel*) **Action**	10:30 a.m.
5.	Red Drum Working Group Report (*J. Kipp)* • Presentation of Follow Up Tasks to the Red Drum Assessment	11:10 a.m.
6.	Progress Report on the Spot and Atlantic Croaker Benchmark Stock Assessments (*J. Kipp*)	11:45 a.m.
7.	Consider 2015 Fishery Management Plan Reviews and State Compliance for Black Drum, Spanish Mackerel and Spotted Seatrout (*A. Hirrlinger*) **Action**	11:55 a.m.
8.	Review and Populate Advisory Panel Membership (*T. Berger*) **Action**	12:05 p.m.
9.	SEAMPAP Funding Update (S. Madsen)	12:10 p.m.
10.	Other Business/Adjourn	12:15 p.m.

The meeting will be held at the Harborside Hotel, 55 West Street, Bar Harbor, Maine; 207.288.5033

MEETING OVERVIEW

South Atlantic State/Federal Fisheries Management Board Meeting
Tuesday, October 25, 2016
10:15 a.m. – 12:15 p.m.
Alexandria, Virginia

Chair: Jim Estes (FL) Assumed Chairmanship: 02/16	Technical Committee Chair: Red Drum: Mike Murphy (FL) Atlantic Croaker: Chris McDonough (SC)	Law Enforcement Committee Representative: Capt. Bob Lynn (NC)
Vice Chair: Pat Geer	Advisory Panel Chair: Tom Powers (VA)	Previous Board Meeting: May 5, 2016
Voting Members: NJ, DE, MD, PRFC, VA, NC, SC, GA, FL, NMFS, USFWS, SAFMC (12 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from August 2, 2016

3. Public Comment – At the beginning of the meeting public comment will be taken on items not on the agenda. Individuals that wish to speak at this time must sign-in at the beginning of the meeting. For agenda items that have already gone out for public hearing and/or have had a public comment period that has closed, the Board Chair may determine that additional public comment will not provide additional information. In this circumstance the Chair will not allow additional public comment on an issue. For agenda items that the public has not had a chance to provide input, the Board Chair may allow limited opportunity for comment. The Board Chair has the discretion to limit the number of speakers and/or the length of each comment.

4. Consider Draft Cobia FMP Public Information Document for Public Comment (10:30 - 11:10 a.m.) Action

Background

- The South Atlantic Council Fishery Management Council (Council) requested the Commission consider joint or complementary management of cobia with the Council.
- In 2105, 82% of the cobia harvest occurred in state waters. The ACL was exceeded by approximately 91,000 pounds.
- The Council is looking for a more flexible management approach to allow for timely adjustments of measures but still provide equitable access across multiple jurisdictions while meeting conservation goals.
- Staff to draft a white paper to outline how Cobia management would work under a joint, complementary, ASMFC only or Council only plan and the Board initiated a complementary FMP for Cobia.
- The PDT drafted a PID based on Board direction.

Presentations

- L. Daniel will present the Draft Cobia FMP Public Information Document for Public Comment (**Meeting Materials**)

Board actions for consideration at this meeting

- Approve the Draft Cobia FMP Public Information Document for Public Comment

5. Red Drum Working Group Report (11:10 – 11:45 a.m.)

Background

- The 2016 update stock assessment and peer review was presented to the Board in May of 2016.
- The models, using Stock Synthesis framework, suggest overfishing is occurring in both the northern and southern regions. The northern model predicts low adult abundance (age 6+) since 1989. The southern model shows increasing F, resulting in low escapement of juveniles from the fishery.
- The Board had questions/concerns regarding the assessment inputs, reference points, and model types and tasked the TC/SAS to investigate several questions.
- The TC/SAS has completed the tasks.

Presentations

- J. Kipp will present a report on the TC/SAS tasks (**Meeting Materials)**

Board actions for consideration at this meeting

- None

6. Progress Update on Spot and Atlantic Croaker Stock Assessments (11:45 – 11:55 a.m.)

Background

- A data workshop for both species was held in September 2015.
- The first of two assessment workshops we held one in February and one in September 2016.
- It is expected that both assessments will be completed in early 2017

Presentations

- Stock assessment update by J. Kipp

7. 2016 Fishery Management Plan Reviews (11:55 -12:05 a.m.) Action

Background

- Spanish Mackerel State Compliance Reports are due on October 1. The Plan Review Team reviewed each state report and compiled the annual FMP Review.
- Black Drum State Compliance Reports are due on August 1 . The Plan Review Team reviewed each state report and compiled the annual FMP Review. Georgia, New Jersey and Delaware have applied for *de minimis.*
- Spotted Seatrout Reports are due on September 1 . The Plan Review Team reviewed each state report and compiled the annual FMP Review. New Jersey and Delaware have applied for *de minimis.*

Presentations

- Overview of the Spanish Mackerel, Spotted Seatrout and Black Drum FMP Review Reports by A. Hirrlinger. **(supplemental materials)**

Board actions for consideration at this meeting

- Accept 2016 FMP Reviews and State Compliance Reports
- Approve *de minimis* requests: NJ, DE, and GA for Spanish mackerel and NJ and DE for spotted seatrout.

8. Review and Populate Advisory Panel Membership (12:05 – 12:10 p.m.) Action

Background

- South Atlantic Board was asked to evaluate current membership and seek new members with experience in the cobia fishery.

Presentations

- T. Berger will present nominations to the South Atlantic Advisory Panel **(supplemental materials)**

Board actions for consideration at this meeting

- Approve Captain Bill Parker (SC), Glenn Ulirch (SC), Lee Southard (GA), Aaron Kelly (NC)

9. SEAMAP Funding Update (12:10 – 12:15 p.m.)

Background

- Taxes and assessments on the SEAMAP Congressional appropriation have decreased the overall funding available to surveys.
- This has resulted in decreased days at sea, number of stations sampled and therefore the amount of fishery independent data collected.

Presentations

- S. Madsen will present the funding implications on SEAMAP-SA surveys **(meeting materials)**

10. Other Business/Adjourn

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

SOUTH ATLANTIC STATE/FEDERAL FISHERIES MANAGEMENT BOARD

The Westin Alexandria
Alexandria, Virginia
August 2, 2016

Draft Proceedings of the South Atlantic State/Federal Fisheries Management Board Meeting
August 2016

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INDEX OF MOTIONS

1. **Approval of Agenda** by Consent (Page 1).

2. **Approval of Proceedings of May 2016** by consent (Page 1).

3. **Move that the South Atlantic Board recommend to the Policy Board the development of a complementary Fishery Management Plan for Cobia; so this would be Option 1 under the plan structure listed** (Page 8). Motion by Michelle Duval; second by Robert Boyles. Motion carried (Page 13).

4. **Move to recommend to the ISFMP policy board that the South Atlantic Board is the appropriate venue to develop the FMP for Cobia** (Page 13). Motion by Robert Boyles; second by Spud Woodward. Motion carried (Page 13).

5. **Motion to adjourn** by Consent (Page 22).

Draft Proceedings of the South Atlantic State/Federal Fisheries Management Board Meeting
August 2016

ATTENDANCE

Board Members

Adam Nowalsky, NJ, proxy for Asm. Andrzejczak (LA)
Russ Allen, NJ, proxy for D. Chanda (AA)
Tom Fote, NJ (GA)
John Clark, DE, proxy for D. Saveikis (AA)
Roy Miller, DE (GA)
Craig Pugh, DE, proxy for Rep. Carson (LA)
Rachel Dean, MD (GA)
Lynn Fegley, MD, proxy for D. Blazer (AA)
Ed O'Brien, MD, proxy for Del. Stein (LA)
Joe Cimino, VA, proxy for J. Bull (AA)
Kyle Schick, VA, proxy for Sen. Stuart (LA)
Doug Brady, NC (GA)
Jerry Schill, NC, proxy for Rep. Steinburg (LA)
Michelle Duval, NC, proxy for B. Davis (AA)
Robert Boyles, SC (AA)
Malcolm Rhodes, SC (GA)
Patrick Geer, GA, proxy for Rep. Nimmer (LA)
Spud Woodward, GA (AA)
Jim Estes, FL, proxy for J. McCawley (AA)
Martin Gary, PRFC
Wilson Laney, USFWS
John Carmichael, SAFMC

(AA = Administrative Appointee; GA = Governor Appointee; LA = Legislative Appointee)

Ex-Officio Members

Staff

Toni Kerns
Robert Beal

Guests

Roy Crabtree, NMFS
Dr. Louis Daniel, NC
Andrew Shiels. PA Fish & Boat Comm.

The South Atlantic State/Federal Management Board of the Atlantic States Marine Fisheries Commission convened in the Edison Ballroom of the Westin Hotel, Alexandria, Virginia, August 2, 2016, and was called to order at 10:04 o'clock a.m. by Chairman Jim Estes.

CALL TO ORDER

CHAIRMAN JIM ESTES: Good morning. I would like to convene the South Atlantic/Federal Fisheries Management Board this morning. My name is Jim Estes; I am the Administrative Proxy from Florida; welcome! I hope we can do some conservation this morning.

APPROVAL OF AGENDA

CHAIRMAN ESTES: We have an agenda. you all should have been given the agenda.

I would like to make an addition to the agenda. When we're discussing cobia management, we would also like to discuss any recommendations that we might have to the South Atlantic Fisheries Management Council on Framework 4. We'll do that during the discussion of cobia. Are there any other suggestions about changes to the agenda?

CHAIRMAN ESTES:Is there any objection to accepting the agenda as amended? Seeing none; the agenda is set.

APPROVAL OF PROCEEDINGS

CHAIRMAN ESTES: We also have the proceedings from our May meeting; and I'm sure that most of you can remember how much fun that was. Are there any suggestions to edit or change the proceedings of the May meeting? Seeing none; are there any objections to accepting those proceedings? Seeing none; the proceedings are accepted.

PUBLIC COMMENT

CHAIRMAN ESTES: Public comment, do we have any members from the public that wish to speak on items that are not on the agenda? Okay, seeing none; we'll go forward.

COMMISSION INVOLVEMENT IN COBIA MANAGEMENT

At our May meeting the Policy Board tasked the staff to create a white paper about cobia management, and I think that we'll have an explanation about that in a few minutes. We have an honorary member who agreed to help work on this issue. Dr. Louis bluegill Daniel is here with us to make a presentation about possible cobia management actions that we might take.

DR. LOUIS B. DANIEL, III: It is a delight to be back in Alexandria and be with you again. I am working for the Commission on a limited basis; putting together the cobia information for you. I'll go through a-- I tried to keep it short and sweet for you, to go through the issues as they pertain to cobia management.

Essentially, these fish range from Nova Scotia to Argentina, I think the Scotian fish were lost; but they are uncommon north of Maryland. We'll talk more about that here shortly. They are an extremely valuable fishery to the for-hire and recreational sector, and they serve primarily as a bycatch in the commercial fishery.

Briefly, the management history, cobia have been managed by the South Atlantic Fishery Management Council through the coastal migratory pelagics FMP since 1982, as a unit stock from the east coast of Florida to New York. Management has been precautionary throughout the time series, with a two-fish limit for commercial and recreational fishermen and a size limit of 33 inches fork-length. The thought was there to be, I think at the time, extremely precautionary on cobia. The primary fishery occurs when they're spawning; so let's be precautionary and preemptive on any potential problems and maintain this fishery as a small fishery.

Amendment 18 did establish allowable catch limits in 2012, and some recent genetics studies indicate two separate populations of cobia; the Gulf group, which is the east coast of Florida

and around the Gulf of Mexico, and the Atlantic migratory group, which you'll see me denote here from here on as AMG cobia, which occur from the Georgia/Florida line north to New York and may occur north of there. We do have some landings records from north of New York.

Further with the management history, Amendment 20B revised catch limits based on the stock assessment. That stock assessment was the SEDAR; Southeast Data Assessment and Review 28, and modified the boundary between the Atlantic and Gulf based on the recent genetic studies. The current management strategy, which you'll go over I think after my presentation, coming out of the South Atlantic is Framework action Amendment 4.

That is currently being developed to address overages of the allowable catch limits by the recreational fisheries of the Atlantic migratory group. To briefly summarize current issues, and probably the primary reason we're here at this particular point. The National Marine Fisheries Service announced a closure to the AMG cobia effective June 20th, of 2016, for exceeding the allowable catch limit in 2015.

The allowable catch limit for our cobia in 2015 was 630,000 pounds. That is based on the stock assessment. Well, landings were 1.5 million pounds; so an extraordinary overage of the recreational ACL for 2015. The closure that was scheduled for June the 20th impacted the fishery throughout the range of the AMG cobia; but impacts were greatest for the outer banks of North Carolina and all the states from Virginia to the northern extent of the range.

Virginia and North Carolina reacted to the closures recently by implementing state-specific regulations to try and lessen the impact of the closures on their specific states. To kind of give you a sense of why this is so important, the recreational fishery occurs primarily from April to October in nearshore and offshore waters.

Based on the MRIP information, about 82 percent of the cobia harvest is reported from in-state waters. You can see from this graphic that the dominant landings occur during that May/June Wave 3, but there are substantial landings during the July/August Wave. The June 20 closure had a significant impact on the later fisheries that occur along the east coast of our jurisdiction.

Where the fish go from October to April is a good question, and one that I hope we will be able to delve into if we move forward and develop something further on this fishery. The fishery generally begins as fish move nearshore off of Georgia in early spring, and proceeds northwards. Just to give you an idea of where the landings come from, the majority of the recreational landings occurred in North Carolina and Virginia from May through July, during most years.

But you'll notice here that while for North Carolina and Virginia, many years would count for 80 to 90 percent of the total landings, there is variability in those trends on an annual basis. I think particularly to note are the landings from South Carolina, for example in 2007, the landings from Georgia particularly in 2008, and again from South Carolina in 2012. It is variable as the fishery moves south to north. But generally, North Carolina and Virginia take the lion's share of the cobia landings recreationally; at least they have from 2005 to 2015, important to note here that there are no MRIP landings reported north of Virginia.

Just to look at the general trend, recreational landings from 2005 to 2015, it is a pretty variable trend over the time series until this past year, when the recreational ACL was exceeded. You will note here that with a recreational ACL of 630,000 pounds, it would have been exceeded in seven of the last 11 years.

To look at the landings a little more completely, and not to forget our friends in Florida, this is all in your white paper that was distributed in your supplemental material. From 2005 to 2015, these are the landings from Virginia. I include

the east coast of Florida to give you an idea of the magnitude of the landings in that recreational fishery.

The next iteration of this presentation I will have a comparison of the total landings from the AMG cobia and the east coast of Florida, because in putting this together, I noticed they are fairly diphasic in terms of they don't track one another. Some years the AMG cobia will have very high landings and the Florida landings down and vice versa. They don't track one another very well.

What you can see here from the east coast of Florida landings that they do have a significant landing of cobia off the east coast of Florida. Looking at the commercial fishery, again, those trends have shown an increase since 2011. The areas here are down below Georgia/South Carolina, very minor landings.

The Mid-Atlantic States, which is essentially Virginia, and then reported landings from the states of Maryland, New Jersey, New York and Rhode Island also, have reported landings during the time series; not every year north of Virginia do those states have landings, but episodically through that time series, they have reported landings, mostly in the 3 to 400 pound range.

Then for North Carolina you can see the general trend tracks the Mid-Atlantic since 2011, with pretty steadily increasing landings. There was a late season closure in 2014; as the result of going over the ACL for the commercial fishery. A pretty significant overage occurred in 2015; but that information came in so late that we weren't able to react to a closure in 2015. Just a reminder that these closures in the commercial fishery do raise some concerns for discards in a bycatch fishery.

Just briefly, and this is in the white paper, the fishery is primarily a bycatch in the trawl fisheries for king mackerel and other species; as well as a pretty substantive bycatch in the South Atlantic snapper grouper complex fishery, where, when they move offshore after the spawning season, they tend to aggregate around wrecks and reefs and live-bottom areas; where they are subject to bottom fish fishermen, snapper grouper fishermen.

The same general trend in Florida East Coast commercial landings, they are not included in the AMG cobia quotas and are managed through the Gulf Council portion of the plan. But you can see that general trend in their landings is likewise up over the last five years, well not the last five years. These are the latest, most recent data we had for the Florida landings. But they are seeing an increase in those landings, as well. Further examination into why those landings are increasing the way they are, is something that we would like to look at in the future. Just a basic summary of the stock status, and John Carmichael is here to my left with the South Atlantic.

Between the two of us, I think we can answer any of your questions on the stock status. The most recent assessment was the 2013 cobia benchmark assessment, with data through 2011. While the assessment indicates that the stock is not overfished, and overfishing is not occurring, the assessment does indicate an overall decline in stock biomass.

I pulled out this one figure that I think is pretty pertinent to this discussion, with the SSB over SSBmsy ratio, and you can see that from about 1995 to present, there has been a fairly steady decline to where we are approaching the one-to-one ratio of SSB over SSBmsy, and if we fall below that one, then we would be considered overfished. We're getting close in that particular graphic.

The assessment does indicate an overall decline in stock biomass. The 2015 recreational landings exceeded the overfishing limit as well as the ACL. The overfishing limit is set at 699,200 pounds. With the landings at about 1.5 million, we basically doubled the overfishing limit in 2015; resulting in at least the council's

determination, overfishing for 2015 in the recreational fishery.

There is a new benchmark stock assessment scheduled for 2018 to further look at the trends, and particularly in this SSB graphic. Just a little more detail on the stock boundaries. The new cobia stock boundaries were established through South Atlantic Council Amendment 20B in 2014, and beginning March the 1st of 2015, the Atlantic migratory group cobia annual catch limits apply from Georgia through New York.

Cobia caught off the east coast of Florida are now counted against the Florida East Coast allocation of the Gulf of Mexico cobia annual catch limit. As was discussed, to continue to look at this stock ID question is that the commission was able to get cobia included in the stock ID workshop in 2017.

Hopefully, by the 2018 stock assessment, we'll have a good handle on the stock boundaries for the stock assessment. There is some chance, based on some of the discussions with the analysts, that there could be some drop down into the state of Florida; but right now the data being used for this is, I think, a study out of South Carolina, where they did have a lot of samples from what is considered the mixing zone, which is right around the Florida/Georgia border.

Based on these issues, concerns, problems, the commission received a letter from the South Atlantic Fishery Management Council requesting that the commission consider cobia management at some level. The ISFMP Board at your May meeting directed staff to develop a white paper to consider options for moving forward.

Based on those discussions and based on a review of the minutes of your board meeting, we put together two potential options for your consideration here today. I'll go through these, and then we can start back, Mr. Chairman, if that satisfies your plan. The first issue is the cobia management plan options to A, develop a management plan structure should the plan be a complementary plan between the Atlantic States and the South Atlantic; Option 1. Option 2 is a joint fishery management plan between the commission and the South Atlantic. Option 3 is an ASMFC exclusive management plan, which would not include the council. Option 4 is status quo, which means we would continue to just have the South Atlantic Council operate the way they have and simply abide by the closures, or come up with some independent state options to monitor those quotas.

If there are any other options that the board may have in mind that they would bring up during this discussion. Then the second issue that we felt we needed clarification on and direction is the board structure. We basically have three options. There could be others. Option 1 would be to have this board, the South Atlantic State/Federal Fisheries Management Board, handle the issues related to cobia; reaching out to states that have an interest in sitting at this board to discuss these issues, if so desired.

Option 2 would be a standalone Atlantic migratory group cobia board, and Option 3 is an option where we could possibly split out species that are currently within the South Atlantic Board and try to coordinate species that are more alike. One option would be to perhaps include the red drum, black drum and cobia as a single unit in the South Atlantic Board, and maybe have the smaller croaker, spot, speckled trout, Spanish mackerel in a separate group; but that is for the board to discuss.

The short term timeline, you've got a long term, very detailed timeline in the white paper that is in your supplemental materials, but just for the next meeting or two, if the board moves in direction or recommends to the ISFMP Policy Board to move forward with a cobia plan, we would begin developing the PID for your review and approval, hopefully, in November of 2016.

During the period between the annual meeting and the end of January, staff would conduct public meetings and accept public comment. Then at the 2017 board meeting, you would review public comments and direct FMP development. With that, a couple of nice cobias off of Wrightsville Beach, I would be happy to answer any questions you may have.

CHAIRMAN ESTES: Do we have questions, Malcolm?

DR. MALCOLM RHODES: Just one question. Since we've talked about or have been brought up with the east coast of Florida and the Gulf. How is the Gulf stock handled? Is it solely the council, is it commission? Do they have some complementary plan going; just to see how it is handled in our neighboring jurisdiction?

DR. DANIEL: Well, we've got Dr. Roy Crabtree and John Carmichael here, but there is a joint coastal migratory pelagics plan between the South Atlantic and the Gulf. This is consistent with the way that king mackerel are handled, where the king mackerel Gulf are handled in a separate but equal situation as the Atlantic king mackerel.

In the Gulf for Gulf cobia, they have their own special stock assessment and they have specific ACLs and overfishing limits, and they are handled as two separate stocks; two separate species. They are managed the same way as the council manages the Atlantic group cobia.

MR. JOHN CARMICHAEL: In the Gulf it is council. The states aren't involved at this time. I am not aware that they've talked to the Gulf's States Commission about getting involved, so it is strictly council management.

MR. ROBERT BOYLES: Dr. Daniel, thank you for an excellent presentation and excellent work. No surprise, I think that we have, from our perspective in South Carolina, a lot to gain from coordinated management; whatever that coordinated management looks like. I've sat here before at this table and pled my case for the Ben Franklin approach to fisheries management. "If we don't all hang together, we will all certainly hang separately."

With 82 percent of the catch occurring in state waters, I think this is a species that certainly lends itself to interjurisdictional fisheries. Dr. Daniel, thank you for your excellent presentation. A question perhaps for Roy, and this might be a nuanced question that maybe I should handle separately and offline.

In South Carolina, we manage cobia, again because it primarily has been managed under the Magnuson Act authorities. We adopted by reference the regulations as promulgated under the South Atlantic Council. My question may be for Roy is, can you school us or school me on the differences, the nuances between what we may call a complementary fishery management plan versus a joint fishery management plan.

I guess, let me state my interest at the outset. I certainly think that there are a lot of cross-shelf movements. I certainly think that there is a lot to be had for federal involvement in it, as well. I certainly think that the accountability measures and the ACLs as promulgated under Magnuson need to be part of cobia management.

DR. ROY CRABTREE: Well, I would defer a little bit to staff on some of that. Most of my experience has been with complementary plans, which we've done, and in that case I think the council can operate in their own meeting and go down their path, and then the Atlantic States does theirs.

But if we were to do a true joint plan, then we would need to have joint meetings and we would need to each pass the same motions and those kinds of things; similar to when we do a plan amendment of the coastal migratory pelagics plan and have to meet jointly with the Gulf Council. I think that is the main distinction. I would defer to Toni, if you've got anything to add to that.

MS. TONI KERNS: I think there are a couple of things with the complementary plans oftentimes, like, for example, Atlantic herring we would call that a complementary plan. The quotas are typically set by the council, and then the states then deal with those quotas that are set by the council and there is not a lot of input from the states on those quotas and the ACLs that are attached to those.

I think that there is some flexibility around the accountability measures in the sense of how the states decide to implement measures to meet those quotas within their groupings. With the joint plans Roy is correct, we have to make actions like motions, so then the states have input on those quotas. You are still bound by what the SSC sets for the ABC, but there is input from both groups on the overall quota, so how much you're going to take into account for uncertainty for scientific uncertainty or management uncertainty. With the complementary plans, if the states do decide to do something different than what the council has done, then you have chance that you are going to have different measures, and so then your state and federal permit holders would be fishing on different rules; which sometimes can be problematic, depending on what set of regulations are different.

For example, if you set a different quota, then the federal permit holder would be impacted, or the state permit holder would be impacted. I think those are some of the bigger ones. It does take a little bit longer for us to get through management documents when they are joint plans, because we do need to meet consistently with the other council. I think that is most of the large differences that are there. On Page 8 and 9 of the white paper it does spell out in bullet format what the differences are between the different plans. Hopefully, that is a little bit helpful as well.

CHAIRMAN ESTES: Are there other questions?

MR. JOHN CLARK: Thanks for the presentation, Dr. Daniel. Great to see you back here. I guess I had a question about the data. I mean the increase in the recreational landings between 2014 and 2015 is enormous. Does the MRIP show a corresponding increase in effort? At the same time I saw that the stock assessment actually shows the stock coming down, and yet these catches are just huge.

DR. DANIEL: Well, we certainly don't see anything in the 2015 landings data that would suggest that there is something wrong in the MRIP landings data stream. We don't think that there is a glitch there. Situations occurred that came together where there were a lot of fish available, and also the fish are trending larger in the fishery, quite a bit larger actually.

The actual numbers of fish probably aren't as reflective as they would be in previous years, when the fish were a little bit smaller. I believe, and this is speaking to some degree anecdotally, because I don't know that the data formally exists. But we are seeing an increase in the number of trips directed towards cobia in the recreational fishery.

But we've also seen sort of a shift in how the fishery operates, to where it has become far more, at least in the Mid-Atlantic region in our southern area region, more of a hunt and fish fishery, as opposed to a bottom fishery. We've seen quite an increase in the development of tackle and baits directed for large cobia.

That increase in interest and effort I think is reflective in some of these landings. But clearly, you can see in years previous it has vacillated around a pretty stable mean. What we'll see this year would only be speculation, but the concern is if we continue to exceed that 630,000 pound allowable catch limit, then we continue to run the risk of an overfished condition.

DR. MICHELLE DUVAL: I'll ask for your indulgence, since I'm wearing a couple of hats here today. I chair the South Atlantic Council, but I'm also here as North Carolina's administrative proxy. There have been a lot of

questions from stakeholders with regard to the MRIP data, and we did have some conversation yesterday during the state director's meeting about MRIP estimates.

You know, there has been some concern and there were, with regard to black sea bass and blue fish, final estimates; and we did ask MRIP folks if they could go back and look at if the re-estimations that were used for those species had any impact on cobia. The answer was very little; I believe it was a drop in something like 28,000 pounds.

That said, I think one of the things that from a council perspective I am interested in exploring are some of the alternative techniques for estimation of harvest that the MRIP staff have been gracious enough to present to the South Atlantic Council's SSC, using things like an annual estimate of catch multiplied by estimates of effort; so that you might be not necessarily getting wave-based estimates, but you might be getting annual estimates that would allow for a smoothing out some of these spikier approaches.

There were multiple approaches that MRIP staff had put forward last fall to our SSC. These were for different species that tend to be rarely intercepted, but I think for a pulse fishery like cobia, some of those might be applicable. We have encouraged NOAA Fisheries MRIP staff to consider development of additional business rules for when those types of techniques might be applied during the MRIP review that has gone on.

I also wanted to follow up on Mr. Boyle's comments with regard to commission involvement in the management of cobia. I think one of the things that has certainly become clearer, if we didn't already know it, is the differences in this fishery up and down the coast. You know Georgia's fishery is different than South Carolina's fishery, is different than North Carolina's fishery, is different than Virginia's fishery.

You know we've just seen in the past few weeks a little girl from Maryland who caught a fish that was half as big again as she was. I think it certainly lends support and rationale for the commission becoming involved in cobia management. I think, and Pat can correct me if I'm wrong, but Georgia's fishery is pretty much a federal waters fishery.

South Carolina has seen a lot of changes in their inshore versus offshore fisheries over the last seven or eight years. You know in North Carolina itself, we sort of straddle between what Virginia's fishery characteristics are versus what the characteristics are south of us. You know, north of Ocracoke Inlet it is a different fishery, versus south of Ocracoke Inlet.

Then Virginia, of course, has a longer season with a peak that is offset by another wave. I think with the things that we have heard from stakeholders, with regard to having an equal voice or an equal seat at the table, the commission process offers that with every state having an equal vote and an equal voice.

Then one of the other major issues that we've heard has been the ability to react to changing conditions within the fishery, and the commission process allows for a more nimble and flexible response. Certainly, even though the council as you'll hear about, is undertaking a framework amendment, and most folks here are familiar with a framework amendment; its process.

It is a shorter process, but it still requires going through federal rule making; whereas the commission process allows for more rapid changes in regulations. I think for all of those reasons I would certainly advocate for the commission becoming involved in this. Whenever you're ready, Mr. Chairman, I am prepared to make a motion with regard to that.

CHAIRMAN ESTES: Thank you. Let's see if we can exhaust the questions.

MR. JOE CIMINO: I just wanted to make a comment and follow up with what Michelle has just said. I think the South Atlantic Council's framework has exhausted all of their possible management options. I think they've done a great job with what they are putting forward with options for the framework. I'm not sure that that is enough for this fishery, since it is so different state-to-state.

I really think we need to have some decisions made here, especially for the conservation equivalency that could put the states in a bind with the current framework. I would feel remiss if I didn't thank the council for all they've done so far. This has been a tough year for a lot of us, and I also want to thank Dr. Crabtree's staff. They've been extremely helpful through all of this, and just really open to working with us; but I do believe it belongs here.

DR. CRABTREE: I just wanted to follow up on some of the comments. I think the Fishery Service thinks it is important that the commission take on more of a role in management of this fishery, and I think there is a need for the commission to develop a fishery management plan. I don't think any of us want to complicate this any more than we need to; to achieve our objectives and have a successful fishery.

But I think we do need to insure that the states that have important fisheries for cobia all do have a voice in how the fishery is managed. I think flexibility here is certainly desirable. I think more state involvement here. This is, I think, Louis, 80, 85 percent of the fishery is occurring in state waters; and so this is predominantly a state water fishery.

I think it is appropriate that the states take on a greater role in the management of the fishery. Exactly how we get there, the complementary plan sounds like maybe the most straightforward way to get to what we need to do, but I'm open to other options, as well. But I do think we support the development of a commission plan of some sort; and I think that is necessary to properly manage the fishery.

CHAIRMAN ESTES: If there are no other questions, maybe if we could go backwards about three or four slides here to look at the management options; and then when we get that up there Michelle, if you have a motion, I would appreciate that. Go ahead, Michelle.

DR. DUVAL: I move that the South Atlantic Board recommend to the Policy Board development of a complementary fishery management plan for cobia; so this would be Option 1 under the plan structure listed.

CHAIRMAN ESTES: Do we have a second? Robert Boyles. Michelle, would you like to expand on that?

DR. DUVAL: I put forward the option for complementary management at this time, because as you've heard here, I think there is a strong rationale for the commission to become involved in this; based on some of the stakeholder concerns with regard to adequate representation, being able to be responsive to each state's management needs. But I think what we've also heard is that stakeholders believe that the actions that have occurred as a result of the federal process have led to the situation that we are in today, and so they want to see the council fix that situation as much as possible. I think maintaining federal involvement at this time is certainly appropriate.

PUBLIC COMMENT

CHAIRMAN ESTES: Before we have any further discussion, we have a member of the public that I think would like to make a comment. Sir, if you come to the microphone and state your name and any affiliation you might have.

MR. JONATHAN FRENCH: Thank you, my name is Jonathan French. I represent a loose collaboration of charterboat captains; tackle shops and just regular recreational anglers from

Virginia and North Carolina. I'm probably the stakeholder that Dr. Duval has mentioned expressed most of those concerns.

I am here to ask for this commission to be very patient and not make a recommendation at this time. I think Dr. Daniel; his presentation shows the reason why. I don't know if it is appropriate to ask for the slides to go backwards, but one of the slides mentioned that there is a genetic dividing line at the Florida/Georgia general area.

I believe the exact line claimed is slightly south of the Florida/Georgia state line. We have two genetic studies, one of which is from South Carolina Department of Natural Resources that say that that is hogwash. It is an example of throughout this process, information has been presented to the public that at best is best and inconsistent, and at worse seems to be downright dishonest; and those issues need to be fixed before additional regulatory bodies come into place.

The first of those studies comes from Texas A & M University. It is peer reviewed and it's published in the North American Journal of Aquaculture that says the cobia sampled from the coastal waters of Virginia, Mississippi and Louisiana were genetically homogeneous; based on essays of microsatellite genotypes and mtDNA haplotypes.

The second study, again, I reference from South Carolina, says that offshore migratory fish are genetically identical throughout Gulf and Atlantic waters. There is no dividing line. However, that study does acknowledge the existence of an anomaly genetically in South Carolina that is a byproduct of a failed stocking effort and aquaculture projects started in 2004 by the state.

I would like to reference specifically from that study; "No fish collected outside of South Carolina were identified as South Carolina stocked fish. Therefore evaluation of hatchery contribution represents the contribution to South Carolina's cobia populations." What that means is that the fish that are the genetic anomaly that were used for the justification for the zone split in Amendment 20B, in the fisheries management plan, those fish don't move.

South Carolina's actions in order to reduce pressure on that localized fishery, I would deem them to be appropriate, but should not be impactful outside of that area. Those were the reasons used to justify the zone split; and the end result was 880,000 pounds of quota that were carved out of the Atlantic management zone and given to East Florida, which is now part of the Gulf management zone.

Those 880,000 pounds was given, even though the average catch in the East Florida for the years 2013 through 2015, was only 427,000 pounds. Essentially, East Florida got double what they normally catch; at least in that three-year period. During the same time period, North Carolina and Virginia by themselves caught 550,000 pounds; yet only 630,000 pounds was carved out of the entire area from the Georgia state line up to New York. That is not fair; that is not equitable, that is a violation at the absolute root; not best science available, not fair and equitable impact, not a fair and equitable impact of the resource.

The result is, even if you accept the MRIP data as accurate, which most of the folks that I try to represent say is absolute malarkey. But even if you accept it as being accurate, you look at the standard deviation of the catch averages for the last ten years, and 2015 is the only year that goes above the standard deviation.

It is one of only three years that go above the appropriate ACL, which is the ACL that includes East Florida; because as I pointed out earlier the genetic rationale for the zone split is not grounded in science. With that being the case, we wouldn't have a crisis. This is a manufactured crisis that, frankly, to use a term that "us dumb folks" are familiar with, because

of the recent election cycle, this has been gerrymandered.

I would recommend that this commission wait until South Atlantic conduct a new stock assessment to reconsider some of this other scientific information, and determine whether or not there needs to be any additional management. One other point that was kind of brushed over in Dr. Daniel's presentation is what North Carolina and Virginia have done. That catch average occurred when North Carolina allowed a two-fish per person limit, with fish at 33 inches a piece in 2015.

North Carolina initially dropped to a one-fish limit for this year, and that was only deemed to be worth a couple of additional days of the season, so now North Carolina has gone to a four-fish boat limit for charter boat anglers, a two-fish boat limit for recreational boat anglers who can only possess a fish on Monday, Wednesday and Saturday; which I regard as a horrible violation of equal protection, and peer anglers can keep one fish per day, all at 37 inches fork-length rather than 33.

There is going to be a significant drop in the catch from those steps. Virginia has had a one-fish per person limit for an extended period of time. That is one of the reasons we regard the population as thriving in the Chesapeake Bay. Virginia has managed carefully and ended up getting punished for it.

Virginia, in response to all this, did not comply with federal law either; however, the commission in Virginia made the decision to drop to a two-fish boat limit, only one fish over 51 inches could be kept, and Virginia anglers are only allowed to use nets. If you factor in those changes, or even if you adopted a one-fish per person limit across the states in the management area, look at the trended data out over ten years.

There is no reason to reasonably assume that if the ACL were set at the 2014 level, where it belongs, with East Florida/Key West as the appropriate dividing line; which is appropriately based on the genetic science available and the tagging data available, that a one-fish per person limit would not produce numbers well beneath the ACL.

We have argued this until we're blue in the face. We have been told by we're wrong, and yet the information presented is at best confusing and misleading; and at worse it feels like we're being lied to. Fisheries management will not work if the public feels like they can't trust the folks around this table and the folks around those councils and commissions as honest dealers. The folks I represent are furious. They're independent, they are not well organized, but they are mad as all get out.

What they observe on a daily basis does not align with the information you have been presented. I regard the presentation that Dr. Daniel just gave to you as dishonest. I hope you all read it closely. I would beg and plead that another hearing is held so we have an opportunity to present this other publically available, peer reviewed, published genetic information; and then you make up your own minds. But don't feed this bull you've been handed. Thank you.

CHAIRMAN ESTES: Thank you for your comments. Do we have any further discussion of the motion on the board?

MR. THOMAS P. FOTE: I really didn't want to comment on this, since New Jersey is a very small player. We have some recreational incidental catches and some commercial catches. But I really am not happy with complementary plans, the same way I'm not happy with joint plans. I mean, the only complementary plan that I've been involved with is winter flounder; and that really works horribly.

As we can put in the commission, we put in a one fish bag limit and a 50 pound trip limit, and GARFO for some unknown reason allows 5,000 pound trip limits on our boats, commercial that

fish in federal waters; which meant that in four or five trips they would catch more fish than our commercial fishermen in state waters would catch in 30 years, and the same thing with the recreational.

They didn't ask for our guidance in things like that. I'm also concerned -- I didn't see the PEs on the recreational data. I was wondering, because I'm not that familiar with the fishery. When the red snapper fishery was constrained, did that basically put a lot more effort on the cobia fishery? That is the question that hasn't been answered; because I can see that happen.

When we started losing summer flounder and regulations went where they had to do 20 to 1 to catch and release. Then it put more pressure on, and more people became striped bass fishermen. That's my other concern here. I'm just trying to look at the data that I'm not that familiar with. My concern is I have a problem with a complementary plan.

MR. BOYLES: I support the motion, obviously having seconded it. I remind the board that in South Carolina, our state waters and what is now known as the Southern Cobia Management Zone closed May the 1st, to protect what we believe to be is a spawning aggregation. Because we adopt federal regulations by reference, South Carolina anglers have not had access to the cobia fishery since June the 20th of this year.

Eighty percent of the catch caught in state waters, I think this is a species that screams for interjurisdictional management. With respect to our fishermen and our anglers to points north, their commissions, which we respect, those anglers in Virginia and North Carolina have access to the cobia fishery. My anglers in South Carolina are asking me why that is. I support the motion and think it is something that we should move forward to the Policy Board.

MR. ADAM NOWALSKY: Can we get any comment here today about the question of the DNA demarcation line? We heard that the gentlemen and those groups involved have gotten a response as to why they're wrong. Can we hear that on the record here today?

CHAIRMAN ESTES: Dr. Carmichael.

MR. CARMICHAEL: The genetics information that was available at the time the assessment was done was studied in quite a bit of detail; and then the samples by South Carolina were during the assessment process where there was some additional sampling done for them as well. Now the study that Mr. French sited by Dr. Gold that was done had a relatively small sample size. They looked at the Virginia offshore, they looked at Mississippi, Louisiana and Taiwan versus the Darden study.

The South Carolina study looked at inshore/offshore of Virginia, North Carolina and South Carolina, all of them inshore/offshore. There were kind of two different purposes of the studies. The South Carolina and Darden study was to try and define the stock boundaries as they were; and really started out in the case of South Carolina to try and understand the inshore components, you know, like the Port Royal population, whether that was its own separate population.

What was happening to the stocked fish? Then as the result of those efforts began to realize that there were multiple stock units along the coast that had various degrees of mixing and interactions, and then looked closer at what the relationship was to the Florida stock and the Gulf stock, and maybe where those lines were.

The Gold Study that was sited came along later and was really geared toward aquaculture and trying to understand relationships between different stocks. That is why it included Taiwan. One of the things that I found interesting about that is that the Gold Study that was sited used Virginia offshore. They had 35 fish, and they had some difficulties in telling whether or not those were truly different; distinct from say the fish in the Gulf of Mexico where they studied.

One of the problems that certainly that raises is that the Darden Study that was done in '08 and '09, and then added more stocks in 2012; really made an effort to collect the fish when the Virginia inshore fish were inshore. Because what they realized is sometimes those inshore stocks were mixing with this offshore component; particularly off of North Carolina and Virginia.

The Darden Studies for example, couldn't establish the North Carolina fish as being distinct from either the fish in the Virginia inshore or the fish that were farther south in the South Atlantic. There is a mixing that goes on, and you guys work with striped bass and other stuff; you all are well aware of all that kind of stuff that was going on sort of off of the mouth of the Chesapeake Bay and stuff.

Of course, genetics being such as they are that is not always the be all and end all, and there are sample size issues and trying to truly understand what a distinct, functioning, productive population unit is. When these stock boundaries were drawn for the assessment, they took all that into account. They realized that it was difficult to draw a line on the southern boundary; which is the case with many of our stocks, and they recommended a pragmatic choice of drawing a line at the Georgia/Florida boundary. I think we know in terms of dealing with datasets and things of that nature in regulations, it is often if you can go to a boundary that exists and you don't have clear distinction as to whether it should maybe be 150 miles north or south of that. It is going to be much more efficient to use that existing boundary. Now, of course, that has raised a lot of questions as we've looked into that and as Louis mentioned, we're going to have a stock ID workshop coming up in late 2017. Cobia is at the top of that list and will absolutely be considered in preparation for the next assessment.

Florida FWC is looking into this now. They're doing some tagging and they're trying to look at movements and other things; to really get better resolution of that Florida component, to try to decide where should the line be? Is it possible that the South Atlantic stock that we call the Atlantic stock should go down to maybe Daytona Beach, as opposed to being at the line?

The reality was there weren't a lot of studies of fish in that area. There weren't a lot of samples of fish in that area when this was done for the last assessment with the data through 2012. There is a lot going on now, and I would say this will definitely be looked at in the next assessment. There may be more genetic studies perhaps, or more samples that come to light when we get around to the next assessment; and that will all be looked at.

Our thought is to look at this population and try to decide, what are the functioning population units? Is there a Chesapeake Bay stock that should be considered similar to the Port Royal stock? Perhaps, and if that is the case, then I would think the commission involvement in the management would certainly become an even stronger position.

DR. DUVAL: Since I made the motion I am obviously in support of it. I did just want to follow up on John's response to Adam's question. I don't believe the Gold Paper was available at the time that the data workshop for this species occurred, so there has got to be a deadline for information to be considered in a data workshop for a species to be assessed.

That information came to light afterward. It certainly has played into the council's request that cobia be at the top of the list for this stock ID workshop that is occurring. I think, if it were up to the council, we would keep all stock boundaries at the nice, neat jurisdictional boundaries that we have between the South Atlantic and the Mid-Atlantic and between the Gulf and the South Atlantic.

Unfortunately it doesn't always work that way. The council has had to respond on many occasions to these designations of biological stock boundaries. We have one, an action that

is going through right now for king mackerel where the mixing zone was thought to be pretty much most of the east coast of the Florida Peninsula and part of the way around the west coast of the Florida Peninsula.

The most recent stock assessment for king mackerel has determined that the mixing zone between the Gulf and Atlantic stocks is actually now centered around the Florida Keys. We are at the whim of the science to some extent, but we are trying to be as responsive as possible to the very valid concerns that stakeholders have brought forth on this.

CHAIRMAN ESTES: Unless I see further interest in discussion, I will read the motion. Move the South Atlantic Board recommend to the Policy Board for the development of a complementary fishery management plan for cobia. Motion by Dr. Duval and seconded by Mr. Boyles, I'll give you just a moment to talk to each other, and then we will ask for a vote. Okay, all of those in favor of the motion as read; please raise your right hand. All those opposed, like sign, abstentions, null votes; motion passes. Okay, the next agenda item is; excuse me, where did Dr. Daniel go?

DR. DANIEL: I'm right here.

CHAIRMAN ESTES: I'm sorry; we have another part to this.

BOARD STRUCTURE OPTIONS

DR. DANIEL: Yes, if you go back to the presentation and we can get there. The next slide talks about the board structure options, Mr. Chairman.

MR. BOYLES: I would make a motion that we recommend to the ISFMP Policy Board that the South Atlantic State/Federal Fisheries Management Board be the appropriate venue for development of a cobia interstate fishery management plan.

CHAIRMAN ESTES: Is there a second? Spud.

DR. DUVAL: I'm supportive of this motion. I struggled with, what is the best approach here? I think that if current situations are any indicator, it is highly likely that harvest of cobia north of Virginia is probably going to increase down the road. I think it is appropriate that the other states that are currently on the board have the opportunity to participate in the development of a fishery management plan.

CHAIRMAN ESTES: Any further discussion of this issue? As soon as it is on the board we'll see what we're doing. Move to recommend to the policy board that the South Atlantic Board is the appropriate venue to develop the FMP for cobia. Motion by Mr. Boyles and seconded by Mr. Woodward. **Is there any objection to this motion? Seeing none; it passes unanimously.**

FRAMEWORK 4 FOR COBIA

Now, Toni wants to talk a little bit about Framework 4 for cobia.

MS. KERNS: We had a request from the South Atlantic Council to give some recommendations or comments on their Framework 4; as Michelle said that they are undergoing management action that looks at cobia. Framework 4 is just addressing the Atlantic migratory group for cobia within the document.

The document is considering changes to insure longer future seasons and allow fair access to cobia for fishermen in all states. The public comment will go through September, which is when their council meeting is, to address this issue. If we have written comments that get in by August 19, they will be a part of the meeting materials; but they will accept comments after that timeframe.

The actions that are in the document include recreational harvest limits, the bag and vessel limits modifying the recreational minimum size, modifying the accountability measures for the recreational fishery, and then establishing a commercial trip limit for Atlantic cobia. There is

also action within this document to look at the recreational fishing year.

The council was given guidance after the document was put out that they have to do an amendment in order to do this, but they are still seeking comment on the fishing year; just in case they decide to change the actual season through management action. Again, like I said, it is just looking at the Atlantic migratory group, so this is the management from Georgia northward. The current limits for federal waters are 33 inches and two fish per person per day. All of the management scenarios and the impacts of those scenarios are based off of these coastwide measures; not based on the state specific measures that have been put in place recently by some of the states.

Skip through some of these slides just in the interest of time. First is looking at modifying the recreational management measures for cobia. There are a couple of things that we are looking at here. First is looking at the possession limit. There are alternatives to not modify or to have a one fish per person per day, and that is the preferred alternative.

There is also looking at a vessel limit. That vessel limit has options ranging from one to six fish per vessel per day. The preferred alternative is three fish per vessel per day. In addition, they are looking at modifying the size limit for recreational harvest. The current is 33 inches. The document looks at modifying anywhere from 33 to 50 inches. The preferred alternative is 36 inches within the document.

This figure here shows what the preferred alternatives would get you, in terms of how much season you would have; and remember that this is a coastwide measure comparison, and it assumes the fishing date start would be January 1. Those two preferred alternatives would pull the season through almost the end of July. It is predicted that it would go through July 20th.

Next is looking at modifying the recreational fishing year for Atlantic cobia. Again, this action would actually have to be done through an amendment. But 1 is to not modify. The preferred alternative is to have the fishing year be from May 1st through April 30th. Alternative 3 would be a June 1st through May 31st season, and the last alternative is an April 1st through March 31st season.

This figure here shows the recreational landings by month, and where you see the spikes in the landings occurring is mostly March through September/October, for the waves in MRIP. I am going to skip through these tables, Max and we're going straight to the accountability measures. Then looking at how the council is adjusting, modifying their accountability measures.

The current accountability measure for cobia has the recreational ACL reduced by the total overage in the next year. That's based on the most recent three years of data, so you do some averaging out to determine how much of the overage has to be taken out of the ACL in the following year. In the commercial fishery the council closes harvest when the quota has been met, and if any overages occur, those quotas come out of the next year's quota. Michelle is correcting me, and I asked her to do this.

DR. DUVAL: Just a quick correction on the recreational side of things. The current accountability measure requires a shortened season the following year if the recreational annual catch limits and the total annual catch limit; so recreational and commercial combined, is exceeded. The length of the season will be reduced the following fishing year. If the stock is overfished, which cobia is not, then you would also have a reduction in the annual catch limit. Right now, we're just under a situation of having had a reduced season.

MS. KERNS: The preferred alternative for making changes to the accountability measure

is that if the recreational landings exceed the recreational ACL, landings would be monitored for a persistent in the increase in landings. There would be a reduction in the length of the season to insure that the recreational landings met the ACT; but are not exceeding the ACL in the next year.

This would be based on one year of data, not using the averaging that is in the current accountability measure. The next option is to look at reducing the recreational ACL in the following year, similar to what is in the current measures but it would be based on the one year of data, not the three year.

Lastly, is looking at having in-season closures. It gives the ability to close the recreational sector for the remainder of the fishing year if the ACL has been met or is projected to have been met. Then lastly is to modify the recreational vessel limit for the following fishing year, to insure that the recreational landings meet the ACT but don't exceed the ACL. It is based on the one year, as well.

For all of these recreational accountability measures, you can see that some of the big change would be instead of using the three-year average, you would use the one year. Just note that the council could use more than one of these accountability measures at a time, in order to ensure that there wouldn't be an overage in the following year.

Then lastly is to look at potentially establishing a commercial trip limit for cobia. The current trip limit is two fish per person per day. There is an alternative to establish a commercial trip limit of two person per day, and the trip would decrease to one fish when 75 percent of the commercial ACL had been met.

Then another is to establish a six fish per person vessel per day, and the trip limit would decrease to three fish per vessel per day when 75 percent of the ACL had been met. Lastly is to look at two fish per person per day with no more than six fish per vessel per day; and the trip limit would decrease to one fish per person per day, with no more than three per vessel per day when 75 percent of the ACL has been met.

This is a summary of the estimated month when the actual Atlantic cobia commercial landings reach 75 percent of the commercial ACL, and the current commercial ACL of 50,000 pounds. You can see that in the most recent year, that would have been in July, when 75 percent was met and then when it actually hit the ACL was August. That is all.

I think that we can either do one of two things here, Mr. Chairman, is that we can either get just a general consensus that the board wants to comment; and then those comments can come back to me and then we can draft a letter and send it back to the board for their review, or we can give the comments here today and then send the letter back to the board.

CHAIRMAN ESTES: First of all, so what is the will of the group? Do we want to make comments on this?

MR. NOWALSKY: I won't be cobia specific, but I will draw on the lessons learned with recreational management in conjunction with the Mid-Atlantic with summer flounder, black sea bass and scup. Having gone through that at the council level, one of the early iterations of accountability measures included in-season closure authority, and that has since been taken out and deemed just wasn't practicable. I would recommend that same course of action for recreational fisheries; including cobia, unless somebody can make some very clear case why the recreational cobia fishery is that much different than other recreational fisheries.

I would also draw on our experience in the variability inter-annually of the MRIP data and the danger of responding to a single year's worth of data, and some type of multiyear. Currently, we're using a three-year-rolling average at the council level. I would encourage the board to interact with the council, and

recommend a similar course of action to reduce that inter-annual variability

DR. DUVAL: Thank you, Adam, very much. I appreciate those comments. I think the in-season closure option is in there because it is sort of consistent with what we have for some of the accountability measures for some of our other species; but we actually don't have in-season closures for recreational cobia right now, specifically for the very reasons that you've sited.

It is in there as a reasonable alternative for public comment. I think, with regard to the three-year-moving average that is what we have currently, and that three-year-moving average resets in the year that a new ACL is rendered from a stock assessment. That is the situation that we had in 2015. We got a new annual catch limit, so the three-year-moving average started again with 2015.

You were only comparing 2015 landings with the 2015 ACL. If we maintain that three-year-moving average, anglers are going to continue to be penalized for the next two years by having to include that 1.5 million pound spike in the following two years. I just wanted to provide some rationale for why the council was looking at moving to a one-year comparison, so that if for 2016 harvest has been constrained to the limit. You would only be comparing 2016 landings to a 2016 ACL.

You would not be penalizing anglers by inclusion of that 2015 spike in the three-year-moving average. I think the other thing with the accountability measures was the council was looking at trying to not have some type of season closure by inclusion of the option that allows for a reduction in the vessel limit as a potential option; to be used possibly in combination with a shortened season, but to try to offset any shortened season that might need to occur. I just wanted to provide some context for some of those options in there.

CHAIRMAN ESTES: Obviously, each state can provide comments to the council as they see fit. I think the question before us is do we want, as the commission, do we want to provide comments on this Framework 4?

MR. BOYLES: I'm not sure we could get consensus on what to say, and so my sense is let's just look at this, at commenting individually. Again, I think that is one of the challenges we have; in terms of moving the interstate management. We don't have that yet. I wouldn't expect my views on cobia or South Carolina's views on cobia would be congruent with those of Virginia necessarily, and so I think that would be a futile exercise. I'd recommend we just move on.

MR. CIMINO: I agree with that. I just want to reiterate that I'm glad to see all the work that the council put into this, and in bringing so many options forward; although I think it would be very difficult for us to have consensus on all of them right now. There was an obvious realization by everyone that there needed to be more options within the accountability measures, and I think this is a big step forward for that.

DR. DUVAL: Just one final thought. I agree with Robert, but if there are folks, like Adam offered some very constructive comments. I think if there are folks sitting around the table who do have specific thoughts that they may want to provide to Toni, and Toni could certainly just compile. I mean, recognizing that this isn't consensus, but certainly any constructive criticism of what's in the document would be appreciated by any individuals around the table who chose to do so.

CHAIRMAN ESTES: Is everybody all right with that approach, send comments to Toni that she can compile? Okay, it looks like that is what we're going to do. It is now lunchtime. We obviously can't get done in the next five minutes. Let's break until about 12:30? It's 12:20.

MS. KERNS: We may have Jeff start giving his presentation on sort of what the red drum working group is doing while you guys are eating, and then by the time you're done eating, you can start asking him questions.

(Whereupon a recess was taken.)

RED DRUM WORKING GROUP REPORT

MR. JEFF J. KIPP: I'll be giving an update on the red drum tasks that this board tasked the Red Drum Technical Committee and Stock Assessment Subcommittee with at the May meeting. Just to refresh your memory, the tasks were to look at the appropriateness of the current biological reference points for red drum; which are spawning potential ratios.

Similar to that, 0 look at F-based reference points and the appropriateness of those for just a juvenile-based-F reference point. Evaluate the validity of age-based models for red drum, given data limitations and the life history of this species. Conduct continuity runs of the statistical catch-at-age model that was developed for SEDAR 18, the previous benchmark assessment, and to evaluate the tag return rates and the tag recapture data as it is used in the stock synthesis models.

Just a summary of the meetings that we've had since the May meeting, we did have a conference call with the commissioners to clarify some of the questions we had on the tasks; and sort of what the goals of the tasks were. We've had a series of conference calls and webinars with the Technical Committee and Stock Assessment Subcommittee to go over these tasks.

We do have a webinar planned for the week of August 15th. Also, where we'll get most of our in-person work and discussions done is at an in-person meeting at the Fall TC week, which is September 12th through the 16th, and we don't have that to be determined, the exact date and time for that meeting.

I'll spare the full language here, just in the matter of time, but the first was biological reference points and evaluating the appropriateness of spawning potential ratios for red drum, and whether or not the 30 percent threshold and 40 percent target are suitable goals for red drum. The progress to date for this task -- we started out and felt that it would be useful to go summarize the theory and use of spawning potential ratios as reference points; and how that relates to red drum and their life history. That was provided in the summary in meeting materials. We also did discuss that an overfished reference point is still contingent on spawning stock biomass estimates out of the models; whether that be the stock-synthesis models in the current assessment or, as I'll get to, the catch-at-age model that was used in SEDAR 18.

It was noted that there is the need for some additional information in addition to these F-based reference points, especially if we are lacking an SSB overfished reference point. The group kind of centered around the need for a recruitment reference point likely derived from an index-based survey under a stoplight framework or a traffic light framework as you may recognize, to supplement the F-based reference points; whether those be the spawning potential ratios, or we are tasked also at looking at just juvenile-F reference points.

Moving forward, we are currently working also on some simulations of looking at the red drum stock, fished to an equilibrium state under different spawning potential ratios, and how that will impact recruitment in the long term to help inform the group's final decision on the SPR reference points for red drum.

The ultimate goal of that will be the final recommendation on SPR reference points and the appropriate threshold and targets for both stocks. Also, to supplement that, as I mentioned, we will provide a recommendation for an index-based-recruitment reference point. For the F-based reference point this was to look at an F-based reference point strictly for the

juvenile harvest. We later did confirm on our call with some of the commissioners that that harvest is also to include the assumed B2 mortality of the fish that are discarded in the recreational fishery.

What the group has done here, they've evaluated the relationship between the current overfishing reference point SPR, and juvenile fishing mortality estimates, and also developed a list of pros and cons or advantages and disadvantages of using a juvenile F-based reference point for management of the red drum stocks.

These two figures here just show that evaluation of the relationship between the juvenile fishing mortality estimates and SPR. On the left figure for the southern stock and the right figure for the northern stock, the SPR estimates out of the stock synthesis model are on the Y axis and on the X axis are the fishing mortality estimates for age 0-5 fish.

You can see that there is a tight relationship between those two measures of fishing mortality, but one of the issues that we are currently debating for this is similar to the issues for spawning potential ratios and escapement that have been discussed in the past; and that is what is the appropriate level or reference point of fishing mortality for this type of metric to manage the stock on.

Moving forward with that in mind, again, we will be having discussions at our in-person meeting, but the final product for this task is a final recommendation on the appropriateness of a juvenile F-based reference point; and if it is deemed appropriate to provide a recommendation for what that reference point is.

As I mentioned before, the group does feel that there needs to be this supplemental index-based recruitment type reference point to supplement any type of fishing mortality reference point. The third task was to evaluate the validity of age-based models for red drum, given some of the data limitations for the species, and also the life history of that species. What the group has done here is we've summarized the potential concerns about data limitations for age-structured models for red drum. We did discuss some other types of models; most notably a biomass dynamics model or surplus-production-type model, and the TC and SAS do recommend against any type of this as inappropriate for red drum.

Moving forward, the product right now is we have coming for this task is a description of the potential implications that the data limitations that are currently in place for red drum could have on age-structured model estimates. I will note that the TC and SAS on our calls have struggled the most with this task and what the goal of this task is.

If what I've presented here is kind of what we see as the final product coming forward for this task is agreeable amongst the board, then we'll keep moving forward on that. But if there is feedback on kind of additional information or thoughts on what the board would like to see to address this task, we are kind of seeking that today.

The fourth task here is updated continuity runs of the catch-at-age model that was used in SEDAR 18. If you recall the presentation of the assessment at the May meeting, there are some pretty major differences between the estimates out of SEDAR 18 and the new stock synthesis models that were put forth in the most recent assessment.

What we spent most of our time working on for this task is just updating the model inputs to align them as closely as possible to the inputs going into the stock-synthesis-3 models, for the sake of comparing those results more closely and from the updated continuity models through 2013.

I just made a note here that the tag recapture components will be unchanged from SEDAR 18. The group views this as a major task that would

not be able to be accomplished before the annual meeting when the board would like to review the work on all these tasks. Moving forward, once those models are run, we will put together a comparison of the catch-at-age model estimates and the stock-synthesis model estimates, and we'll provide a description of those discrepancies and the likely reasons for those discrepancies.

The Stock Assessment Subcommittee will provide a final recommendation on the utility of that catch-at-age model that was used in SEDAR 18 for management advice and the caveats that go with that recommendation. But I do want to note here that the group sees the primary goal of this task in comparing what the implications are from switching from the old catch-at model to the stock-synthesis model.

If the board would like to consider the catch-at-age model as a model for management advice, there would likely need to be additional work to be done following the annual meeting. The group believes that that would need a peer review of that model; because there would be some additional data streams going into the model and likely some modifications to the model, relative to how it was configured for SEDAR 18.

The last task was to evaluate the tag return rates that are used in the stock synthesis model, and the tag recapture data and make a recommendation if any changes should be made, on how that is incorporated in the stock synthesis models. For the southern stock synthesis model, there were two sensitivity runs done, one with a lower reporting rate and one with a higher reporting rate; 60 percent reporting rate was the higher value, and an 18 percent for a lower value. For the northern model there was a likelihood profile conducted over several fixed values for the recreational harvest fleet reporting rate.

These are just some figures to show the preliminary results of those analyses. In the upper left hand corner is for the southern model, and on the Y axis is the static SPR estimates out of the stock-synthesis model over the time series. The red line is the sensitivity run with the southern model with the reporting rate fixed at 60 percent.

When that is allowed to be estimated within the model, it is estimated at about 30 percent, so it is about doubling the reporting rate as it is estimated in that model. You can see that those estimates fall very similar to the SEDAR 18 SPR estimates, which are the green-dashed line. The black line is the base-southern-stock-synthesis model, and the SPR estimates out of that model, the black-dash line is the stock synthesis model without the tag recapture data included; and you can see it has a little effect on the overall SPR estimates.

The blue line is the sensitivity run with the reporting rate fixed at 18 percent. You can see that the SPR does decrease when fixing that value at a lower rate than what it's estimated in the base model. In the lower right hand corner is the likelihood profile done for the northern model, with the change in the likelihood on the Y axis and the recreational harvest reporting rate on the X axis.

This was profiled over fixed values from 10 percent all the way up to 95 percent. If you recall, that model was estimating a reporting rate around 10 percent. What we're looking for here in this figure is just a smooth convex shape that comes to a minimum point at the best estimate out of the model.

As you can see here, that is not what we're seeing. This model, when the reporting rate is fixed, estimates a similar solution up to about a reporting rate of 50 percent, and at that point the model finds a very different solution and jumps to that solution instead of a smooth kind of transition to that as you increase the reporting rate. This is indicative of some stability issues within the model when that tag recapture data is included and the reporting rate is fixed.

Moving forward, another idea and thought that the group had and is looking into currently is evaluating the tag recapture data that was used in the stock synthesis model; but in standalone software, most notably the MARK program which is used to look at tag recapture data to get a feel for what that model would estimate from the tag recapture data.

Given a similar reporting rate that is being estimated in the stock synthesis model, that will help us inform how that stock synthesis model is estimating those tag recapture parameters.

Then from that work we'll come up with a final recommendation on how to treat the tag recapture data in the stock synthesis models, and if there are any changes that need to be made relative to how they are presented in the assessment at the May meeting. That is just a quick summary on the work we've been doing for these tasks, and if there are any questions, I can take those now.

CHAIRMAN ESTES: Questions? Spud.

MR. A. G. "SPUD" WOODWARD: Thank you, Jeff, and I certainly want to extend my appreciation to the hard work that you and everybody else has been doing on our behalf. This one is a challenge, and I know everybody is busy. We certainly appreciate the attention to detail. A question that I have been asked is whether there would be any value to doing an SS3 run with the data from the previous statistical catch-at-age model.

Would that be informative in any manner, because I think one of the things we're struggling with is; is what we're seeing as a model output a function of the inputs or is it the methodology? That's a question I've been asked is whether there would be some value to doing that.

MR. KIPP: We did try and address that as closely as we could with some sensitivity runs. In the assessment there was what we kind of called our catch-at-age alternative model runs. Those were where we did go back and we used the input data as closely as we could from SEDAR 18, within stock synthesis; and looked at the model results from that model relative to the base models.

The model results were very similar. That was a sensitivity that we did look at, but it didn't have a major impact on the model; even though we were looking at an age structure of 0-6 plus, which was comparable to what was looked at in SEDAR 18. What our take home from that was that was not a major implication in how we are making the transition from the SEDAR 18 catch-at-age model to the stock-synthesis model.

MR. WOODWARD: Also, on the task related to the validity of age-based models, I think at least personally what I'm looking for there is that we know we have data source limitations that are unavoidable and very difficult to mitigate, because of management measures and ontogenetic shifts and habitat preferences of the fish, out migration into the ocean; a variety of things that we've been plagued with since we've been trying to do quantitative assessments of this species.

What I was looking for was just a very pragmatic assessment. Given all those limitations and the uncertainties that come along with trying to fill the empty spaces, is an age-based model the only choice we have? I see that there has been some analysis of alternatives that were rejected. But I think the thing that is troubling us is that we continue to struggle to fill in the empty boxes.

When you've got cohort recruits to the fishery, you basically get to quantify its abundance effectively for a couple three years, and then it's gone where you can't really get to it. Even with our best efforts to assess the adult stock, we still end up with fragmented data. Is there something else, or is this what we're stuck with?

MR. KIPP: I think we are on the same page as far as what we're providing and putting forth to

address this task, which is a more detailed description of what those data limitations are, and how those could potentially affect model estimates from a model structure that we used in stock synthesis. But we will also include our thoughts and recommendations on other model types; in addition to the age-based models that are currently used.

CHAIRMAN ESTES: Any other questions? Hearing none; I guess there is more to come. We'll have more of this information when we meet up north in the end of October. If you are ready, Jeff, we can talk about the progress on the spot and croaker – oh, nope.

MS. KERNS: I just wanted to reiterate what Jeff had talked about in terms of moving forward with the different model types, and that if we get to at the annual meeting the point where the board wants to utilize information; that some of these models may require peer review for us to use it for management. I just want to make sure that that would mean that we couldn't move forward until after we had that peer review. I just want to make sure that everybody is clear on that.

CHAIRMAN ESTES: Any questions or issues with that?

MS. LYNN FEGLEY: Thank you, Toni. That was on my mind. It sounds like if, in October, the board decides to move forward with outputs from the statistical catch-at-age that it may need a peer review. I just wonder, for clarification, would that assessment then take the place -- What are we dealing with at that point? Are we dealing with two peer-reviewed assessments that we're considering in tandem, or are we considering the one with more recent science than the other?

MS. KERNS: I'm going to toss that question to my good friend, Pat Campfield, to answer.

MR. PATRICK A. CAMPFIELD: Thanks very much. My suggestion would be that you put together the whole package for peer review. Given the evolution of the red drum stock assessment models that we've gone through from SEDAR 18 to present, and possibly an additional type of model, you would want to put forward the whole package.

MR. BOYLES: Not a question, just a comment. Our trammel net surveys are suggesting a real issue. We are not getting year ones showing up in out years. We have strong interest in South Carolina to make some management adjustments. I find myself in this rather precarious position of wanting to be informed by the stock assessment.

I appreciate what Toni offered in terms of, if we have other questions this might just push this further and further out. I will just put a marker from our perspective. We have reason to be concerned in South Carolina with what we're seeing in our trammel net survey. We have some constituents who are very concerned about it.

I'm flummoxed in terms of a potential management response when our release rate is reported at somewhere north of 80 percent. It's got me in a little quandary, so I would just urge us to get it right to the degree we can. I'll echo Spud's comments. Jeff, to you and to all the members of the Technical Committee and the Stock Assessment Subcommittee, I appreciate your effort to this. But we want to get it right, but just know for the board that we've got some strong interest from South Carolina to make some management changes.

CHAIRMAN ESTES: I would also like to point out that although we want to get it right, the more that we task this group with doing things, there is an issue of funding and an issue of time. Therefore, the more things that we drag this out, the longer it is, there are going to be fewer things that we can do for the other species. I think we need to be mindful of that, also. Are there any other questions before we go on to the next agenda item? Seeing none; Jeff it is still your show, I guess.

PROGRESS REPORT ON THE SPOT AND ATLANTIC CROAKER STOCK ASSESSMENTS

MR. KIPP: Yes, I just have a quick update for the board on the progress of the spot and Atlantic croaker stock assessments that are currently underway. We do have our second stock assessment workshop scheduled for next week; it is Tuesday through Thursday at the commission's offices in Arlington. The bulk of that meeting will be to review our base models for both species and wrap up the assessment work at that meeting; and the plan is to then finalize the reports following that meeting and go to peer review, likely sometime in November.

For the Atlantic croaker assessment, the primary model right now is a stock-synthesis model, and for spot, we're looking at two modeling approaches, a surplus-production model and a two-staged-catch-survey analysis. Those will be the models that we're reviewing next week and moving forward with. If there are any questions on those assessments, I can take those now, as well.

CONSIDER 2015 FISHERY MANAGEMENT PLAN REVIEW AND STATE COMPLIANCE FOR RED DRUM AND ATLANTIC CROAKER

CHAIRMAN ESTES: Any questions? **Our next agenda was approval of fishery management plan reviews. Toni suggested, and I think it's a good idea, that we do this via e-mail; just because of the time that it is taking. Are there any objections to approval of the Atlantic croaker and red drum plan reviews via e-mail? Seeing none; is there any other business that we have before the board?** We've been here all morning, it seems like.

ADJOURNMENT

Seeing none; is there any objection to adjourning or do I have a motion to adjourn?

MR. BOYLES: So moved, Mr. Chairman.

CHAIRMAN ESTES: Malcolm seconded, we're adjourned.

(Whereupon the meeting adjourned at 12:40 o'clock p.m. on August 2, 2015.)

This is a draft document for Board review only and is not intend for public comment.

Atlantic States Marine Fisheries Commission

PUBLIC INFORMATION DOCUMENT

For the Interstate Fishery Management Plan For Cobia

October 2016

Vision: Sustainably Managing Atlantic Coastal Fisheries

This draft document was developed for Management Board review and discussion. This document is not intended to solicit public comment as part of the Commission/State formal public input process. Comments on this draft document may be given at the appropriate time on the agenda during the scheduled meeting. If approved, a public comment period will be established to solicit input on the issues contained in this document.

The Atlantic States Marine Fisheries Commission seeks your input on the initiation of an Interstate Cobia Fishery Management Plan

The public is encouraged to submit comments regarding this document during the public comment period. Comments must be received by **5:00 PM (EST) on Month Day, 201X.** Regardless of when they were sent, comments received after that time will not be included in the official record. The South Atlantic State/Federal Fishery Management Board will consider public comment on this document when developing the first draft of the Fishery Management Plan.

You may submit public comment in one or more of the following ways:

1. Attend public hearings held in your state or jurisdiction, if applicable.
2. Refer comments to your state's members on the South Atlantic State/Federal Fishery Management Board or South Atlantic Advisory Panel, if applicable.
3. Mail, fax, or email written comments to the following address:

Louis Daniel
Fishery Management Plan Coordinator
Atlantic States Marine Fisheries Commission
1050 North Highland Street, Suite 200A-N
Arlington, Virginia 22201
Fax: (703) 842-0741
ldaniel@asmfc.org (subject line: Cobia PID)

If you have any questions please call Louis Daniel at (252) 342-1478.

YOUR COMMENTS ARE INVITED

The Atlantic States Marine Fisheries Commission (Commission) is developing an Interstate Fishery Management Plan (FMP) for Cobia. The Commission, under the Atlantic Coastal Fisheries Cooperative Management Act, is charged with developing FMPs which are based on the best available science and promote the conservation of the stock throughout its range.

This is the public's first opportunity to inform the Commission about changes observed in the fishery, management measures the public feels should not be included in the FMP, regulation, enforcement, research, development, enhancement and any other concerns the public has about the resource or the fishery. In addition, this is the public's chance to present possible reasons for the changes and concerns for the fishery.

WHY IS THE ASMFC PROPOSING THIS ACTION?

At its August 2016 meeting, the Commission's South Atlantic State/Federal Management Board initiated the development of the first interstate Cobia FMP.

Currently, the South Atlantic Fishery Management Council (SAFMC) and NOAA Fisheries manage cobia under the Coastal Migratory Pelagic (CMP) FMP through an allowable catch limit (ACL), combined with possession and minimum size limits. An overage of the recreational ACL occurred in 2015 and resulted in a shortened recreational season in 2016, consistent with the accountability measures (AMs) implemented by the SAFMC. The closure had measureable impacts to member states when their recreational fisheries were shut down at the peak of their season (Outer Banks of North Carolina and all of Virginia). The closures occurred at the peak of the Outer Banks fishery and the Virginia recreational fishery causing an economic loss. Concerned by these impacts and recognizing that a significant but variable proportion of reported recreational landings are harvested in state waters, the SAFMC requested the Commission consider complementary or joint management of the cobia resource.

The Commission's Interstate Fisheries Management Program Policy Board reviewed a white paper at its August 2016 Meeting and agreed Commission management of cobia was prudent. The Commission tasked the development of an FMP to the South Atlantic State/Federal Fisheries Management Board, complementary with the SAFMC plan for cobia (*Rachycentron canadum*).

SAFMC management, based on current genetic information, addresses the management of Atlantic Migratory Group (AMG) of cobia that occur from Georgia through New York (Figure 1). Cobia that occur off the east coast of Florida are part of the Gulf stock, but the SAFMC manages the portion of that stock on the Florida east coast that occurs within its jurisdiction (Florida/Georgia (FL/GA) border to the Monroe County line). Tag recapture data suggested two main stocks overlap at Brevard County Florida and corroborated the genetic findings. The genetic findings also determined there were two distinct population

segments (DPS) in Port Royal Sound, South Carolina and Chesapeake Bay, Virginia. The main South Atlantic and Gulf stocks were separated for management purposes at the FL/GA border because genetic data suggested the split is north of the Brevard/Indian River County line and there was no tagging data to dispute this split. The FL/GA border was selected as the stock boundary based on recommendations from the commercial and recreational work groups of the Southeast Data Assessment and Review (SEDAR) 28 stock assessment (2013) as well as enforcement and administrative concerns.

Cobia occurring off the east coast of Florida are part of the Gulf Migratory Group (GMG) of cobia, but the Gulf of Mexico Fishery Management Council (GMFMC) allocated a portion of the GMG cobia ACL for the SAFMC to manage. SAFMC sets measures for the Florida east coast to achieve the sub-ACL set by the GMFMC. The Florida east coast boundary and the revised ACLs based on the stock boundary changes were implemented through Amendment 20B to the CMP FMP (GMFMC/SAFMC014). Collection of genetic samples from northern Florida (east coast) and Georgia continues and analysis will be used in a stock identification workshop planned for 2017 that will review the stock boundary between the south Atlantic and Gulf stocks.

Recreational cobia landings in 2015 were 1,565,186 pounds (SEFSC), well above the 2015 ACL of 630,000 pounds. This overage resulted in a June 20, 2016 closure of the fishery by NOAA Fisheries. Concern was expressed by individual states whose recreational seasons were reduced by the 2016 closure. North Carolina and Virginia developed alternate management strategies for harvest in state waters to avoid the June 20, 2016 closure enacted by NOAA Fisheries. South Carolina recently implemented more restrictive measures to protect an inshore spawning population in southern South Carolina that was independent of the actions taken by NOAA fisheries.

Commercial cobia landings in 2015 were 71,790 pounds (landed weight) that exceeded the commercial ACL of 60,000 pounds (landed weight). Unusual fall landings occurred in 2015 that prevented a timely closure. Landings can be reported as both gutted or whole weight. Management uses “landed” weight to determine if the ACL has been met. Since landed weight includes both gutted and whole fish total weight harvested is likely underestimated.

STATEMENT OF THE PROBLEM

Historically, cobia has been managed through the federal Gulf of Mexico and Atlantic CMP FMP; the plan’s measures had been considered precautionary due to the low bag limits. Both sectors of the fishery have been managed with a two fish possession limit and 33” fork length (FL) minimum size since formal management began in 1990 (under Amendment 6). The ACLs and AMs were established through Amendment 18 and then updated in Amendment 20B

(GMFMC/SAFMC 2012 and 2014). The 2013 stock assessment conducted through the SEDAR process indicated overfishing was not occurring and the stock was not overfished. However, biomass/abundance had been as trending steadily downward over the previous two decades. Additionally, the stock assessment used a different stock boundary than that in the FMP. The current ACL is a conservative approach to prevent the stock from reaching an overfished status. The recent overage in 2015 exceeded the SAFMC's defined overfishing limit, meaning the stock is undergoing overfishing. Further, quota overages would continue to contribute to overfishing and could lead to the stock becoming overfished.

Efforts to more closely monitor state-specific harvest to ensure that quotas are not exceeded and that overfishing is averted is the Commission's primary focus. Further, by developing a Commission plan, the impacts of a single, federal closure may be mitigated through state-specific measures designed to maintain traditional seasons at reduced harvest rates. The proposed interstate FMP considers potential management approaches to maintain a healthy resource while minimizing the socioeconomic impacts of seasonal closures.

DESCRIPTION OF CURRENT MANAGEMENT

SAFMC management of cobia is consistent for the AMG in federal waters with a two fish possession limit and 33" FL minimum size limit for commercial and recreational harvest. To reduce recreational harvest and attempt to extend seasons, some states have recently modified their state water measures (Table 1). Commercial management remains at two fish and 33" FL. Because cobia found in Florida waters are not a part of the AMG, they have a different set of management measures designed to achieve the sub-ACL.

Table 1. Recreational measures in 2016 for Cobia in Virginia, North Carolina, South Carolina, Georgia**,** and Florida.

State	**Bag limit (Fish per person/ day)**	**Vessel limit (Fish per vessel per day)**	**Size Limit (inches)**	**Legal Gear**
Virginia	1 *	2	40” TL, only 1 > 50” TL	No gaffing permitted
North Carolina	1 **	For-hire: 4/vessel or 1 person when less than 4 people on board Private: 2 fish on vessels with more than 1 person on board	37” FL	
South Carolina – north of Jeremy Inlet, Edisto Island	2	None	33” FL	
South Carolina- south of Jeremy Inlet, Edisto Island	1 (June 1-Apr 30) Catch and release only May 1-May 31	3, or 1 per person, whichever is lower	33” FL	
Georgia	2	None	33” FL	
Florida	1	1 per person or 6 per vessel, whichever is less	33” FL	spears, gigs, hook and line, seine, cast net

*VA State waters close 8/30/16.

**NC State waters close 9/30/16; private recreational can only retain cobia on Mondays, Wednesdays, and Saturdays. Shore based anglers may retain 1 fish per day, 7 days per week.

In September 2016, the SAFMC recommended NOAA Fisheries approve the following measures contained in Framework 4: recreational harvest limits of one fish per person per day or six per vessel per day, and a minimum size limit of 36" fork length (FL) for recreational harvest; a commercial harvest limit of two fish per person per day or six per vessel, whichever is more restrictive, but no change to the commercial minimum size limit of 33" FL.

The SAFMC is also proposing modifications to the recreational AMs for AMG cobia. These changes are expected to be implemented in spring 2017. In December 2016, the Council will review and recommend to NOAA Fisheries approval of an amendment to change the recreational fishing year for AMG cobia, the current fishing year is January 1 – December 31. The amendment's preferred alternative would change the fishing year to May 1 – April 30.

The allocation of the SAFMC's ACL between commercial and recreational sectors is based on historical landings (50% is based on the average 2000-2008 landings and 50% is based on the average 2006-2008 landings). Beginning in 2016, the ACL is split 92% recreational and 8% commercial. The 2016 ACL for cobia is 670,000 pounds, with 620,000 comprising the recreational ACL and 50,000 comprising the commercial ACL. The ACL for 2015 was slightly higher at 690,000 pounds.

LIFE HISTORY AND STATUS OF THE STOCK

Cobia is a fast growing, moderately lived (14 years old) species, with most fish maturing by age two. Females grow faster and attain larger sizes than males, but become sexually mature later. Cobia migrate south to north as well as east to west. Spawning occurs when water temperatures reach 20-21° C from April through September with spawning occurring earlier in Florida and later in Virginia. Cobia form aggregations and spawn multiple batches of eggs throughout a relatively short season. Year class strength can be highly variable but trends in the data show a very strong year class occurs once in a decade. Both tag recapture and genetic data show cobia exhibit natal homing and are often recaptured on the same structure or in locations where they were caught years before. This natal homing and spawning aggregation behavior make them very predictable and easily located by fishermen.

The results of the SEDAR 28 stock assessment determined the FL/GA border as the demarcation between the Atlantic and Gulf of Mexico stocks. As previously mentioned, a workshop in early 2017 will evaluate all the current cobia genetic information. While cobia do frequent areas north of Virginia, the harvest is uncommon and sporadic. Landings have been episodically reported from Maryland, New York, New Jersey and Rhode Island and make up from 3-15% of the total Mid-Atlantic landings.

The SEDAR 28 stock assessment indicated overfishing was not occurring and the stock is not overfished. The current ACL is a precautionary approach to prevent the stock reaching an overfished status. The recent overage in 2015, exceeded the Council defined overfishing limit, meaning overfishing is occurring. The stock assessment does indicate concerns. While the terminal year of the assessment was 2011, spawning stock biomass (SSB) experienced a general decline from 2002 forward (Figure 2). Further, recreational landings have increased over the latter portion of the time series that may increase potential overfishing issues in the next assessment. The Council proposed cobia be included in the 2019 SEDAR schedule for a research track assessment which will give guidance on the appropriate data and models to be used in the 2020 stock assessment.

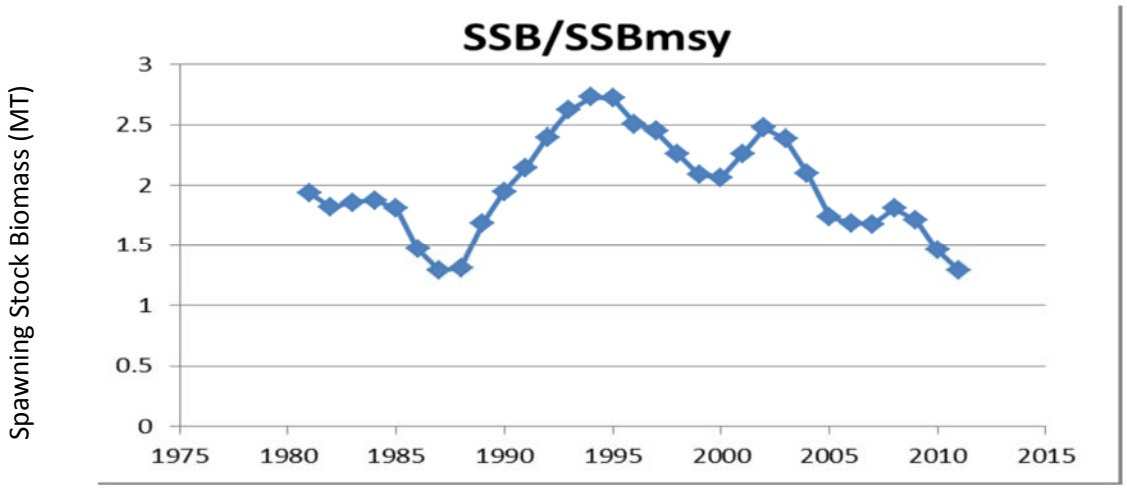


Figure 2. Cobia spawning stock biomass relative to the MSY biomass reference for 1981-2011.

Data collection programs vary by state and will be further described in the upcoming draft FMP. However, research efforts at the state level are confounded by the observation that cobia only occur in specific state jurisdictions in aggregations for a brief period each year and often in locations conflicting with the peak of recreational fishing. Directed sampling efforts are difficult outside of the primary recreational season that extends from April through August, because fish are migrating from spawning locations and not found in large concentrations.

DESCRIPITON OF THE FISHERY

Recreational Fishery

Cobia supports a valuable recreational fishery throughout the South Atlantic and into the Mid-Atlantic region. Known for their readiness to take a bait, tough fighting abilities and excellent table fare, the fishery is popular in the recreational sector. Recreational landings data are generated through the Marine Recreational Information Program (MRIP) for state and federal waters. Current information

indicates a variable proportion of landings come from state waters and can range from 0 to 100% (Table 2). The 10 year average, annual percentage of cobia taken in state waters with and without east coast Florida included are 66% and 51% respectively (Tables 3 and 4).

Recreational fisheries are prosecuted similarly along the coast. The directed cobia fishery is prosecuted in two distinct ways. Bottom fishing with live or dead baits, often while chumming, in estuarine waters or around inlets or offshore around structure, buoys, markers, natural and artificial reefs. More recently, an active method of searching for fish traveling alone or in small groups on the surface or associated with schools of Atlantic menhaden or other bait fishes has grown in popularity. This newer method has resulted in the further development of the for-hire sector for cobia, as well as the development of specific artificial baits and boat modifications (e.g., towers) to facilitate spotting and catching the fish. A third method primarily prosecuted in offshore waters is to target large rays, large sharks, sea turtles or floating debris around which cobia congregate. This more active method likely confounds reported landings being in state or nearshore federal waters as vessels tend to move in and out of state and federal waters following the bait or the fish. Additionally, the Atlantic coast of Florida is starting to see more directed spearfishing pressure on cobia. Specifically, spearfishers are chumming for bull shark and then diving/free-diving to spear cobia that associate with them. Spearfishing also occurs off North Carolina, along with a popular pier fishery.

The recreational fishery also takes cobia as bycatch in offshore bottom fisheries such as snapper/grouper, nearshore trolling for king mackerel, bluefish, and dolphin and any other fishery that employs live or dead bait fished on or near the bottom. While the directed fishery appears to focus more on the spring-summer spawning migration, bycatch, especially offshore, can yield cobia virtually year-round.

Recreational landings for cobia have varied with little trend since 2005; landings did hit a time series high in 2015 resulting in a significant overage of the federal ACL (Figure 3). Since 2005, the highest landings have occurred in the east coast of Florida, North Carolina and Virginia. The three year average landings (2103-2015) in the east coast of Florida, North Carolina and Virginia were approximately 446,218, 466,944 and 429,179 pounds, respectively. In 2015, the three states with the highest recreational landings were Virginia (718,647 pounds), North Carolina (630,373 pounds) and Florida (east coast) (481,956 pounds) (Table 4).

Table 2. Percentage of cobia in the recreational fishery harvested in state waters (zero implies all were harvested from federal waters). All data are final MRIP estimates, which may differ from SEFSC estimates.

	Florida	Georgia	South Carolina	North Carolina	Virginia
2006	22	0	98	30	100
2007	9	0	0	47	100
2008	14	0	0	50	100
2009	53	0	0	58	100
2010	59	39	41	75	94
2011	33	0	0	90	50
2012	21	80	0	49	42
2013	9	0	61	79	83
2014	17	0	52	82	100
2015	13	0	6	92	97

Table 3. 10-year average percentage of cobia harvested in state waters with and without east coast Florida. All data are final MRIP estimates, which may differ from SEFSC estimates.

	Percent of Cobia Harvested in State Waters GA-NY	Percent of Cobia Harvested in State Waters FL-NY
2006	87	68
2007	52	34
2008	29	22
2009	80	71
2010	75	68
2011	56	40
2012	34	28
2013	77	59
2014	83	47
2015	85	71

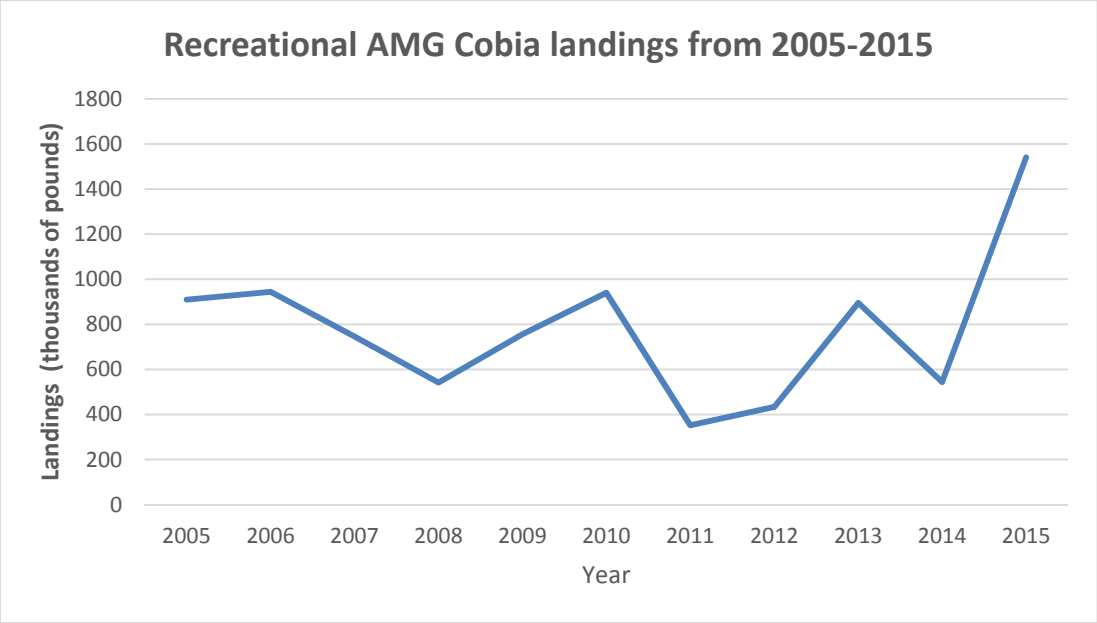


Figure 3. Recreational landings of AMG cobia (2005-2015)

Commercial Fishery

The commercial fishery has traditionally been a bycatch in other directed fisheries such as the snapper/grouper hook and line fishery and troll fisheries for various species (e.g., king mackerel, dolphin, wahoo, amberjack). Directed fisheries are generally precluded as a result of the low possession limits, but do occur, specifically Virginia's commercial hook and line fishery. Cobia from for-hire trips may also be sold commercially, depending on the state's permit requirements for selling fish.

Commercial harvest has been increasing in North Carolina since 2011 and in the Mid-Atlantic since 2012 (Figure 4). Commercial harvest has remained stable in Georgia and South Carolina since 2010. Commercial cobia landings on the east coast of Florida ranged from 57,003 to 156,069 pounds (avg. = 88,278 pounds) during the 2007-2011 time series. Commercial landings in Georgia and South Carolina were low and values for the two states were combined from 2010-2015 to avoid confidentiality issues and averaged 3,867 pounds per year(Table 5).

The commercial cobia fishery closed December 11, 2014. The 2015 overages would have been deducted if the stock were overfished; however, given they are not overfished, the commercial quota for 2016 remains 50,000 pounds (Figure 4). In 2015, North Carolina landings (52,684 pounds) accounted for nearly the entire commercial quota and would have exceeded the 2016 quota (Table 5). Commercial landings for the Mid-Atlantic region (Virginia, Maryland, New Jersey, New York,) and Rhode Island are combined in Table 6 to avoid confidentiality issues in several Mid-Atlantic states. The majority of the Mid-Atlantic landings

come for Virginia. The average landings from 2010-2015 were 14,732 pounds per year.

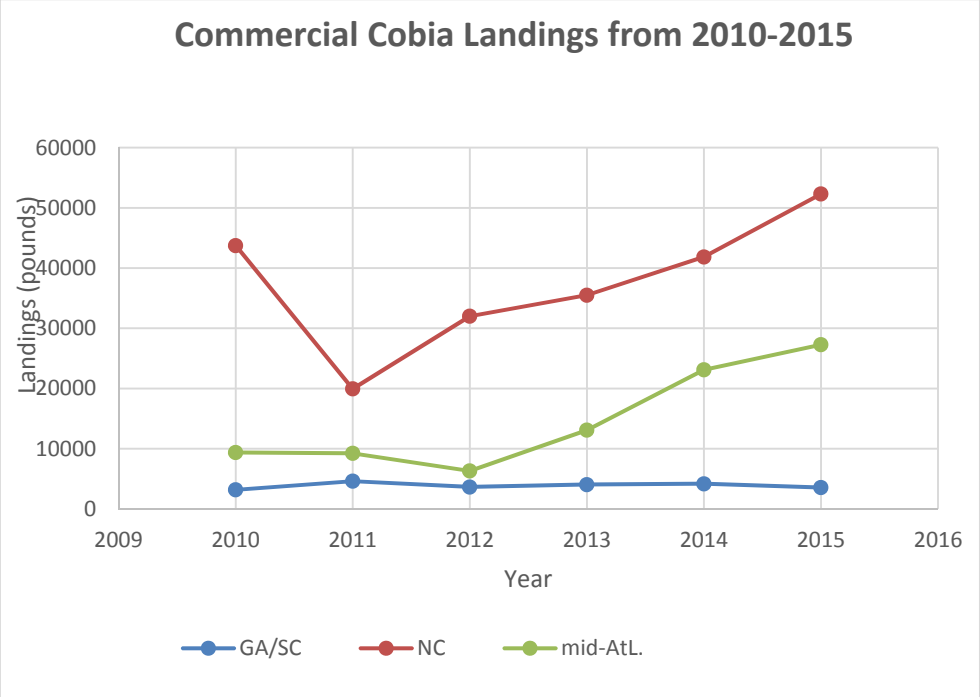


Figure 4. Commercial landings of cobia (2010-2015)

Table 4. Recreational landings of AMG cobia from 2005-2015 in pounds. Data sources: SEFSC

Year	Virginia	North Carolina	South Carolina	Georgia	Total AMG (VA-GA)	East Coast of Florida
2005	577,284	322,272	5,793	3,358	908,707	287,267
2006	733,740	104,259	101,018	4,824	943,841	493,334
2007	322,887	90,197	268,677	64,708	746,469	580,632
2008	167,949	66,258	50,108	257,690	542,006	438,621
2009	552,995	123,061	76,229	3,997	756,282	361,120
2010	232,987	561,486	65,688	79,855	940,015	745,228
2011	136,85u9	121,689	3,565	90,375	352,488	761,440
2012	36,409	68,657	224,365	105,193	434,623	370,373
2013	354,463	492,969	19,130	29,224	895,786	274,276
2014	214,427	277,489	31,927	20,642	544,485	582,423
2015	718,647	630,373	123,952	67,804	1,565,186	481,956

* There are no MRIP-estimated recreational landings of AMG cobia in states north of Virginia.

Table 5. Commercial cobia landings (pounds) and revenues (2014 dollars) by state/area, 2010-2015.

Year	GA/SC	NC	Mid-Atlantic*	Total
		Commercial Landing in Pounds		
2010	3,174	43,737	9,364	56,275
2011	4,610	19,950	9,233	33,793
2012	3,642	32,008	6,309	41,959
2013	4,041	35,496	13,095	52,632
2014	4,180	41,848	23,111	69,139
2015	3,555	52,315	27,277	71,790
Average	3,867	37,559	14,732	56,158
		Dockside Revenues (2014 dollars)		
2010	$11,377	$70,377	$19,976	$101,730
2011	$19,666	$37,893	$21,666	$79,224
2012	$15,554	$66,887	$14,597	$97,038
2013	$15,639	$79,397	$35,792	$130,828
2014	$13,320	$95,462	$67,972	$176,754
2015	$11,151	$147,160	$75,360	$233,672
Average	$14,451	$82,863	$39,227	$136,541

Georgia and South Carolina landings are combined to avoid confidentiality issues.
Source: SEFSC Commercial ACL Dataset (December 2015) for 2010-2014 data; D. Gloeckner (pers. comm., 2016) for 2015 data.
*Mid-Atlantic States include Virginia, Maryland, New York, New Jersey.

WHAT IS THE PROCESS FOR DEVELOPING A FMP?

The publication of this document and announcement of the Commission's intent to develop a Cobia FMP is the formal, first step of the FMP development process. Following the initial phase of information gathering and public comment, the Commission will evaluate potential management alternatives and the impacts of those alternatives. The Commission will then develop a draft FMP, incorporating the identified management alternatives, for public review. Following the review and public comment, the Commission will specify the management measures to be included in the FMP, as well as a timeline for implementation.

The timeline for completion of the FMP is as follows:

	Oct 2016	Nov 2016 – Jan 2017	Feb 2017	Mar – May 2017	May 2017	May – Aug 2017	Aug 2017
Approval of Draft PID by Board ***Current Step***	**X**						
Public review and comment on PID		**X**					
Board review of public comment; Board direction on what to include in the Draft FMP			**X**				
Preparation of the Draft FMP				**X**			
Review and approval of Draft FMP by Board for public comment					**X**		
Public review and comment on Draft FMP						**X**	
Board review of public comment on Draft FMP							**X**
Review and approval of the final FMP by the Board, Policy Board and Commission							**X**

WHAT IS THE PURPOSE OF THIS DOCUMENT?

The purpose of this document is to inform the public of the Commission's intent to gather information concerning the cobia fisheries, develop management measures to assist the SAFMC in maintaining harvest levels within the prescribed ACL, and provide management flexibility to the states to minimize the impact of potential closures. The PID provides an opportunity for the public to identify and/or comment on issues and alternatives relative to the management of cobia. Input received at the start of the FMP development process can have a major influence on the final outcome of the FMP. This document is intended to draw out observations and suggestions from fishermen, the public, and other interested parties, as well as any supporting documentation and additional data sources.

To facilitate public input, this document provides an overview of issues identified for consideration in the FMP, as well as background information on the cobia stock, fisheries and management. The underlying question for public comment is: **"How would you like the cobia fishery and population to look in the future?"**

The Commission is looking for both general comments on cobia management in state waters and any comments specific to the issues listed in this document.

WHAT ISSUES WILL BE ADDRESSED?

The primary issues considered in the PID are:

- Complementary Management with the SAFMC
- Management Objectives
- Coastwide, Regional or State-by-State Approach to Management
- Commercial and Recreational Management Tools

ISSUE 1: COMPLEMENTARY MANAGEMENT WITH THE COUNICL

Background: The SAFMC manages cobia through the CMP FMP with consistent bag, trip and size limits in federal waters. A recent ACL has been employed to protect the resource and minimize the possibility of cobia being subjected to overfishing or becoming overfished. Complementary management of cobia is intended to increase flexibility and management reaction time, while providing states the ability to more actively and adequately manage the fishery in their respective states. It is anticipated Commission would adopt the ACLs and biological reference points established by the benchmark cobia stock assessment developed by the SAFMC.

States have historically mirrored the SAFMC's size and bag limit regulations in state waters. The recreational closure in 2015 resulted in Virginia and North Carolina modifying their regulations in order to reduce the impacts of the June 20, 2016 federal closure. South Carolina has developed various, additional regulations based on area-specific genetic work and concern over the condition of a DPS that occurs in its southern waters.

Management Questions:

- Should the Commission develop a complementary Cobia FMP to the SAFMC's CMP FMP?
- What federal management measures should be required in the Commission plan?
- What states should be included in the management unit?
- Given the upcoming genetic workshop in 2017, should the FMP provide the flexibility to make changes to management and stock units to reflect changes in the science?

ISSUE 2: MANAGEMENT OBJECTIVES AND GOALS

- **Background:** The first step in proactive fisheries management is to decide what is meant by optimizing the benefits for a fishery. Goals and objectives can be divided into four subsets: biological, ecological, economic, and social, where social includes political and cultural goals. The biological and ecological goals can be thought of as constraints in achieving desired economic and social benefits. Examples of goals under each of these categories include:

- Maintain the target species at or above the levels necessary to ensure their continued productivity (biological);
- Minimize the impacts of fishing on the physical environment and on non-target (bycatch), associated and dependent species (ecological);
- Maximize the net incomes of the participating fishers (economic); and
- Maximize employment opportunities for those dependent on the fishery for their livelihoods (social).

Identifying such goals is important in clarifying how the fish resources are to be used. Without such goals, there is no guidance on how the fishery should operate, which results in a high probability of ad hoc decisions and poor use of the resources (resulting in lost benefits), and increases the probability of conflicts among user groups.

The Commission could consider the following management objectives for the Cobia FMP and is soliciting other ideas or options that could be raised.

A. Provide a management plan that achieves the long-term sustainability of the resource and strives, to the extent practicable, to implement and maintain consistent coastwide measures, while allowing the states the flexibility to implement alternative strategies to accomplish the objectives of the FMP
B. Provide for sustainable recreational and commercial fisheries.
C. Maximize cost effectiveness of current information gathering and prioritize state obligations in order to minimize costs of monitoring and management.
D. Adopt a long-term management regime which minimizes or eliminates the need to make annual changes or modifications to management measures.

Management Questions
What should be the objectives in managing the cobia fisheries through the Commission?

ISSUE 3: COASTWIDE, REGIONAL OR STATE-BY-STATE MANAGEMENT

Background: States currently manage their cobia fisheries independently. The Commission is considering coordinating the management of cobia in order to avoid states being disadvantaged based on where they occur along the migratory route, while maintaining harvest at the SAFMC's ACL level.

States have been disadvantaged by geography in the past when they occur on the northern or southern end of a migratory range, often resulting in early closures or no fishery at all. While consistent, coastwide measures may be desirable, they may result in disproportionate impacts to certain states.

More flexibility to individual states may be available through state-by-state allocations of the cobia ACLs. Allocations can allow limits and seasons to be

imposed that maximize the individual state fishery needs, and reduce the impact of other state overages.

Management Questions:

- Are consistent, state-specific management measures, coordinated by the Commission, needed for cobia?
- Are there regional differences in the fishery and/or resource that need to be considered when implementing management measures?
- Should the FMP require a coastwide closure if the SAFMC ACL is met?
- Should the FMP require a coastwide measures (e.g., size and bag limit)?
- Should the FMP require regional measures?
- Should the FMP develop a suite of options for the allocation of state-specific quotas, and allow states to adopt unique size, bag, and season measures?

ISSUE 4: COMMERCIAL AND RECRATIONAL MANAGEMENT TOOLS

Background: The Commission could consider different management approaches for the commercial and recreational cobia fishery. Currently, the commercial fishery is managed consistently throughout state and federal jurisdictions, while recreational management measures vary (Table 1).

Potential management tools include: minimum size restrictions, maximum size restrictions, bag/trip/boat limits, seasons or gear restrictions.

Management Options:

- What are the appropriate commercial and recreational measures for cobia?
- Should the FMP consider gear restrictions, e.g. circle hooks for all live and dead bait fisheries for cobia or prohibition on gaffing cobia?
- Are there other management options that should be considered (e.g., slot limits, spawning season closures, etc.)?
- Should the FMP consider some level of *de Minimis* or threshold landings where cobia harvest is minimal or episodic?

ISSUE 5: OTHER ISSUES

The public is asked to comment on any other issues for consideration in the development of the Commission's Draft Fishery Management Plan for Cobia.

Atlantic States Marine Fisheries Commission

1050 N. Highland Street • Suite 200A-N • Arlington, VA 22201
703.842.0740 • 703.842.0741 (fax) • www.asmfc.org

MEMORANDUM

TO: **South Atlantic Management Board**

FROM: **Red Drum Technical Committee and Stock Assessment Subcommittee**

DATE: **10/11/2016**

SUBJECT: **TC/SAS Response to Board Tasks for Benchmark Assessment of Red Drum**

This document contains responses of the Red Drum Technical Committee (TC) and Stock Assessment Subcommittee (SAS) to tasks given them by the South Atlantic Management Board (Board) after the 2016 Red Drum Benchmark Stock Assessment was presented to the Board. A summary of the TC/SAS's conclusions and recommendations regarding these tasks is shown below, followed by four reports providing detailed responses to each of the tasks given by the Board.

Summary of Conclusions

After reviewing all the work done for each of the tasks assigned by the Board, the TC and SAS discussed recommendations moving forward. The TC and SAS recommend against using a juvenile fishing mortality reference point for management. This type of reference point ignores fishing mortality on mature fish which has increased over time as catch and release has become more prevalent, leading to potential adverse effects on the productivity of the stocks. There is also no guidance or support for an appropriate overfished reference point to ensure sustainability. The TC and SAS conclude spawning potential ratios, including the current target (30%) and threshold (40%), are appropriate metrics for red drum management. These management goals are supported by literature reviewed by the TC and SAS, particularly in the absence of better information on the stock-recruit relationship.

The TC and SAS agree age-structured modeling approaches are appropriate and preferred, given red drum life history and the available data. However, there are data gaps that limit the complexity of these modeling approaches. The TC and SAS agree the estimates from the statistical catch-at-age (SCAA) models are more realistic than the estimates from the Stock Synthesis 3 (SS3) models. Given both approaches passed peer review, but the SCAA models provide estimates that better match expert opinion, the TC and SAS recommend using the spawning potential ratio (SPR) estimates from the SCAA models for management. The SS3 framework still provides potential for improvements over the SCAA in future assessments, if certain data gaps are addressed, therefore the TC and SAS recommend to continue working on the SS3 model in the future. Addressing these data gaps may allow for the inclusion of the tag-recapture data, but the TC and SAS recommend these data not be included in the SS3 model for the northern stock until some observed data conflicts are addressed. The biomass estimates from the SCAA models are not reliable and should not be used to determine overfished status. The TC and SAS recommend in the absence of reliable biomass estimates and overfished status,

a reference point for relative recruitment should complement SPR estimates. SPR is a per-recruit measure that does not account for changes in absolute abundance. Therefore, a stock being fished above the target SPR could still experience declining abundance and biomass if recruitment declines. The TC and SAS are developing a recruitment stop light indicator to address the limitation of solely using a SPR reference point to manage red drum.

Biological Reference Points

Board Task: Investigate whether the current biological reference point for overfishing (SPR40% target, SPR30% threshold) is appropriate given the species' long life history. This task is two-fold in that the Board is interested in whether spawning potential ratio is an appropriate metric and whether the 30% threshold and 40% target are suitable goals. The Board also requests the development for an overfished reference point recommendation.

The South Atlantic Board requested information regarding spawning potential ratio (SPR), specifically its basis for usage in stock assessment, whether it is appropriate as a overfishing reference point for red drum, and if the current target and threshold are appropriate. The usage of SPR spread from New England fisheries in the early 1990s and, as a result, much of the early work regarding "spawner productivity" was based on groundfish life history strategies and other northwest Atlantic fisheries (Clark, 1991; Clark, 1993). The stock assessment subcommittee (SAS) believes SPR is the most appropriate type of reference point to use for overfishing for red drum. Calculation of SPR does not require constant recruitment, and it tracks 1-to-1 with fishing mortality. Also, unlike fishing-mortality-based reference points such as $F_{0.1}$ and F_{MAX}, it does not become a "moving target" when there are changes in size structure due to changes in fishing regulations. Because red drum has undergone considerable regulation changes in the past, calculation of $F_{0.1}$ or F_{MAX} would be complicated.

Early simulations conducted in the 1990s suggested that fishing at a level that produced SPR levels between 35-45% provides a high percentage of maximum sustainable yield, especially if there is uncertainty in the stock-recruitment relationship (Clark, 1993). Later work in the early 2000s suggested this SPR would need to be higher for less resilient and/or data-poor stocks but could be lower for resilient and/or data-rich stocks (Clark, 2002). Because red drum has an uncertain stock-recruitment relationship but is considered resilient because of its large number of spawning age classes, the SAS recommends staying with the current 40% SPR target and 30% SPR threshold.

The SAS recommends against the development and usage of an overfished reference point for red drum at this time. Overfished reference points often take the form of a spawning stock biomass estimate and the difficulties of reliably estimating spawning stock biomass in SEDAR 18 have persisted in this assessment, as well. This might suggest a data deficiency in the adult stage of red drum. Currently, the longline surveys in South Carolina, Georgia, and North Carolina are the main indices used to inform adult abundance and age structure in the southern and northern regions. The North Carolina longline survey is relatively new (2007), so it is possible that the issue will be mitigated in the northern region as the time series grows in length. A common solution for setting the overfished target and threshold would be to set them at the biomasses that correspond to the SPR target and threshold. However, the validity of these values as reference points depends on having a well-defined stock-recruitment relationship (Goodyear, 1993); otherwise, SPR is not inherently tied to stock biomass. There is likely not a well-defined stock-recruitment relationship for red drum, especially in the northern region where recruitment may be heavily influenced by environmental factors rather than spawning stock biomass.

The SAS is currently designing a juvenile/recruitment-based traffic light analysis to be employed for red drum. It will include juvenile abundance indices as well as age-1 and age-2 surveys from Florida, Georgia, and South Carolina to assess the southern region and North Carolina to assess the northern region. While it is not ready to be implemented alongside the proposed stock assessment, one of the goals is for it to be used in conjunction with assessment results. For this assessment, SPR is the only reference point being proposed, but SPR is not a true indicator of population size, so this analysis could at least provide much-needed information on the productivity of the stocks. The other goal would be to use this traffic light approach in between assessment years—similar to the exercise used for Atlantic croaker—which could inform the Board whether an assessment of red drum can be put on hold or if there is an urgent need to update it. Because of its longer life span relative to croaker, the SAS has considered a requirement based on four years of traffic light indicators. This may help avoid premature action as a few bad years of recruitment do not appear to impact the stock considerably.

See Appendix I for a list of papers and summaries which provide more detailed information on reference points and analysis techniques.

References

Clark, W. G. 1991. Groundfish exploitation rates based on life history parameters. Canadian Journal of Fisheries and Aquatic Sciences 48: 734-750.

Clark, W. G. 1993. The effect of recruitment variability on the choice of a target level of spawning biomass per recruit. Management of Exploited Fish, Alaska Sea Grant: 233-246.

Clark, W. G. 2002. $F_{35\%}$ revisited ten years later. North American Journal of Fisheries Management 22: 251-257.

Goodyear, C. P. 1993. Spawning stock biomass per recruit in fisheries management: foundation and current use. P. 67-81. In SJ Smith, JJ Hunt, and D Rivard [ed.] Risk evaluation and biological reference points for fisheries management. Canadian Special Publications of Fisheries and Aquatic Sciences 120.

Appendix I

Summaries of relevant literature on SPR and other biological reference points.

Bacheler, N. M., L. M. Paramore, J. A. Buckel, and F. S. Scharf. 2008. Recruitment of juvenile red drum in North Carolina: Spatiotemporal patterns of year-class strength and validation of a seine survey. North American Journal of Fisheries Management 28: 1086-1098.

- North Carolina's juvenile abundance index (JAI) seine survey estimated dome-shaped age-0 CPUE at its 21 sites over the course of each sampling period (September-November). This suggests the survey was capturing peak abundance levels.
- Temperature and salinity only explained 8.1% of the variation in abundance in a GAM framework (spawning stock biomass, predation might be other factors).

- The loss rates of age-0 red drum (from peak time to emigration in November) were not density-dependent, as late-November CPUE did not reach an asymptote at higher peak CPUE values. Also, the loss rates were not correlated with age-0 CPUE.
- Commercial catch of age-2 red drum two years later were correlated with the age-0 abundance index. When the outlier of 1996 was removed from JAI numbers (hurricane), recreational catch of age-2 was also correlated with the age-0 abundance index. *Could these JAI values serve as a proxy for age-2 abundance (and later) and vice versa?* "Thus, the JAI survey appears to provide a robust index of age-0 abundance and should be useful as a valid tuning index for red drum stock assessments in North Carolina." *Could it be used to tune Virginia as well?* "…red drum CPUE was correlated at a large, intrastate scale of tens to hundreds of kilometers but not at a much larger spatial scale."

Clark, W. G. 1991. Groundfish exploitation rates based on life history parameters. Canadian Journal of Fisheries and Aquatic Sciences 48: 734-750.

- Fixed exploitation rates (unless biomass gets below a threshold) can maintain SSB, except it is hard to decide on rates or biomass threshold without knowing the stock-recruit relationship. It is also not equipped to deal with stocks that are "subject to large natural variations in equilibrium abundance." The author uses examples of Alaskan groundfish stocks seeing 5- to 10-fold changes in abundance in 20 years. *Does red drum experience this, or just wild fluctuations in recruitment? Probably not with its many spawning age classes.*
- "It is clear that even if unfished spawning biomass were known only very roughly, say with a precision of the half-to-double variety, one could still be reasonably sure of getting something close to MSY simply by holding the spawning biomass in vicinity of 35-40% of the estimated unfished level." This strategy also requires a consistent equilibrium abundance. *Only problem with this is that for red drum we aren't estimating biomass, SPR is based on F. (From Genine Lipkey's notes) Could we get anything "accurate" enough?*
- The "maximin yield," defined as the maximum of the minimum yields at each level of spawning biomass per recruit (or at each rate of fishing mortality), is close to $F_{0.1}$ for typical marine demersal fisheries—which is also close to M. Depending on which particular stock-recruit relationship a fishery is dictated by, any one of the rates chosen (F_{mmy}, $F_{0.1}$, F_M) would give 75-90% of MSY or more. The danger is that this F_{mmy} is very sensitive to M, so if the estimate of M is off, so too will F_{mmy} be. It is also not robust to uncertainty in the stock-recruitment relationship. Still, it may be safer than a biomass-based approach when there is high variability in equilibrium abundance.
- When recruitment is delayed (i.e., mature more before fishing mortality), F_{mmy} can be much higher than both $F_{0.1}$ and F_M. The opposite is true when maturity is delayed (i.e., recruit to fishery before spawning). *If anything, red drum may recruit slightly before becoming fully mature (recruit at ~age 2, not quite 100% are mature at age 2).*

Clark, W. G. 1993. The effect of recruitment variability on the choice of a target level of spawning biomass per recruit. Management of Exploited Fish, Alaska Sea Grant: 233-246.

- Goal was to see if ideal spawning biomass per recruit was different from $F_{35\%}$ if random recruitment variability was included, and what level would result in stable year-to-year yield and minimal instances of low biomass.
- Recruitment can range from totally independent year-to-year to serially correlated (run of good years followed by run of bad years). With purely random variation, the deterministic F_{MSY} can be fully achieved, and a large percentage of MSY can be taken without putting spawning biomass per recruit below 35% of the unfished value (deterministic optimum 36%, stochastic 38%, achieves 75% of MSY). With serially correlated variation, the best is 90% of deterministic F_{MSY} achieved; optimal level of spawning biomass per recruit is about 42%, with that F getting only 60% of deterministic MSY.
- Yield is also highly variable with random recruitment variation, and very highly variable with serially correlated variation.
- The number of times spawning biomass falls below 20% unfished levels is greatest with serial correlation (most spawner-recruit curves and any F between $F_{35\%}$ and $F_{45\%}$. If variation is uncorrelated, $F_{40\%}$ prevents this except for one of the SR curves considered. This happens for about half the curves at F35%, which shows that small discrepancies can lead to large management implications depending on how these discrepancies fall in relation to reference points.
- Keeping the spawning biomass per recruit between 35% and 45% is a safe bet, especially if the SRR is largely unknown.

Clark, W. G. 2002. $F_{35\%}$ revisited ten years later. North American Journal of Fisheries Management 22: 251-257.

- D is the density-dependent multiple by which spawner productivity at low stock sizes exceeds that at the unfished level; a measure of resilience. If this is less than 8, then F_{MSY} will generally be less than $F_{40\%}$, and the $F_{40\%}$ rule of thumb could deplete the stock. If not enough SR data are available to determine D, you could choose a range and set target SPR/Fs accordingly.
- If unsure of the stock's resilience (i.e., could be very low), even fishing at $F_{40\%}$ could lead to trouble; $F_{70\%}$ is safer, even though it gets only a fraction (about half) of MSY. Pacific Ocean perch is the example for this study.
    - Biomass-based strategies, however, are robust to different levels of resilience, with $B/B_0 = 0.4$ being safe across the board.
    - At lower levels of D, $F_{40\%}$ could lead to $B/B_0 = 0.20$-0.30. $B_{40\%}$ (B at $F_{40\%}$) is always less than $B/B_0=0.4$, but $B_{50\%}$ or $B_{60\%}$ gets above $B/B_0=0.4$.
    - *Why isn't there agreement between F and B/B_0 in terms of Yield/MSY?*

Gabriel, W. L., P. M. Mace. 1999. A review of biological reference points in the context of the precautionary approach. Proceedings, 5th NMFS NSAW. NOAA Technical Memom. NMFS-F/SPO-40.

- Proxies can be used in situations where they are easier to calculate, require fewer data, or are more robust than traditional reference points.

    - Some proxies for B_{MSY} are equilibrium biomass corresponding to F reference points (e.g., $F_{30\%}$, F_{MAX}, $F_{0.1}$), some percentage of unfished biomass (e.g., 30% for data-rich or resilient stocks, 60% for data-poor or sensitive stocks), and mean recruitment multiplied by SPR(F_{MSY}) or 30-60% $SPR_{F=0}$.
- If F_{MSY} cannot be reliably estimated, authors suggest a proxy of $_{F30\%SPR}$-$F_{40\%SPR}$. $F_{0.1}$ might be preferable after that, more so than M, F_{MAX}, or F_{MED}. Biomass according to these proxies are suggested (in that same order).

Gibson, AJF, RA Myers. 2004. Estimating reference fishing mortality rates from noisy spawner-recruit data. Canadian Journal of Fisheries and Aquatic Sciences 61: 1771-1783.

- Researchers estimate MLE of F_{msy} using a production model made up of a BH stock-recruit curve, an SPR model, and a YPR model; does not provide clear parameter combinations in the stock-recruit curve
- SPR model gives "the rate at which recruits produce spawners as a function of fishing mortality."
- Can also estimate reference F values with the mode of the marginal PDF for alpha (F_{marg}, alpha = slope at origin of SR curve) and the F that maximizes the expectation of the catch ($F_{maxE[Y]}$).
- $F_{maxE[Y]}$ can be estimated without stock-recruit data, if you assume all values for SR parameters within some range are equally probable (estimates will be sensitive to assumed range).
- Monte Carlo simulation (assuming constant R_0): The MLE of F_{msy} is the least biased estimator, but most variable in its estimation. At higher levels of alpha and sigma, $F_{maxE[Y]}$ was least variable. $F_{maxE[Y]}$ and F_{marg} did not highly overexploit populations in the simulation, but MLE of F_{msy} did 25% of the time (extinction 13.4%). $F_{maxE[Y]}$ gave the highest yields on average (especially in cases of high recruitment variability), with F_{marg} maintaining the highest spawner biomass. *Would the $F_{maxE[Y]}$ method provide utility for F reference point for red drum?*
- By taking random effects distributions and transforming them (see paper p. 1779), one can get priors with information about distribution of SR parameters "at the species level obtained by analyzing data from other alewife populations." *Perhaps we could use prior information from the GoM (or the other region on Atlantic coast) to adjust $F_{maxE[Y]}$.*
- Researchers suggest maximizing expected yield while including information from other populations. However, if the data used have a small spawner biomass range, the $F_{maxE[Y]}$ method could overestimate compared to the true F_{msy}; this is why it's important to compare to parameters from similar populations, if possible. Also, this method is most appropriate for a fishery focused on fish that are fully grown prior to recruitment. *Can we say this for red drum? Probably not. More importantly, the difference between alewife and red drum is one only lives to five or so and one lives to fifty. Alewife are at risk for extinction because two bad years of recruitment could eliminate the spawning stock, which is not the case for red drum.*

Goodyear, C. P. 1993. Spawning stock biomass per recruit in fisheries management: Foundation and current use. P. 67-81. In SJ Smith, JJ Hunt, and D Rivard [ed.] Risk evaluation and

biological reference points for fisheries management. Canadian Special Publications of Fisheries and Aquatic Sciences 120.

- SPR is not directly tied to population size, it depends on the density-dependent effect of the population growth (slope of the stock-recruit curve near the origin). So, you need a well-defined stock-recruit relationship to derive SSB from SPR.
- There are three common ways to set the critical minimum for SPR (i.e., threshold): noting the point at which compensation required "jumps" (often 20-30%); comparing to stocks that have declined at certain SPRs (if cases exist for related species); setting the value based on stock-recruitment relationships in the literature.
- SPR has advantages and disadvantages relative to other biological reference points:
    - Values like $F_{0.1}$ and F_{MAX} are based on the distribution of F among the age classes of a population, so these values are "moving targets" if the size structure is fished down, or if regulations change. Nor does $F_{0.1}$ consider the spawning stock size directly. It can also change if selectivity changes (especially if age distribution of harvest is affected).
    - Managing for a spawning stock biomass that maximizes average recruitment is preferred over SPR, but data needs are often too high.
    - SPR behaves similarly to fixed harvest and fixed escapement strategies, except that it is defined more in terms of conservation (instead of F or its associated yield). This benefit is most pronounced when there are competing sectors in the fishery, because each can be given an allowable reduction in SPR. However, this is not really the case for red drum.
- The commonly employed 20-30% range of SPR comes from experience in the NW Atlantic fisheries.

Halliday, R. G., L. P. Fanning, and R. K. Mohn. 2001. Use of the traffic light method in fishery management planning. Research Document, Marine Fish Division, Science Branch, Scotia-Fundy Region, Department of Fisheries and Oceans: 41 pp.

- If using the precautionary approach, the yellow/red boundary should be the limit reference point, while the green/yellow boundary should be a buffer between good conditions (green) and those that are close to unacceptable conditions (yellow).
    - The green/yellow boundary should not be set at some "target" (see p. 11).
- Setting the green/yellow boundary at the mean of a data series and the yellow/red at 60% of the mean is appropriate when the series is long enough to illustrate long-term behavior (*i.e.*, includes highs and lows).
    - In this case, the boundaries can be set at the 33rd and 66th percentiles, as the mean and 60% settings are a statistical rule that assume the data span the full range of the attribute.

Mace, P. M. 1994. Relationships between common biological reference points used as thresholds and targets of fisheries management strategies. Canadian Journal of Fisheries and Aquatic Sciences 51: 110-122.

- Reference points devised in deterministic conditions can be adapted for stochastic systems by employing control laws that act based on the frequency at which a threshold is breached.
- *Tau* is a measure of compensation at low stock sizes (e.g., 0.05 implies twenty times higher survival than at virgin stock size). For Beverton-Holt, *tau* strongly impacts the SRR, being almost linear at high values (low compensation) but having flat recruitment down until about 20% B_0 at lower values. In other words, as *tau* increases, F_{MSY} and F_{tau} (F with equilibrium biomass being zero) decrease (but increase with M and K).
    - $F_{0.1}$, F_{MAX}, $F_{20\%}$, and $F_{35\%}$ are not influenced by tau, but increase with M and K.
- B_{MSY} never fell below 20% B_0 (but got close for M = K = 0.2 and *tau* = 0.05).
- For Ricker configurations, F reference points behaved similarly, except for F_{MSY}, which was higher than in the Beverton-Holt runs (e.g., at most, twice as high at *tau* = 0.05).
- B_{MSY}/B_0 was less sensitive to tau than with B-H, but all other ratios were more sensitive.
- Setting biomass at a fixed value of B_0 can be dangerous as the fixed Fs become less sustainable as age of recruitment is reduced or compensation decreases.
    - Setting the biomass reference point at a fixed percentage of R_{MAX} or at 100**tau* (tau as a percentage) can incorporate the degree of compensation, with the latter working best if you don't know the SRR. These would work as control laws, too.
    - Unfortunately, tau is difficult to estimate without good contrast in stock size data. Using the survival ratio of R/S may not be reliable as a proxy.
    - Most of the time, *tau* appears to fall somewhere between 0.05 and 0.35, and 0.20 is probably appropriate for stocks of average or above-average resilience. If this is true, $F_{35\%}$ exceeds F_{MSY}, so $F_{40\%}$ is more appropriate (which Clark (1993) found, except based on recruitment variability). Then, F will stay away from F_{tau} (extinction) unless *tau* > 0.40.

Report from Gulf of Mexico SPR Management Strategy Committee (1996). Rationale for choosing SPR for Gulf of Mexico fisheries.

- Static SPR—amount of spawning with constant F (selectivity and reference F) over a lifespan relative to spawning without fishing
    - Does not require constant recruitment, but does require constant growth rates and mortality and maturity schedules. Assumes stable age structure
    - Maps 1:1 with F, which is why it's used to measure overfishing
- Transitional SPR—spawning per recruit in year t relative to spawning per recruit in year t if there had been no fishing on the cohorts in year *t*
    - Conceptually, like static SPR, except with a running average of fishing mortalities; because of this inclusion of past damage, inherently lends itself to being used as a recovery target
    - Used to measure whether a stock is overfishED, which is the distortion of age structure from fishing; however, does not measure depletion, which is low biomass that could result from fishing or natural causes
    - Transitional SPR cannot be expected to correlate with biomass, just age structure

    - Requires you to have at least as many years of recruitment data as age classes for the fish; also expanding age classes past maximum age
    - Sensitive to changes in exploitation patterns (*e.g.*, gear, regulations); not as sensitive to uncertainty in M

Williams, E. H., and K. W. Shertzer. 2003. Implications of life-history invariants for biological reference points used in fishery management. Canadian Journal of Fisheries and Aquatic Sciences 60: 710-720.

- The use of life-history invariants (relationships between K, M, and a_{mat}) allows biological reference points (M-based, B-based, and SPR in this study) to be viewed as a function of the growth coefficient K and steepness.
- With knife-edge selectivity and maturity, the BRP is independent of K (only depends on steepness).
    - In general, all three BRPs depend on steepness, regardless of selectivity/maturity.
- Ratio of age at 50%-selectivity to age at 50% maturity: matters in M-based BRP, does not with B- or SPR-based BRPs.
- For Beverton-Holt scenarios, B-based and SPR BRPs have a strong relationship with each other (but neither with M-based BRP). This becomes a little less so with a Ricker curve and M/K ratio other than 1.65 (*which definitely exist*). SPR BRP is the most robust to deviations in M/K for both stock-recruit curves. The BRPs diverge from each other at higher steepness values, for both stock-recruit curves.
- The M-based BRP (e.g., F_{MAX} and $F_{0.1}$) should be used with caution, because they assume the stock-recruitment relationship is well-defined and the life history and steepness parameters are well estimated. Also, they ignore effects on SSB.
- Because the SPR BRP is almost independent of life history parameters, it is one of the best to use when life history data are limited. Steepness becomes paramount!

Use of a Sub-Adult F-based Reference Point for Red Drum Management

Board Task: Given concerns regarding the appropriateness of the current reference point and the lack of data on adult red drum, the Board would like to see an investigation of the feasibility of an F-based reference point that looks strictly at the harvest of juvenile red drum[1]. The Board looks for guidance on whether this type of reference point would provide an appropriate level of information for management.

Summary

The committee considered various advantages and disadvantages of using an F-based reference point that looks strictly at the harvest of juvenile (sub-adult) red drum.

Advantages include: (i) the existence of a close relationship between sub-adult mortality and spawning potential ratio (i.e. the current reference point), (ii) a sub-adult reference point will likely be estimated more precisely than SPR because it focuses on the most data-rich component of the stock, and (iii) sub-adult fishing mortality can be estimated, and thereby cross-validated, using a variety of methods.

There are, however, some serious disadvantages to focusing on just sub-adult fishing mortality. Disadvantages include: (i) no effective method of deriving a suitable reference point due to the lack of information about stock-recruitment relationships (this issue has been addressed previously with Gulf of Mexico red drum), (ii) stock depletion can occur under a scenario of increasing adult mortality, and (iii) stock depletion can occur under a scenario of declining recruitment and/or recruitment stochasticity.

The committee concluded that a reference point based solely on sub-adult fishing mortality could lead to stock depletion under realistic population scenarios, since declines in recruitment or spawning stock would not trigger management action. **Therefore, the committee <u>does not recommend</u> the use of a reference point based <u>strictly</u> on the harvest of sub-adult red drum**.

Issues considered by the committee

Potential advantages of using sub-adult fishing mortality as a reference point

i) <u>Close relationship between sub-adult F and SPR</u>: Since the majority of fishing mortality occurs on sub-adult red drum, there is a tight link between sub-adult fishing mortality and spawning potential ratio (SPR). This close relationship is evident from the results produced by the Stock Synthesis 3 (SS3) base runs, which show log-linear relationships between SPR and sub-adult red drum mortality ($\sum_{age\ 0}^{age\ 5} F_{age}$)[2] with $R^2 \approx 0.99$ (**Fig. 1**, top two panels).

[1] In a conference call on 6/13/2016, Robert Boyles confirmed that the Board's interpretation of 'harvest' *does* include B2 (discard) mortality.

[2] In this document, we use Stock Synthesis 3 ageing notation. (i.e. Fish turn age 0 on their first Jan 1st of life at a biological age of ~4 months; they turn age 1 on their second Jan 1st of life at a biological age of ~16 months, etc.)

ii) Sub-adults are a data-rich component of the stock: An advantage of focusing on just the sub-adults is that they comprise the most data-rich part of the population. This should allow reference parameters to be determined with greater precision, and to be compared against the reference point with greater certainly, than when tracking reference parameters that incorporate data-poor components of the population (e.g. the adults).

iii) Availability of methods for cross-validation: Focusing on sub-adult mortality may allow reference points to be estimated (and cross-validated) by a variety of methods. For example, in addition to estimates produced by stock assessment models, sub-adult mortality may be estimated from fishery-independent survey data, or from stand-alone tag return models. The latter two methods may enable reference points to be tracked more frequently (e.g. annually) than stock assessment updates (~5 years). (Note, however, that state-run fishery-independent surveys and tagging programs operate over relatively small spatial scales when compared against the scale of the entire stock).

Potential disadvantages of using sub-adult fishing mortality as a reference point

i) Difficulties in deriving a suitable reference point: It is unclear how to derive a suitable sub-adult fishing mortality reference point. This issue was addressed previously with Gulf of Mexico red drum when the Florida Division of Fisheries Management was requested to examine relationships between spawning stock, recruitment, and escapement (i.e. sub-adult fishing mortality). They concluded that it is difficult to derive a suitable reference point due to poor information about stock-recruitment relationships (Murphy, pers. comm., 2016). The lack of good stock-recruitment information results in a variety of equally feasible scenarios that produce very different sustainable escapement rates (see **Fig. 2**).

ii) Ignoring fishing mortality on spawning adults: Although most of the red drum fishery targets the sub-adults, post-release (B2) mortality of discarded fish outside the harvestable size limits may also have an important effect on the sustainability of the stock. Discards are a significant source of red drum fishing mortality, but allocating discard mortality across red drum sizes is notoriously difficult because there are no surveys designed to collect B2 size information. Notwithstanding these difficulties, results from the SEDAR 44 base runs suggest that adult fishing mortality has been increasing in the southern stock (**Fig. 3**). This agrees with anecdotal evidence of a growing catch-and-release fishery for adult red drum in some areas. Changes in adult mortality patterns have an obvious and direct effect on spawning capability. Therefore, using just sub-adult F as a management reference point results in a risk of stock depletion under a scenario of increasing adult mortality.
It is also worth noting that, although the board highlighted the lack of information about adult red drum, there has been considerable progress in gathering information on adults since the previous stock assessment (SEDAR 18, 2009).

Longline surveys in both the northern and southern regions have greatly increased our knowledge of adult size composition, age composition, and catch per unit effort. The influence of the adult longline data will likely increase in future stock assessments as their temporal coverage increases. Therefore, there will be increasing benefits of using reference points that take the stock as a whole into consideration (including the spawning stock), rather than just the sub-adults.

iii) Reference point is independent of recruitment: Another potential risk of relying on just sub-adult F as a reference point is that, in order for the stock to be sustainable, an assumption is made that recruitment does not decline over time. If recruitment were to decline, spawning stock biomass could decline to unsustainable levels, even if sub-adult fishing mortality was maintained below a previously sustainable reference point. Stochastic variation in recruitment may have additional influences on the choice of a sub-adult F reference point (Holden & Conrad, 2015).

References

Holden, M. H., and J. M. Conrad. 2015. Optimal escapement in stage-structured fisheries with environmental stochasticity. Mathematical Biosciences 269: 76-85.

SEDAR (Southeast Data, Assessment, and Review). 2009. Stock assessment of Atlantic red drum. SEDAR, Charleston, South Carolina.

Fig. 1 Relationships between static spawning potential ratio (SPR) and fishing mortality. (Data from Stock Synthesis 3 base runs for the southern (left) and northern (right) Atlantic red drum stock assessments). Top row: sub-adult fishing mortality (sum of ages 0-5); middle row: age 1 fishing mortality; bottom row: adult fishing mortality (sum of ages 6-40). Fitted lines are back-transformed linear regressions of Ln(SPR) vs F (solid lines: intercept fixed at SPR = 100%; dash-lines: intercept fitted).

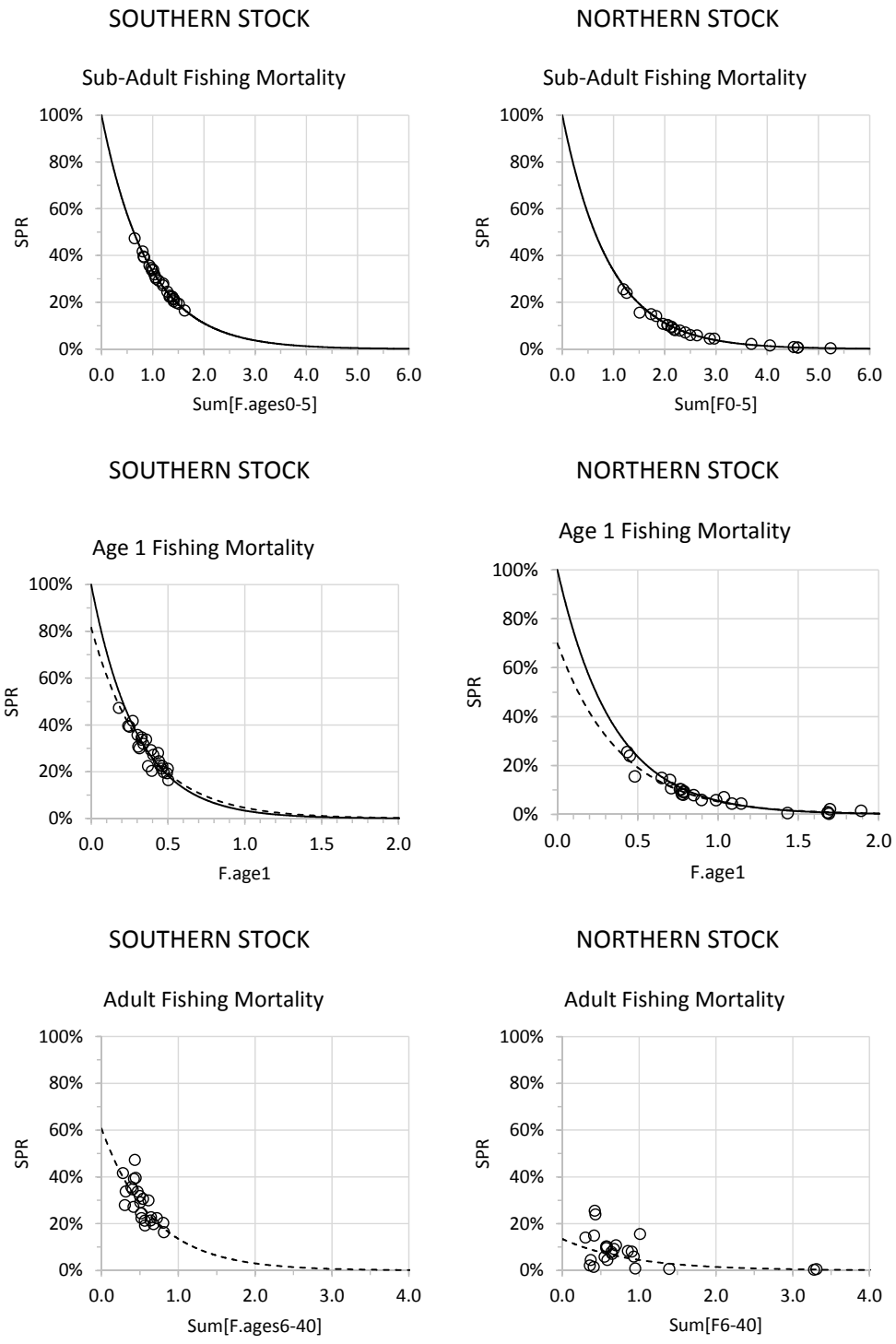
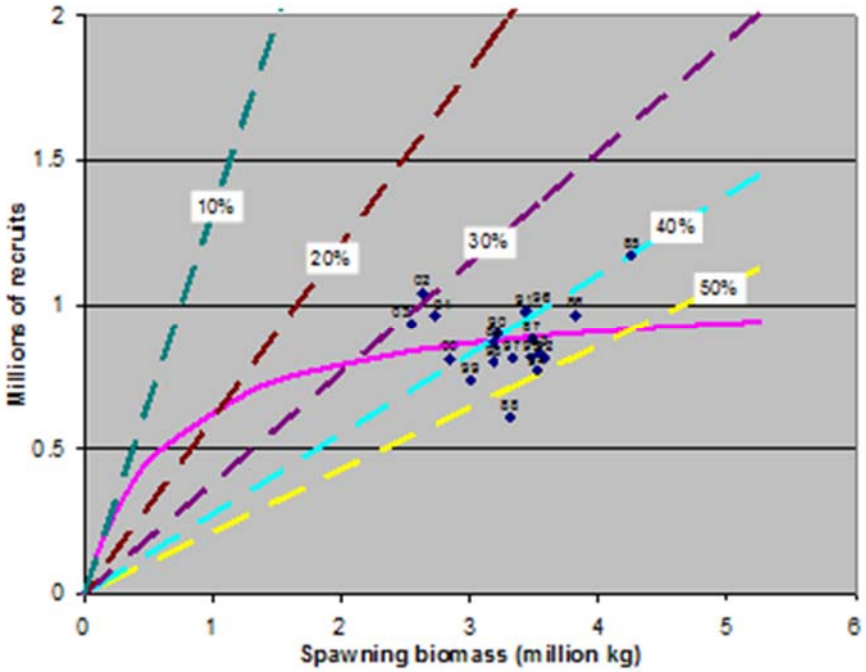


Fig. 2 Two plausible spawner-recruit relationships (pink lines fitted to blue diamonds) for Gulf of Mexico red drum that result in different sustainable levels of sub-adult escapement. Radiating dash lines show expected levels of recruitment (intersects with the pink spawner-recruit relationship) associated with sub-adult escapement rates (percentages). (Plots from Murphy, pers. comm., 2016).



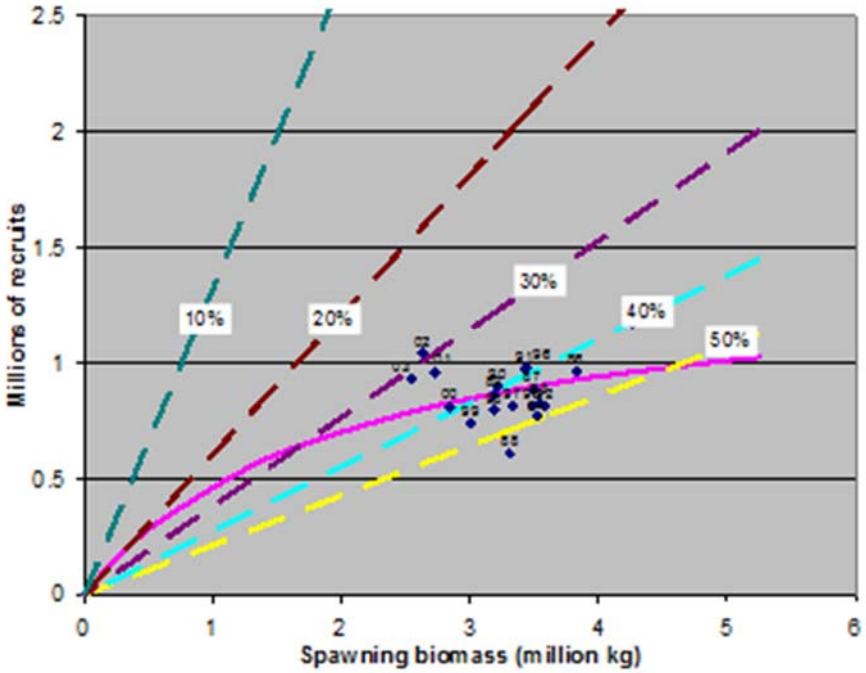
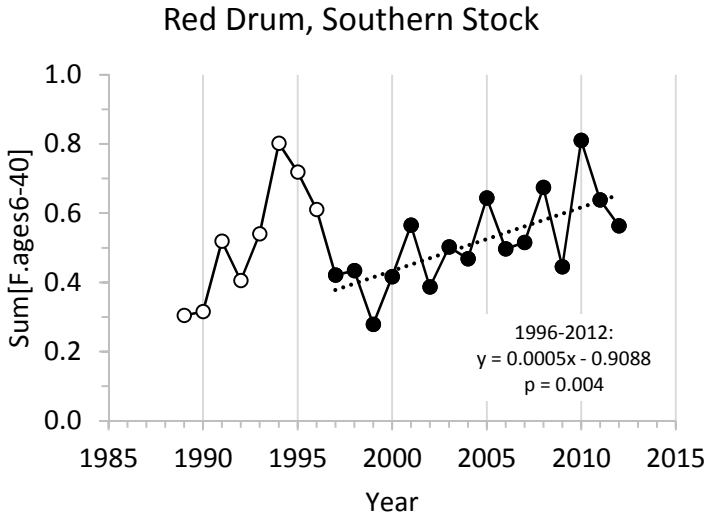
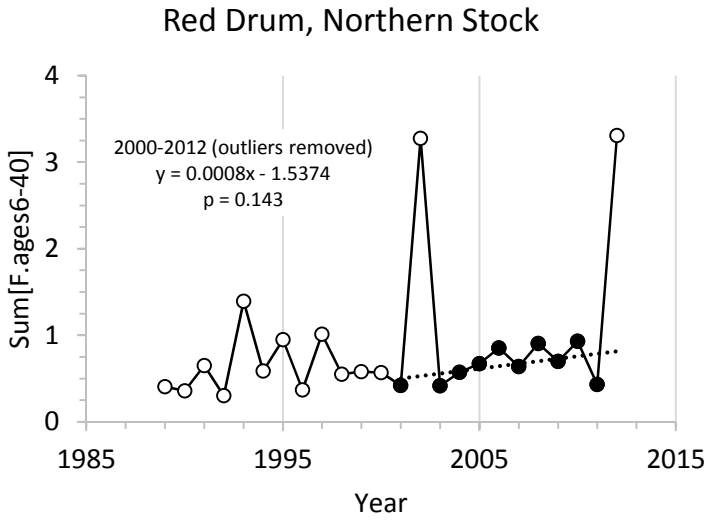


Fig. 3 Temporal changes in adult red drum (ages 6-40) fishing mortality, based on outputs from SEDAR 44 Stock Synthesis 3 base runs. Regression lines are fitted to just the filled circle data points.





Validity of Age-Based Models

Board Task: The Board is concerned that the lack of information on adult red drum, especially in the northern stock, may impact the ability of the stock synthesis models to accurately measure stock abundance. As a result, the Board asks for an evaluation of how red drum life history and current regulations (namely the moratorium on fishing in federal waters) may limit the validity of an age-based model such as SS3.

Working Group Progress

Age-based models provide a framework capable of providing managers with estimates of fishing mortality that can be separated into year and age effects as well as providing information on the abundance and age structure of a population, given all necessary inputs are available.

The prior stock assessment, SEDAR 18, incorporated a statistical catch-at-age model (SCAA; SEDAR 18, 2009). The model used standard inputs such as fishery catches, abundance indices and age compositions but also, for the northern region, incorporated externally derived F-at-age estimates reported from a tag recapture model (Bacheler et al. 2008). The model configuration also included a very large proportion of the population in a plus group (ages-7+). This plus group was necessitated by the sparseness of information on adult fish from either dependent or independent sources and a scarcity of aging data at older ages. This dearth of information on the adult stock led to model results that were considered uninformative regarding biomass reference points. Determinations on the overfishing status, however, were considered useful through the use of static SPR, given that the majority of catch and indices were indicative of sub-adult ages (1-3).

For the northern stock, estimated parameters in the model were heavily influenced by the inclusion of the tagging data. This dependence on the tagging data was a concern, particularly with how the model was configured (i.e. tagging estimates used were derived external to the model). A high priority research need in the review recommended that the tagging data should be integrated within the SCAA model to ensure that assumptions used when analyzing the tagging data would be fully incorporated into the estimates of the SCAA. The southern stock, which lacked F-at-age estimates from tagging data, had much higher uncertainty in the SPR estimates.

The move from the SCAA model to the SS3 framework was in response to recommendations from SEDAR 18 and the ongoing need to provide managers with reliable estimates of spawning stock biomass. SS3 provides an integrated modeling approach that addresses many of the concerns made during SEDAR 18. For example, SS3 allows for integration and analysis of tagging data internal to the model. The framework also allows for the direct fitting of index, length, and age composition data. The integrated design requires less processing and/or assumptions about data external to the model and takes into account the uncertainty in the various data inputs. While this integrated approach is advantageous, data gaps, particularly for adult red drum, still exist adding to qualitative uncertainty with any estimated adult biomass.

Lack of information on adult red drum

As noted above, the lack of information on adult red drum has precluded prior assessments from providing reliable estimates of spawning stock biomass. More recent efforts through the red drum longline surveys in Georgia, South Carolina, and North Carolina provide fishery independent indices of abundance and age-structure information that is incorporated into the SS3 framework. While informative, it should be noted that relative to the life-span of red drum (40+ years), these indices offer a short time series for evaluation (2007 for Georgia and North Carolina; 1994 for South Carolina).

Some noted sources of data gaps and assumptions impacting estimates for adult red drum include:

1. Adult Harvest and Regulations
   - Estimated harvest of adult fish from MRIP is very low, even in the early part of the time series when known fisheries existed and harvest was legal.
   - Regulations implemented by the states between 1998 and 2002 prohibited harvest on adults (no harvest over 27 inches from states NJ south) further limiting information on this portion of the stock.
   - Regulations taken to reduce or prevent adult harvest had no detectable impact on length compositions of recreational harvest. As a result, the data available from landings estimates suggests no significant adult harvest fishery existed.
   - In contrast, tag data suggests a large proportion of tagged adult red drum recaptures were harvested for the period when harvest was legal.
   - An accurate accounting of adult harvest has been a longstanding data concern. Adult red drum catches have traditionally been noted as poorly represented in the catch. In part, low catches could be due to a large portion of the adult fishery occurring at night while recreational sampling was exclusively in daytime hours. Extending MRIP sampling to include night time intercepts has been a long-standing research recommendation of the TC (note: night sampling is in place under MRIP where it is “needed” as described by NOAA but this did not start until 2016).
   - Lack of adult harvest data in the past leads to a potential lack of contrast in length composition data over time despite regulatory changes to the contrary. There is no apparent shift in length composition despite a ban on the harvest of adult fish. It is likely harvest on adult fish may be underestimated in the early part of time series as a result.
   - Lack of adult harvest data also leads to an inability to measure any potential benefit from past regulatory action.

2. Life History and Management Strategy
   - Relative to the long-lived age of red drum (40-60 years), the data used for the model (catch and indices) results in a short time series (1989), limiting any potential historical contrast over time as exploitation has changed.
   - There is only a short time series for the adult indices (longline) relative to the life-history of red drum.

- Ontogenetic shifts in life history likely reduce availability of red drum to the fishery with increasing age. Immature fish are described as ubiquitous with shorelines and shallow habitat in estuaries. These changes in availability occur with the onset of maturity (age 3+) and subsequent movement out of estuaries (presumably to areas of reduced vulnerability; i.e. offshore).
- No fishery dependent or independent surveys fully select for fish over a wide range of sizes, particularly as fish transition from sub-adults to adults. Most surveys collect data on sub-adults or juveniles, while the adult indices from the longline surveys are likely not fully selected until around age 5 or higher.
- As a result, there can be difficulty in estimating selectivity given the decreased availability due to both the life history changes and the slot limit. Model results will be sensitive to any assumptions about the descending limb of a dome shaped selectivity curve.
- Review of the SS3 model noted an impact on the model's ability to estimate equilibrium catch and initial F in the start year of the model. This concern arises from the short time series and potential lack of contrast in data.

3. Size Distribution of Recreational Releases
   - Length information on releases is largely unknown and must be assumed from other sources.
   - The proportion of releases to harvest has increased over time, increasing any potential bias. Removals from release mortality exceeds harvest mortality in some years.
   - Decreased bag limits, increasing catch and release practices in the fishery, and possible increased effort in the fishery have all led to an increasing trend in the number of fish released alive.
   - The size distribution for all releases (sub-adult and adult) is implied from tagging data. To the extent that these tagged fish do not represent the size of fish in the population at-large, the resulting assumed length frequency will be biased. Potential exists in the north that there is a bias towards larger fish due to volunteers in the red drum tagging program being instructed not to tag red drum under 27 inches.
   - The lack of harvest data on adult fish in the early part of the time series coupled with the increasing trends and assumed length composition of the recreational releases could result in a positive bias of adult removals in the more recent time period and an underestimate of removals in the earlier time period.

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SS3 Tag-Recapture

Board Task: During the red drum benchmark assessment, the SS3 model for the northern stock was found to be sensitive to the reporting rate of recaptured tags. When freely estimated, the reporting rates were estimated at values much lower than estimates from previous analyses of red drum tag-recapture data (Table 1). When the reporting rate of tagged red drum harvested by recreational anglers is fixed to the value estimated by Bacheler et al. (2009) (0.49), the estimates fluctuate significantly. Due to this sensitivity, the *South Atlantic State/Federal Fisheries Management Board* tasked the Red Drum Technical Committee and Stock Assessment Subcommittee to further evaluate the tag-recapture component of the SS3 framework and to provide a recommendation on how to proceed with the SS3 models. Several analyses discussed below were completed to inform the recommendation on how to treat the tag-recapture data in the SS3 models. An additional analysis was attempted with the SS3 model for the northern stock by using lengths of tagged fish that were recaptured and released alive by recreational anglers from the Virginia Game Fish Tagging Program in place of the length data from the NC DMF Tagging Program to characterize the size composition of fish released by recreational anglers and assumed to die post-release and part of the size composition of the recreational CPUE. This model run did not converge.

Analysis: Sensitivity runs with the SS3 model for the southern stock.

The final base run of the SS3 model for the southern stock estimated the reporting rate for the South Carolina harvest fleet of about 32%. This is within the range of reporting rates determined for inshore fisheries tagging programs in South Carolina in the past (21%, Jenkins et al., 2000; 57-63%, Denson et al., 2002), similar to rates reported by black drum and red drum anglers from Texas (28%, Matlock, 1981) but lower than reporting rates for a highly prized common snook fishery in Florida (60-70%, Taylor et al., 2006).

The exclusion of tag-recapture data from the southern base model had little impact on the estimates of spawning potential ratio (Fig. 1). This apparently indicates that the analysis of data for age/length composition, catch, indices of abundance, etc., gave similar estimates of fishing mortality as those derived when the tag/recapture data were included.

When the reporting rates were fixed at different (and less likely) values in the southern base model, higher reporting rates of 60% gave SPRs similar to that estimated for SEDAR 18 and lower reporting rates of 18% gave SPRs that, on average, were about 30% lower than the base model levels (Fig. 1).

Due to the similarities of the reporting rate estimate from the SS3 model for the southern stock and the literature estimates and the negligible effect of excluding the tag-recapture data, the following analyses focused on the discrepancies in reporting rate estimates from the SS3 model for the northern stock.

Analysis: Likelihood profile on the reporting rate of tagged red drum harvested by recreational anglers.

Methods

The model was run with the reporting rate parameter fixed at values ranging from 10-95% at increments of 5%. Additionally, a run with the reporting rate fixed at 18% was included in the profile. This value was an alternative estimate from the literature (Bacheler et al., 2008) and a specific run recommended by the peer reviewers and subsequently requested by the Board.

A likelihood profile was originally done by fixing the reporting rate of all harvest fleets to the same value since the values in the literature for NC DMF tags are not fleet, or even, sector-specific (Bacheler et al., 2008; Bacheler et al., 2009). However, fixing the reporting rate of just one fleet allows the model flexibility to estimate inter-fleet variability in these parameters. There was inter-sector variability estimated by Bacheler et al. (2009) between commercial and recreational fisheries. Therefore, fixing the reporting rate of just the recreational harvest fleet was determined to be the best approach.

Objective

Determine how model fits to observed data change over the values of reporting rate. The likelihood profile shows how model fits to data components, individually and aggregated, change over the values of the reporting rate parameter. As fits deteriorate, the negative log likelihood increases. As fits improve, the negative log likelihood decreases. The lowest negative log likelihood indicates the most likely parameter value, given the input data.

Results and Discussion

The total negative log likelihood increases as the reporting rate is increased up to 45%, declines at a value of 50%, and becomes stable at values $\geq$ 55% (Fig. 2). The profile indicates the most likely value for the reporting rate, given the input data, is the model estimated value of 9%. However, there is some conflict among the likelihoods of the individual data components. This becomes more apparent when the change in negative log likelihoods across runs is scaled to a maximum of 1 (Fig. 3). Negative log likelihoods of the length composition, tag-recapture compositions across fleets, and tag-recapture time series generally increase as reporting rate is increased. Negative log likelihoods of the catch, indices of abundance, and conditional ages-at-length generally decrease as reporting rate is increased.

Fits to individual tag groups were investigated to provide further insight on why the negative log likelihoods of tag-recapture data are increasing as reporting rate is increased. Likelihoods of the individual tag groups also tend to conflict between tag groups of young fish (< age 3) and older fish ($\geq$ age 3). As the reporting rate is increased, fits to the older tag groups, which are generally poorer than young tag groups in the model with the reporting rate estimated, generally deteriorate while fits to the young tag groups remain relatively stable (Tables 2 and 3). This indicates that observed recaptures of older fish are higher than the model expects, given the low fishing mortality on these older fish as informed by the other data sources. This poor fit becomes poorer as the reporting rate is increased (i.e., abundance increases and F decreases). Removing the older tag groups results in negligible changes to model results, as

negative log likelihoods of the other data components are collectively minimized at high values of fishing mortality (i.e., low values of reporting rate).

The reporting rates of the commercial fleets increase in runs with the recreational reporting rate fixed from 10-45%, though at relatively slow rates (Table 4). This is consistent with lower reporting rates estimated for commercial fisheries by Bacheler et al. (2009). The reporting rates of the commercial fleets then increase to values greater than the recreational fleet when this parameter is fixed at values $\geq$ 50%.

As reporting rate is increased, the fishing mortality decreases. This results in an increasing stock abundance. Because spawning potential ratio (SPR) is an inverse function of the fishing mortality, the SPR estimates increase as reporting rate is fixed at increasing values. Instead of the expected smooth gradient in population estimates as reporting rate is increased, the model jumps between two very different solutions. For reporting rate values from the model estimate (9%) to 45%, the model estimates similar SPRs that are below the 40% target throughout the time series (Fig. 4). For reporting rate values $\geq$ 50%, the model estimates SPRs that are all above the 40% target throughout the time series. Recruitment estimates also fall into two similar solutions between runs in the range of 9-45% and runs $\geq$ 50% (Fig. 5).

The coarse and drastic change in model solution as well as the conflict in data sources indicate abnormal model behavior and instability when the tag data are included and the reporting rate is fixed at different values (Cass-Calay et al., 2014). At the SEDAR 44 Review Workshop, the Review Panel originally suggested investigating the reporting rate parameters, as these parameters should be correlated with another scaling parameter, the unfished recruitment in log space (Ln(R0)). A likelihood profile of unfished recruitment over the range of recreational harvest reporting rate values shows a similar pattern in likelihoods and coarse change in model solution (Fig. 6). A profile of the unfished recruitment parameter from the base model (without the tag-recapture data) over a range of values for the unfished recruitment parameter, shows a much more defined estimate, though some data conflicts remain (Fig. 7).

When the reporting rate is fixed at values $\geq$ 50%, the population estimates are very inconsistent with prior estimates (SEDAR 18, 2009). The recreational harvest reporting rate, when estimated or fixed $\geq$ 50%, also results in patterns inconsistent with the expectation of this parameter (i.e., less than commercial reporting rates).

Analysis: Data weighting sensitivity runs.

Methods

Data weights, either through changes to the model lambdas or input error values, were changed and the model was rerun. Parameter estimates were checked against bounds and a subset of model estimates were compared.

Alternatives considered were (1) decreasing the lambdas (downweighting) of the recreational length composition data, (2) decreasing the lambdas of all length composition data, (3) increasing the lambdas (upweighting) of the conditional age-at-length data, (4) decreasing the overdispersion parameter for all tag groups to 1.5, (5) increasing the overdispersion parameter for all tag groups to 5, (6) decreasing the overdispersion parameter for all tag groups to 1.5 and

increasing the lambdas for all tag-recapture time series to 2, (7) increasing the lambdas of all fishery-independent indices to 10, and (8) the SS3 suggested adjustments to input error for composition and index data. All alternatives were compared to the base SS3 model with tag-recapture data and the reporting rates estimated.

The SS3 weighting adjustments are an approach to objectively weight all data components so that the model puts equal emphasis on fitting each data input. Changing the lambdas is a subjective weighting approach that is usually based on expert judgment and some fitting criteria to put more emphasis on a particular data component (e.g., increase the lambda of fishery-independent indices under the belief that they are more reliable than fishery-dependent indices).

Objective

Determine how model results are impacted across alternative data weighting scenarios. Due to the observed data conflicts in the likelihood profiling, the weighting of data components will potentially impact model results (Francis, 2011). Data weighting was not reported during the assessment, outside of the standard weighting adjustment procedure within SS3.

Results and Discussion

Generally, the estimates are insensitive to the different weighting alternatives considered (table 6). Some parameters do change across the alternatives, but population estimates are relatively unaffected by the weighting changes.

One consistency throughout the alternatives is the tendency to estimate a more depleted stock as the weighting of the length composition data is decreased and/or the weighting of the conditional age-at-length data is increased.

Analysis: Comparison of external tag-recovery model estimates to SS3 estimates.

Methods

Brownie et al. (1995) tag-recovery models implemented in the program MARK were fit to tag-recapture data used in SS3 and tag-recapture data used in Bacheler et al. (2008). Because of the many differences in the SS3 tag-recapture model, Brownie model, and the Bacheler et al. (2008) model, only a small subset of data were compatible with all three approaches for a snapshot comparison. Two tag groups modelled in SS3 (TG 19 and TG 23) and an additional tag group of age-2 fish that did not meet the original threshold of tagged fish (300) were used in the analysis based on a visual evaluation of the SS3 model fit to these tag groups. The additional age-2 tag group was included to estimate age-1 survival for comparison. All fish were tagged with cinch or internal anchor type tags. Recaptures were aggregated across all harvest fleets, unlike in SS3 where fleet-specific recaptures are modelled. The corresponding tag-recapture data from Bacheler et al. (2008) were also modelled.

Objective

(1) Determine if estimates in SS3 informed by tag-recapture data (i.e., recovery rate, survival) are consistent with estimates using other tag-recovery models. (2) Determine if the data used

in SS3 can explain the differences between reporting rate estimates within the SS3 model and those from the literature.

Results and Discussion

The Brownie model estimates lower survival than the SS3 model (table 7). The lowest survival is estimated with the Brownie model using the Bacheler et al. (2008) data. Recovery rate estimates were higher from the Brownie model, with the highest from the model with the Bacheler et al. (2008) data. Because survival is estimated lower in the Brownie models, a higher proportion of available tags are being recovered, resulting in higher recovery rates. Given the Brownie survival estimates and using external natural mortality and chronic tag loss estimates, the combination of fishing mortality and reporting rate can be solved. The Brownie model suggests higher fishing mortality and higher reporting rate than estimated in SS3 (tables 8 and 9). There are other data sources informing the survival estimates in SS3 and the higher survival estimated in the SS3 model results in more tags alive at the beginning of each year with the same number of observed recaptures, resulting in lower proportions of recoveries (recovery rates that are too low given the other data sources) that can be offset by lower reporting rates. Other potential explanations for the differences in survival are that the Brownie model is expecting higher chronic tag loss and/or natural mortality. Bacheler et al. (2008) used higher natural mortality estimates for their analysis.

Comparison of the two data sources showed consistently lower recapture rates in the SS3 data, explaining the higher survival and lower recovery rates estimated in the Brownie model with these data. Looking at all data included in the SS3 model, this pattern appeared in the age-0 and age-1 tagged fish and the opposite pattern generally occurred for the older tag groups (tables 10-12). The latter may be due to assigning an age based on the median length of tagged fish, with slower growing fish that are more likely to remain inshore being tagged.

Analysis: SS3 model runs with simulated recapture data.

Methods

Observed recaptures in the SS3 data were adjusted based on the ratio of the recapture rates in the SS3 data and Bacheler et al. (2008) data (tables 10-12) and the SS3 model was fit to the adjusted recapture data. The Bacheler et al. (2008) recaptures are not fleet specific, so the fleet-specific recapture data in SS3 were adjusted by the ratio of recapture rates aggregated across harvest fleets. Subsequently, observed recaptures were multiplied by a constant (3) and the model was refit to the tag-recapture data.

Objective

(1) Determine if the differences in recapture rates between the data developed for the SS3 model and the Bacheler et al. (2008) data explain the differences in reporting rate estimates. (2) Determine how many recaptures would be expected by the SS3 model to agree with the mortality estimates informed by the other data sources under a reporting rate close to the estimate from the southern model (≈30%). This reporting rate estimate is roughly in the middle of the range of estimates from the literature for NC DMF tags.

Results and Discussion

Adjusting the recapture rates of the SS3 data to match the recapture rates in the Bacheler et al. (2008) data resulted in only slight changes to the recapture rates (table 13) and SPR estimates (table 14). This indicates that the differences in recapture rates between the data sets do not explain the differences in reporting rate estimates between models. Multiplying the adjusted recaptures by 3 (200% increase) resulted in reporting rate estimates near the estimate from the southern model and SPR estimates similar to the estimates from the northern model with the original tag-recapture data and the reporting rates estimated. This further indicates that the current data inputs and SS3 model configuration for the northern stock do not support reporting rates in the range of the literature estimates in table 1.

Final Recommendation

Given the insensitivity of the model to changes in the input tag-recapture data (including data weighting) when reporting rate is estimated and the unstable behavior when fixing reporting rate, the SAS and TC recommend not including tag-recapture data with fixed reporting rates in the current SS3 base models. Data inputs and weighting, including tag-recapture data, need to be reevaluated before including the tag-recapture data in the model with fixed reporting rates. These types of changes would require peer review.

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Tables

Table 1. Reporting rate estimates from the base SS3 model and other analyses of red drum tagged in North Carolina.

Reporting Rate	Estimate	Ages	Fishery	Time Period of Fish	Treatment of Released Tags	Tags
Base SS3 Tag Model	0.09-0.12	0-16	Fleet-Specific	1989-2004	Not Included	NC DMF
Bacheler et al. 2008	0.18	0-3+	All Fleets Combined	1983-2006	Included	NC DMF
Bacheler et al. 2009	0.49	1	All Fleets Combined	2005-2007	Included	NC DMF
Bacheler et al. 2009	0.77	1	Recreational Fleets Combined	2005-2007	Included	NCSU
Bacheler et al. 2009	0.44	1	Commercial Fleets Combined	2005-2007	NA	NCSU

Table 2. Change in fits to tag groups when the reporting rate of the recreational harvest fleet is fixed at 50%.

	Tag Recapture Compostions			**Tag Recapture Time Series**		
	Total	Young	Old	Total	Young	Old
Fit improved	10	8	2	11	8	3
Fit deteriorated	17	8	9	19	8	11
No Change	3	0	3	0	0	0

Table 3. Change in negative log likelihood when the reporting rate of the recreational harvest fleet is fixed at 50%.

	All	Young	Old
Tag Recapture Compostions	1%	0%	7%
Tag Recapture Time Series	21%	-1%	54%

Table 4. Reporting rate values across runs in the likelihood profile.

Fleet	**Reporting Rate of Tagged Red Drum**						
Commercial GNBS (estimated)	10%	11%	12%	12%	13%	13%	13%
Commercial Other (estimated)	12%	14%	14%	15%	15%	16%	16%
Recreational Harvest (fixed)	10%	15%	18%	20%	25%	30%	35%
Commercial GNBS (estimated)	14%	14%	50%	56%	61%	67%	72%
Commercial Other (estimated)	17%	17%	60%	67%	74%	80%	87%
Recreational Harvest (fixed)	40%	45%	50%	55%	60%	65%	70%
Commercial GNBS (estimated)	77%	83%	88%	93%	97%		
Commercial Other (estimated)	93%	100%	100%	100%	100%		
Recreational Harvest (fixed)	75%	80%	85%	90%	95%		

Table 5. Negative log likelihoods of the data weighting alternatives.

Likelihood Component	Base with tag data and reporting rates estimated	All recreational length compositon lambdas = 0.1	All length composition lambdas = 0.1	All conditional age-at-length lambdas = 2	Tag recapture overdispersion = 1.5
TOTAL	11,412	7,263	5,588	15,441	11,423
Catch	0.000158	0.000899	0.000073	0.000161	0.000160
Equilibrium catch	0.0096	0.0861	0.0479	0.0125	0.0101
Indices of abundance	360	320	284	362	360
Length composition	6,209	2,287	725	6,371	6,210
Conditional age-at-length	4,098	3,926	3,854	7,958	4,098
Tag recapture composition	492	493	492	493	493
Tag recapture time series	220	208	205	220	231
Recruitment	32	29	29	38	32
Parameter softbounds	0.007	0.017	0.016	0.007	0.007

Likelihood Component	Tag recapture overdispersion = 5	Tag recapture overdisperion = 1.5 & tag recapture time series lambdas = 2	FI index lambdas = 10	SS3 Variance Adjustments
TOTAL	11,410	11,651	12,649	4,229
Catch	0.000150	0.000150	0.000081	0.000374
Equilibrium catch	0.0090	0.0131	0.0018	0.1611
Indices of abundance	360	362	1,312	-9
Length composition	6,209	6,217	6,431	1,420
Conditional age-at-length	4,098	4,099	4,153	2,107
Tag recapture composition	492	492	492	491
Tag recapture time series	218	449	229	202
Recruitment	32	32	32	19
Parameter softbounds	0.007	0.007	0.007	0.006

Table 6. Select model estimates from the data weighting alternatives.

Parameter	Base with tag data and reporting rates estimated	All recreational length compositon lambdas = 0.1	All length composition lambdas = 0.1	All conditional age-at-length lambdas = 2	Tag recapture overdispersion = 1.5
VonBert_K_Fem_GP_1	0.28	0.27	0.29	0.28	0.28
Age_K_Fem_GP_1_a_4	0.62	0.58	0.36	0.49	0.62
SR_LN(R0)	5.56	5.57	5.51	5.55	5.56
Early_InitAge_41	0.0082	0.1721	0.0412	0.0778	0.0116
Early_InitAge_40	0.0021	0.0175	0.0436	0.0235	0.0023
Early_InitAge_27	0.0331	-0.0187	-0.0744	0.0706	0.0336
Main_RecrDev_1992	-0.010	0.106	0.156	0.015	-0.009
Main_RecrDev_2001	0.210	0.377	0.456	0.252	0.214
Main_RecrDev_2013	-0.020	0.201	-0.405	-0.097	-0.020
InitF_1Comm_GNBS	0.40	0.43	0.45	0.44	0.40
InitF_2Comm_OTHER	0.15	0.14	0.14	0.16	0.15
InitF_3Rec_Harv	1.33	1.64	1.57	1.48	1.33
InitF_4Rec_Discard	0.004	0.005	0.005	0.004	0.004
LnQ_base_5_NC_JAI	-5.49	-5.46	-5.45	-5.48	-5.49
LnQ_base_6_NC_IGNS_0	-5.38	-5.30	-5.27	-5.35	-5.38
LnQ_base_7_NC_IGNS_1	-5.10	-4.94	-5.02	-5.05	-5.10
LnQ_base_8_NC_LL	-4.87	-4.00	-4.00	-4.68	-4.86
LnQ_base_9_Rec_CPUE	-5.23	-5.17	-5.34	-5.17	-5.22
SizeSel_4P_2_Rec_Discard	-0.77	-0.57	-0.50	-0.75	-0.77
SizeSel_9P_6_Rec_CPUE	-1.97	-0.59	-0.81	-1.86	-1.97
SPB_Virgin	32,933	31,599	29,646	31,891	32,908
SPB_Initial	3,202	1,047	1,201	2,502	3,181
SPB_1989	5,039	1,553	1,712	4,022	5,002
SPB_2013	2,135	774	1,186	1,845	2,115
Recr_Virgin	260	262	248	256	259
Recr_Initial	260	262	248	256	259
Recr_1989	100	90	72	88	99
Recr_2013	206	244	131	188	206
SPRratio_1989	0.99	0.99	0.98	0.98	0.99
SPRratio_2013	0.97	0.99	0.97	0.97	0.97
F_1989	1.22	1.24	1.06	1.16	1.22
F_2013	0.81	0.82	0.82	0.84	0.81

Table 6. Continued.

Parameter	Tag recapture overdispersion = 5	Tag recapture overdisperion = 1.5 & tag recapture time series lambdas = 2	FI index lambdas = 10	SS3 Variance Adjustments
VonBert_K_Fem_GP_1	0.28	0.28	0.27	0.28
Age_K_Fem_GP_1_a_4	0.63	0.62	0.63	0.48
SR_LN(R0)	5.56	5.55	5.57	5.56
Early_InitAge_41	0.0058	0.0489	0.0049	0.1108
Early_InitAge_40	0.0019	0.0048	0.0019	0.0210
Early_InitAge_27	0.0328	0.0386	0.0478	-0.0124
Main_RecrDev_1992	-0.011	-0.003	0.245	0.015
Main_RecrDev_2001	0.201	0.236	0.010	0.244
Main_RecrDev_2013	-0.022	-0.020	-0.160	0.114
InitF_1Comm_GNBS	0.40	0.40	0.37	0.45
InitF_2Comm_OTHER	0.15	0.14	0.14	0.14
InitF_3Rec_Harv	1.33	1.31	1.22	1.58
InitF_4Rec_Discard	0.004	0.004	0.003	0.004
LnQ_base_5_NC_JAI	-5.49	-5.49	-5.56	-5.54
LnQ_base_6_NC_IGNS_0	-5.38	-5.37	-5.37	-5.36
LnQ_base_7_NC_IGNS_1	-5.10	-5.08	-5.10	-4.99
LnQ_base_8_NC_LL	-4.88	-4.73	-5.24	-3.73
LnQ_base_9_Rec_CPUE	-5.23	-5.19	-5.39	-5.08
SizeSel_4P_2_Rec_Discard	-0.77	-0.76	-0.78	-0.38
SizeSel_9P_6_Rec_CPUE	-1.97	-1.88	-2.08	-1.17
SPB_Virgin	32,958	32,691	33,315	31,650
SPB_Initial	3,218	2,965	3,881	1,494
SPB_1989	5,068	4,623	6,148	2,001
SPB_2013	2,151	1,886	2,913	811
Recr_Virgin	260	258	263	261
Recr_Initial	260	258	263	261
Recr_1989	100	98	99	102
Recr_2013	206	204	183	224
SPRratio_1989	0.99	0.99	0.98	0.99
SPRratio_2013	0.97	0.98	0.96	0.99
F_1989	1.22	1.23	0.75	0.98
F_2013	0.80	0.82	0.69	0.96

Table 7. Estimates of survival and tag-recovery rates from the SS3 model and Brownie et el. 1985 model using SS3 tag-recapture data and Bacheler et al. 2008 tag-recapture data.

Model	SS3	Brownie et al. 1985	Brownie et al. 1985
Data	SS3	SS3	Bacheler et al. 2008
1998 age 0 survival of tags	0.65	0.58	0.50
1998 age 0 recovery rate	0.008	0.012	0.013
1999 age 1 survival of tags	0.36	0.17	0.13
1999 age 1 recovery rate	0.040	0.046	0.055
2000 age 2 survival of tags	0.42	N/A	N/A
2000 age 2 recovery rate	0.035	0.077	0.106

Table 8. Combinations of 1998 age-0 survival, fishing mortality, and reporting rate estimates using external natural mortality (0.195) and chronic tag loss (0.09) estimates. Values in yellow show the survival or adjacent survival estimates form the Brownie model using the two data sets. The base SS3 model with tagging data estimates age-0 fishing mortality at 0.14 and the average reporting rate across fleets at 0.10.

Reporting Rate	F (SS3 Data)	Survival (SS3 Data)	F (Bacheler Data)	Survival (Bacheler Data)
0.050	2.75	0.05	2.89	0.04
0.100	1.38	0.19	1.44	0.18
0.150	0.92	0.30	0.96	0.29
0.200	0.69	0.38	0.72	0.37
0.250	0.55	0.43	0.58	0.42
0.300	0.46	0.48	0.48	0.46
0.350	0.39	0.51	0.41	0.50
0.400	0.34	0.53	0.36	0.52
0.450	0.31	0.55	0.32	0.55
0.500	0.28	0.57	0.29	0.56
0.550	0.25	0.59	0.26	0.58
0.600	0.23	0.60	0.24	0.59
0.650	0.21	0.61	0.22	0.60
0.700	0.20	0.62	0.21	0.61
0.750	0.18	0.63	0.19	0.62
0.800	0.17	0.63	0.18	0.63
0.850	0.16	0.64	0.17	0.63
0.900	0.15	0.65	0.16	0.64
0.950	0.14	0.65	0.15	0.65

Table 9. Combinations of 1999 age-1 survival, fishing mortality, and reporting rate estimates using external natural mortality (0.129) and chronic tag loss (0.09) estimates. Values in yellow show the adjacent survival estimates form the Brownie model using the two data sets. The base SS3 model with tagging data estimates age-1 fishing mortality at 0.79 and the average reporting rate across fleets at 0.10.

Reporting Rate	F (SS3 Data)	Survival (SS3 Data)	F (Bacheler Data)	Survival (Bacheler Data)
0.050	10.22	0.00	12.24	0.00
0.100	5.11	0.00	6.12	0.00
0.150	3.41	0.03	4.08	0.01
0.200	2.56	0.06	3.06	0.04
0.250	2.04	0.10	2.45	0.07
0.300	1.70	0.15	2.04	0.10
0.350	1.46	0.19	1.75	0.14
0.400	1.28	0.22	1.53	0.17
0.450	1.14	0.26	1.36	0.21
0.500	1.02	0.29	1.22	0.24
0.550	0.93	0.32	1.11	0.26
0.600	0.85	0.34	1.02	0.29
0.650	0.79	0.37	0.94	0.31
0.700	0.73	0.39	0.87	0.34
0.750	0.68	0.41	0.82	0.36
0.800	0.64	0.42	0.76	0.37
0.850	0.60	0.44	0.72	0.39
0.900	0.57	0.46	0.68	0.41
0.950	0.54	0.47	0.64	0.42

Table 10. Ratios of recapture rate in the Bacheler et al. 2008 tag-recapture data to recapture rate in the SS3 tag-recapture data for age-0 fish tagged with anchor tags. Ratios bolded in red indicate higher recaptures rates in the Bacheler et al. 2008 data.

		Year Recaptured											
		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Year Tagged	1991	**1.20**	0.95	**1.07**	**1.16**	**1.16**							
	1992		**1.50**	**1.06**	0.97	0.97	0.97						
	1993			**1.51**	**1.22**		**2.32**						
	1994				**1.17**	0.90	0.72	0.00					
	1995					**1.19**	0.95	0.95					
	1996												
	1997							**1.10**	**1.23**	**1.20**	1.00		
	1998								**1.05**	**1.01**	0.99		0.99
	1999									**1.55**	**1.19**	**1.11**	**1.11**
	2000										**1.25**	**1.10**	**1.07**

Table 11. Ratios of recapture rate in the Bacheler et al. 2008 tag-recapture data to recapture rate in the SS3 tag-recapture data for age-1 fish tagged with anchor tags. Ratios bolded in red indicate higher recaptures rates in the Bacheler et al. 2008 data.

Year Tagged \ Year Recaptured	1998	1999	2000	2001	2002
1998	**1.06**	**1.41**	0.99		
1999		**1.22**	**1.00**		**1.00**
2000			**1.72**	**1.55**	**1.62**
2001				**1.15**	0.90

Table 12. Ratios of recapture rate in the Bacheler et al. 2008 tag-recapture data to recapture rate in the SS3 tag-recapture data for age-3+ fish tagged with dart tags. Ratios bolded in red indicate higher recaptures rates in the Bacheler et al. 2008 data.

Year Tagged \ Year Recaptured	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1989	**1.01**	**1.01**	**1.01**		**1.01**								
1990		**1.96**	0.98	0.98	0.98				0.98				
1991			0.93	0.93	0.93		0.93						
1992				0.87			0.87						
1993						0.89	0.89		0.89				
1994						0.90	0.90		0.90	0.90			
1995							**1.35**	0.90	0.90				
1996									0.91		0.91		
1997										0.87			
1998										**1.83**		0.92	0.92
1999													0.98

Table 13. Recapture rate estimates from SS3 model runs with the input SS3 recapture data, the SS3 recapture data adjusted by the recapture rate ratios in tables 10-12, and the adjusted SS3 recapture data multiplied by 3.

Fleet	SS3 Recapture Data	SS3 Recapture Data Adjusted by Recapture Rate Ratio	Adjusted SS3 Recapture Data Mutiplied by 3
Commercial GNBS	9%	10%	28%
Commercial Other	12%	10%	29%
Recreational Harvest	9%	9%	26%

Table 14. Spawning potential ratio estimates from SS3 model runs with the input SS3 recapture data, the SS3 recapture data adjusted by the recapture rate ratios in tables 10-12, and the adjusted SS3 recapture data multiplied by 3.

Year	SS3 Recapture Data	SS3 Recapture Data Adjusted by Recapture Rate Ratio	Adjusted SS3 Recapture Data Mutiplied by 3
1989	0.014	0.014	0.014
1990	0.019	0.021	0.020
1991	0.063	0.068	0.063
1992	0.128	0.140	0.137
1993	0.006	0.007	0.006
1994	0.038	0.043	0.038
1995	0.007	0.008	0.008
1996	0.038	0.044	0.045
1997	0.143	0.153	0.147
1998	0.050	0.057	0.056
1999	0.092	0.101	0.099
2000	0.092	0.102	0.099
2001	0.240	0.251	0.241
2002	0.003	0.003	0.003
2003	0.137	0.148	0.147
2004	0.085	0.093	0.089
2005	0.082	0.091	0.090
2006	0.074	0.082	0.081
2007	0.069	0.078	0.078
2008	0.072	0.080	0.078
2009	0.097	0.108	0.107
2010	0.052	0.058	0.057
2011	0.225	0.239	0.238
2012	0.005	0.005	0.005
2013	0.027	0.032	0.032

Figures

Fig. 1. Static spawning potential ratios for southern stock red drum under different configurations for the inclusion of tag-recapture data into the analysis.

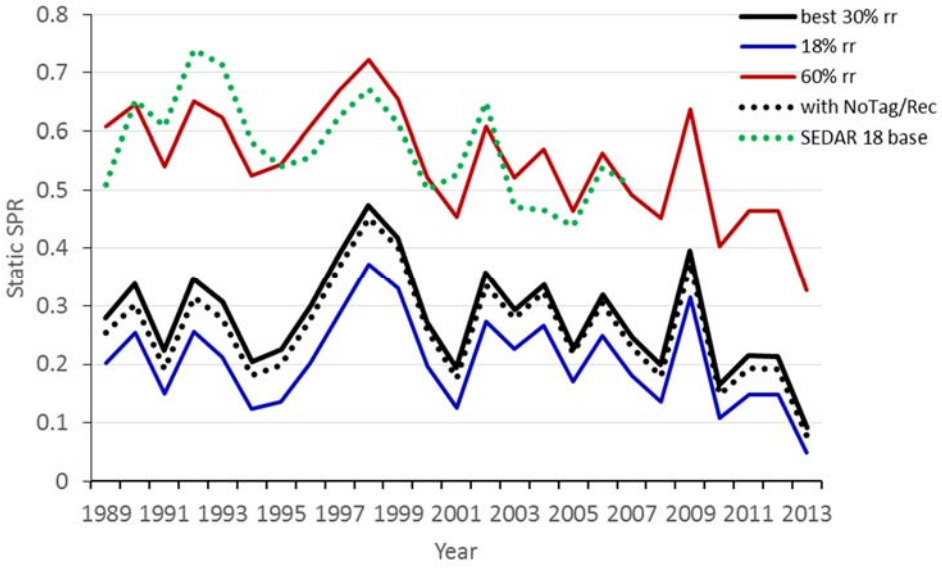


Fig. 2. Likelihood profile over the reporting rate of tagged red drum harvested by recreational anglers with the change in the negative log likelihood relative to the minimum negative log likelihood on the y-axis.

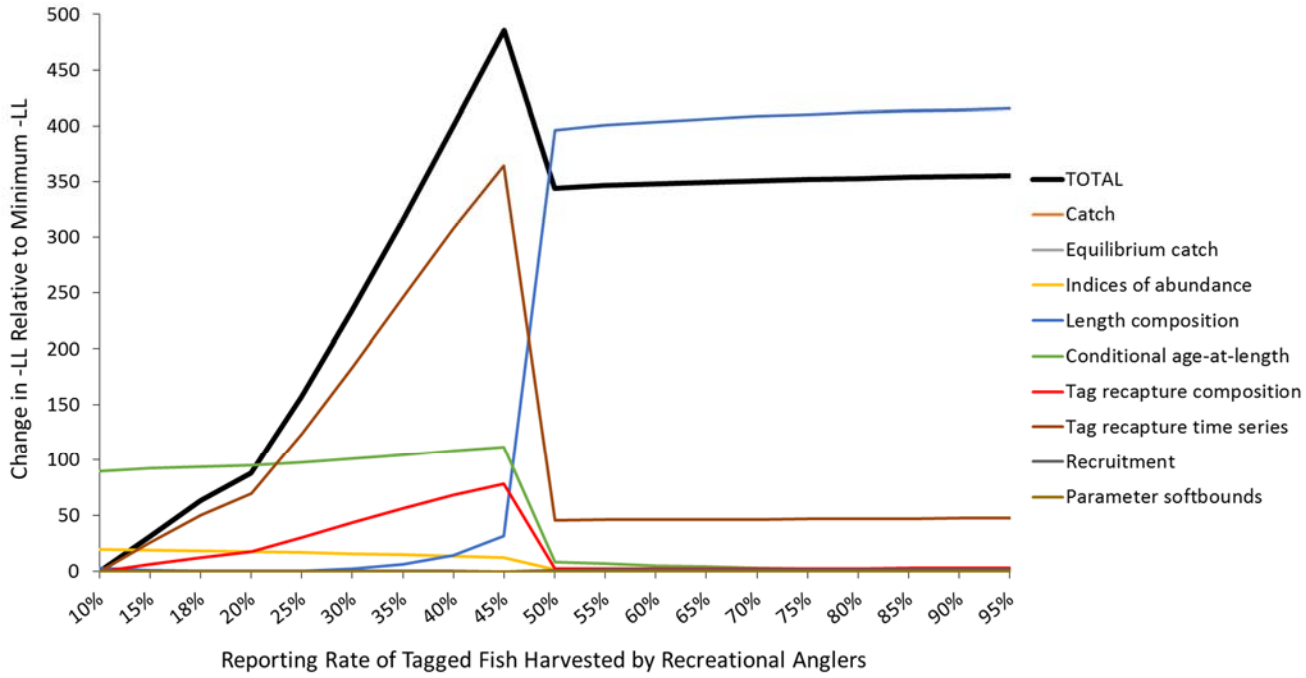


Fig. 3. Likelihood profile over the reporting rate of tagged red drum harvested by recreational anglers with the change in the negative log likelihood relative to the minimum negative log likelihood scaled to a maximum of 1 on the y-axis.

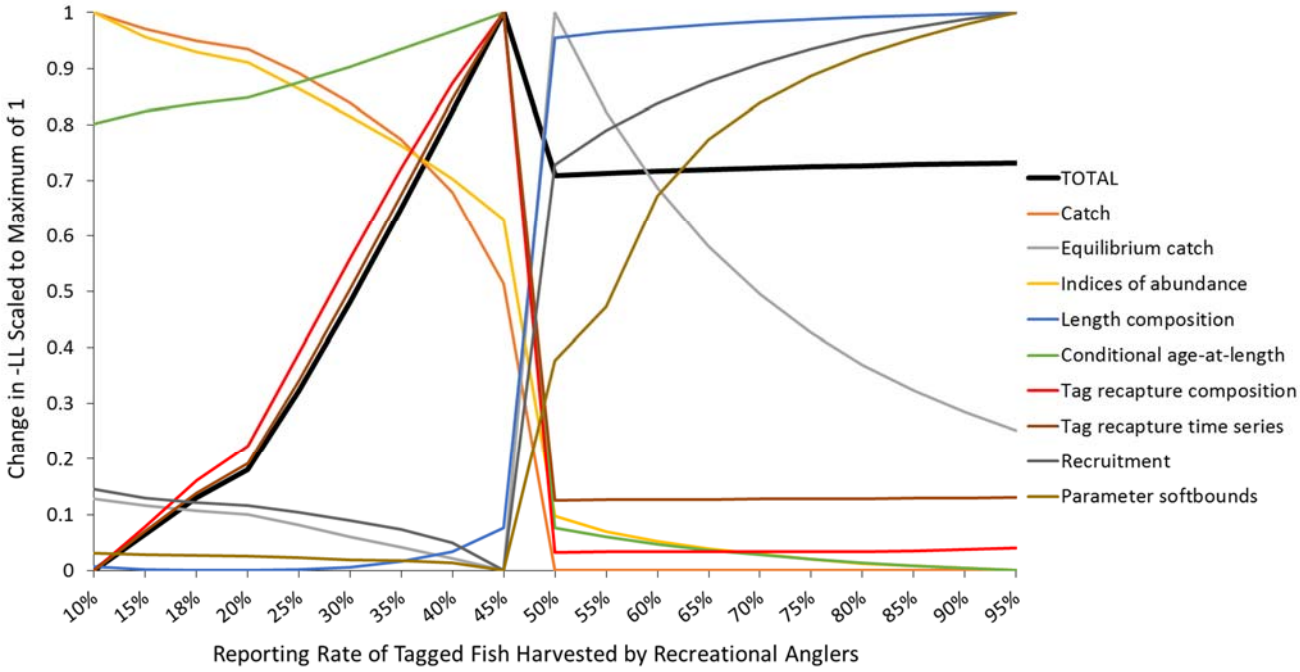


Fig. 4. Spawning potential ratio estimates from the model runs fixed at different reporting rate values for the recreational harvest fleet.

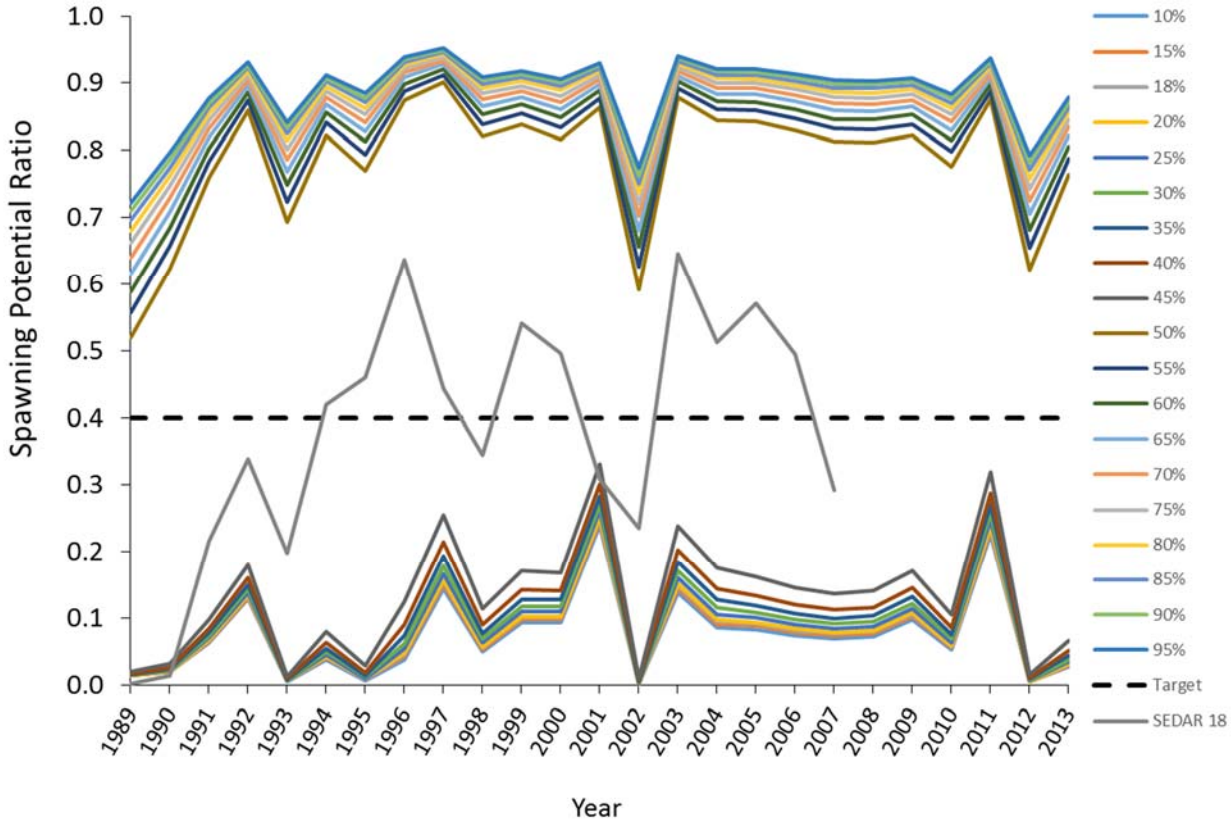


Fig. 5. Age-0 recruitment estimates from the model runs fixed at different reporting rate values for the recreational harvest fleet.

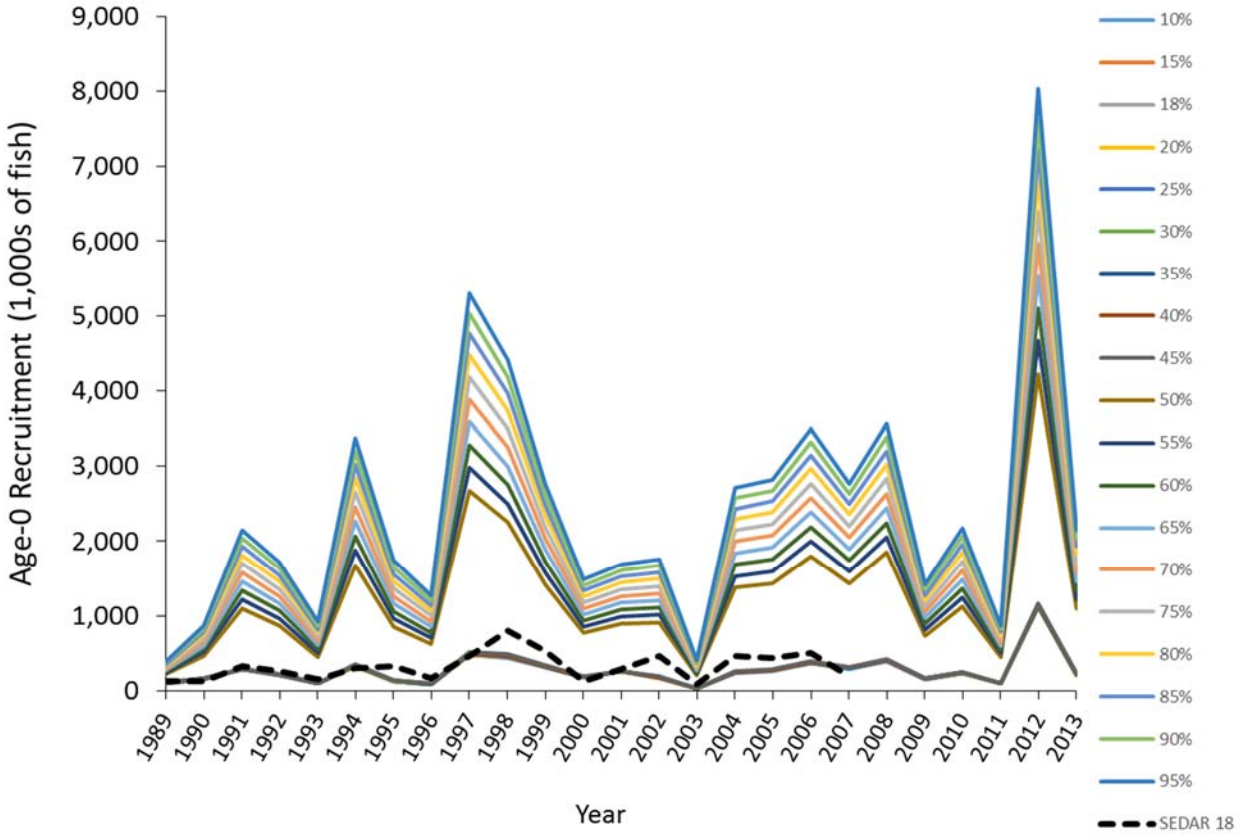


Fig. 6. Likelihood profile over the unfished recruitment from model runs with the reporting rate of the recreational harvest fleet fixed at values from 10-95%. The change in the negative log likelihood relative to the minimum negative log likelihood on the y-axis.

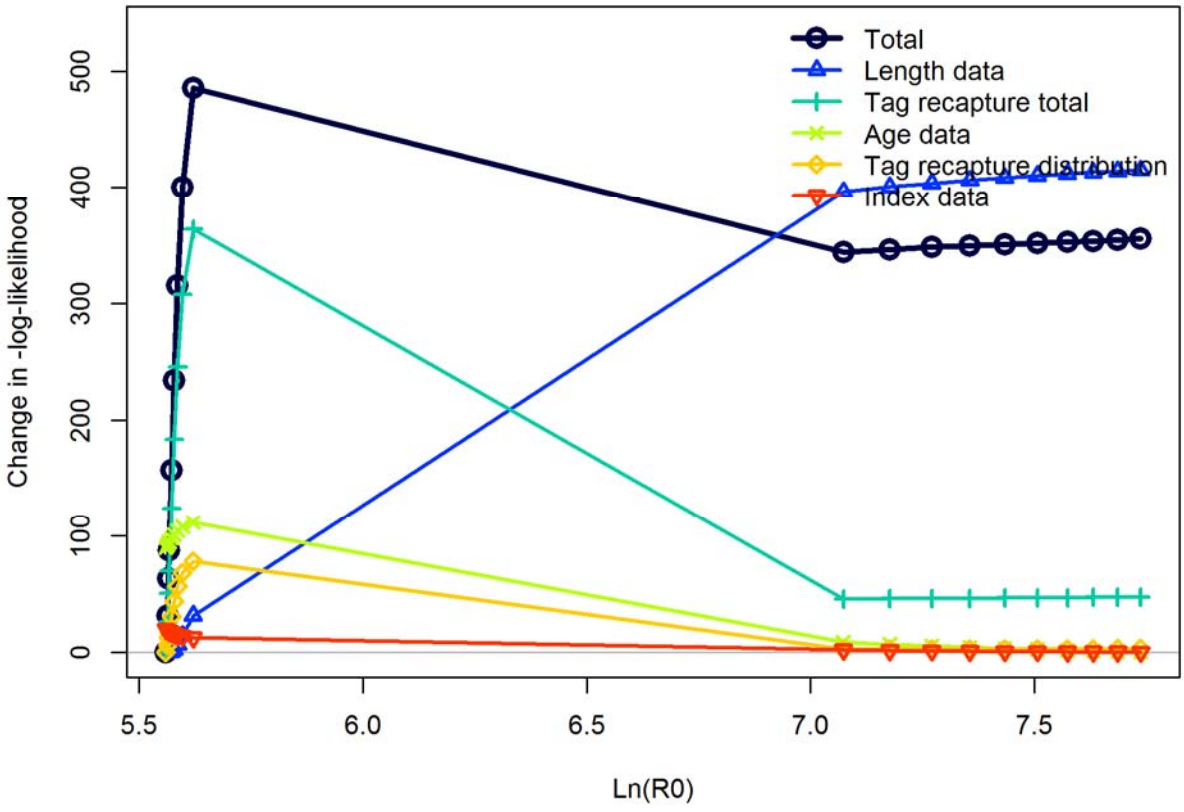
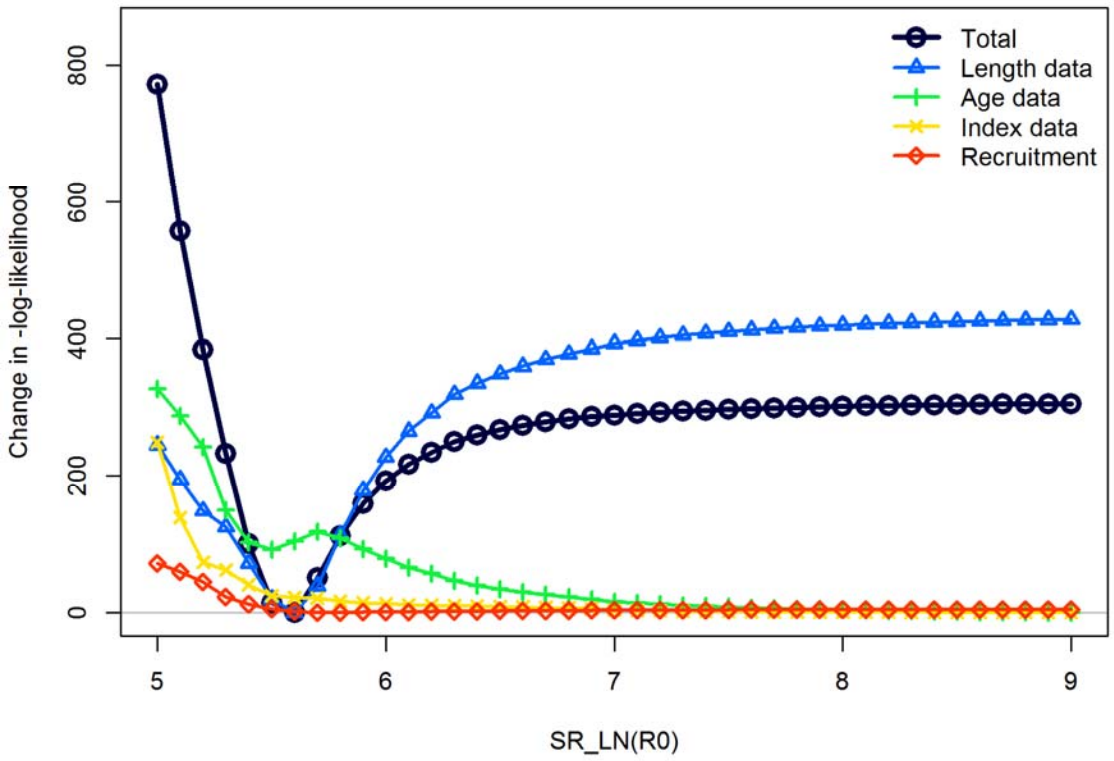


Fig. 7. Likelihood profile over the unfished recruitment from the model without the tag data. The change in the negative log likelihood relative to the minimum negative log likelihood on the y-axis.



The Southeast Area Monitoring and Assessment Program (SEAMAP), formed in 1981, is a State/Federal/University program for the collection, management and dissemination of long-term standardized fishery independent data in the southeastern United States. SEAMAP provides essential fishery independent data for evaluating the status of the Nation's fisheries through the SouthEast Data, Assessment and Review (SEDAR) process, in addition to supporting the regional fishery management councils and enhanced requirements of the Magnuson-Stevens Reauthorization Act.

While SEAMAP's Congressional appropriation has increased since 2013, the amount available for collecting valuable fishery independent has actually decreased for a variety of reasons. Taxes and assessments on SEAMAP's budget now constitute almost 16% of the total SEAMAP appropriation. Taxes and assessments were only 5% in FY2014. Level funding also has impacted days at sea, the number of stations sampled, and the amount of fishery independent data collected. With increasing vessel and personnel costs each year, level funding leads to cuts in data collection.

	FY2013	FY2014	FY2015	FY2016
Congressional Appropriation	$4,779,000	$5,117,000	$5,125,000	$5,125,000
Amount to SEAMAP	$4,424,629	$4,849,906	$4,379,364	$4,313,068

SEAMAP has used other funding sources to help gather critical fishery independent data, but these external funding sources cannot continue to support future SEAMAP sampling. Several states in the Gulf of Mexico have received National Fish and Wildlife Federation (NFWF) grants from NFWF's Gulf Environmental Benefit Fund related to the 2010 Deepwater Horizon oil spill. These SEAMAP partners use the grants to supplement SEAMAP funding and add days at sea to existing SEAMAP surveys or to wholly participate in surveys where SEAMAP funding limitations do not allow them to participate. NFWF supports approximately $4 million in SEAMAP related fishery independent data collection in the Gulf of Mexico. Over the next several years, NFWF grants will be running out and future data collection will be lost unless SEAMAP receives increased funding. State partners have also contributed approximately $500,000 to SEAMAP data collection activities. With limited state budgets, state partners cannot continue to support SEAMAP in this way.

NOAA Fisheries has had an almost 33% decline ($974K down to $659K annually) in SEAMAP funding. Current funding no longer supports payment for plankton sample processing at the Polish Sorting Center with annual funding supported through other SEFSC funding sources. NOAA Fisheries has seen significant reduction in survey support funding for overtime, travel, supplies and equipment with subsequent surveys costs shifted to other SEFSC funding sources. NOAA Fisheries has also seen their SEAMAP staff reduced by 2 employees.

Level funding in the future will lead to the SEFSC's inability to support funding the Polish Sorting Center for the processing of state and federal SEAMAP ichthyoplankton samples. Continued shifting of SEAMAP support to other SEFSC funding sources, potentially impacting the ability of the SEFSC to conduct other regional research activities.

All of the funding reductions detailed below are comparisons between the start of the last 5 year funding cycle (FY2011) and the beginning of this current funding cycle (FY2016).

SEAMAP – South Atlantic

Coastal Trawl Survey

Since the Coastal Trawl Survey's inception in 1986, this survey has provided long-term, fishery independent data on seasonal abundance and biomass of numerous species, including bony fishes, sharks and rays, crustaceans, and cephalopods. In recent years, the survey has also begun collecting data on sea turtles and horseshoe crabs. As the only coastal trawl survey that encompasses the entire Southeast region, the sampling area includes the coastal zone of the South Atlantic Bight from Cape Hatteras, North Carolina, to Cape Canaveral, Florida. Multi-legged cruises are conducted in spring (early April - mid-May), summer (mid-July - early August), and fall (October - mid-November). The Coastal Trawl Survey has provided important data to stock assessments for Spanish mackerel, king mackerel, Atlantic menhaden, spot, and croaker.

- Reduction of funding from $561K to $511K.
- Reduction of sampled stations from 201 to 112.
- Current funding support is for only 50 sea days when about 60 sea days are needed to sample all 112 stations.
- Significant reduction in collecting and processing life history information, including complete elimination of all diet studies.
- Reduction in staff by 1.

Expected reduction in the near future unless additional funding is available:

- Reducing sampling from 3 seasons per year (spring, summer, and fall) to 2 seasons per year. This will reduce the amount of data available for stock assessments by one-third.

Reef Fish Survey and Habitat Characterization

The goal of the SEAMAP-SA Reef Fish Survey is to assist with the expansion of the geographical sampling coverage of the current fishery independent surveys, focusing on either shallow or deep potential live-bottom areas. Designed as a complement to the Marine Resources Monitoring, Assessment and Prediction (MARMAP) program, the Reef Fish Survey funding allows for expanded sampling in marine protected areas (MPAs). The Reef Fish Survey data have been used in stock assessments for red porgy, gag grouper, vermillion snapper, black sea bass, blueline tilefish, snowy grouper, hogfish, gray triggerfish, and red snapper.

- Reduction in funding from $550K to $468K.
- Elimination of an entire program component: the gag ingress study.
- Reduction of number of sea days for the Reef Fish Survey from 35 to 19.5, and a reduction of an equivalent amount of data for stock assessments.
- Reduction of 6 months staff support of data management to include reef fish data into the SEAMAP data base.
- Reduction of 3 months staff support to process life history samples.

Expected reduction in the near future unless additional funding is available:

- Further reduction in sea days or elimination of survey components such as longline sampling. Loss of ability to provide data for stock assessments and management.

- Also, staff has been providing analyses for stock assessments, participated in data workshops, and presented regular updates to SAFMC and others. With a further reduction in staff, we may no longer be able to do this.
- Further reduction in life history processing.

South East Regional Taxonomic Center

The South East Regional Taxonomic Center maintains a reference specimen collection and searchable library for the South Atlantic. To address SEAMAP-SA goals, SERTC concentrates work on stomach content analysis and deciding on level of identification necessary. Additionally, archiving and storage of otoliths and gonadal tissues has proven to be essential for stock assessments.

- Reduction in funding from $82K to $5K.
- This funding reduction all but eliminated SERTC, with the exception of some support to maintain the collections.
- The most serious impact has been the inability to continue support for diet studies that are crucial to ecosystem based fisheries management.

Expected effects in the near future unless additional funding is available:

- Full elimination of SERTC and loss of valuable specimen collections.

Data Management

The primary goal of the SEAMAP-SA Data Management System is to bring all types of SEAMAP-SA project data together into one centralized database that can be accessed by federal and state agencies for things such as stock assessments as well as the public. The data system is envisioned as a relational database for, but not limited to, the long-term surveys (SEAMAP-SA Coastal Survey, the NCDMF Pamlico Sound Survey), the state Coastal Longline Surveys, the Reef Fish Survey.

- Although data management funding increased from $113K to $125K, this merely allowed maintenance of at least one full time staff to manage and update the SEAMAP database.
- SCDNR contributes to server and other hardware maintenance costs, Oracle licensing costs, and internet security and IT support staff for maintaining the SEAMAP-SA data management system. Without these contributions, SEAMAP-SA would not be able to maintain the current level of data management and public access to the SEAMAP-SA data.

Expected effects in the near future unless additional funding is available:

- Inability to include survey data into the SEAMAP database. This may impede the use of the data for stock assessments and management, and complicate compliance with the PARR requirements.

South Carolina Coastal Longline Survey

The South Carolina Coastal Longline Survey is designed to provide a long-term fishery independent database on the distribution, relative abundance, catch per unit effort, size distribution and age composition of adult red drum along the coast of South Carolina.

Additionally, the survey provides information on the relative abundance, size distribution, sex, and maturity of multiple species of small and large coastal sharks.

- Reduction in funding from $74K to $67K.
- Reduction of number of sea days from 15 to 10, and a reduction of an equivalent amount of data for stock assessments. This means that there is no support to sample the full number of sampling stations (sea days needed: 14 days)
- Reduction of supported staff from 12 to 9.5 months.
- SEAMAP-SA contributes only contributes to 46% to 48% of the total survey, other funding must be supplemented and is not dependable.

Expected effects in the near future unless additional funding is available:

- Further reduction in sea days and possible elimination of entire survey.

<u>North Carolina Pamlico Sound and Coastal Longline Survey</u>

The North Carolina Pamlico Sound Survey was designed to provide a long term fishery independent database on the distribution, relative abundance, and size composition of estuarine fish and decapod crustaceans for the Pamlico Sound and associated rivers and bays. Sampling occurs in June and September annually. The Pamlico Sound Survey data has been used for state-managed species such as blue crab, kingfish, and Southern flounder. The data also have been used in ASMFC stock assessments and triggers for weakfish, spot, croaker, Atlantic menhaden, and summer flounder. The North Carolina Coastal Longline Survey is designed to provide a long term fishery independent database on the distribution, relative abundance, catch per unit effort, and size distribution of adult red drum for waters of the Pamlico Sound. Coastal Longline Survey data were used in the red drum stock assessment with the potential of being used in the coastal shark assessments.

Reduction in funding from $112K to $101K.

- Additional funding sources total about $25K annually to keep the surveys running.
- Currently, the surveys are below the funding floor to keep sole staff member allocated to SEAMAP.
- The only reason this survey has been operational until this current funding cycle was staff turnover throughout the grant duration. Unused salary allowed the survey to meet grant objectives.
- Chief scientists' and state staff time for SEAMAP cruises are not accounted for in SEAMAP funding.

Expected effects in the near future unless additional funding is available:

- Inability to include NC survey data (Sound Survey and Longline) into the SEAMAP database. This may impede the use of the data for stock assessments and management, and complicate compliance with the PARR requirements.
- Reduction in number of NC field longline days and a reduction of an equivalent amount of data for stock assessments. This means that there is no support to sample the full number of sampling sites/weeks (72 samples). One week of sampling would be omitted and precision in estimates would be reduced.

Georgia Coastal Longline Survey

Presently, the Georgia Coastal Longline Survey is conducted from May to December. Its random stratified design samples 25 sites monthly (May-August) and adds 10 stations in North Florida for the fall red drum sampling (September to December). The spring and summer (May-August) sampling targets primarily coastal shark species. These information have been used in HMS stock assessments. The red drum data have been included in the recent ASMFC stock assessment.

- Reduction in funding from $86K to $72K.
- Total cost of survey is $140K so funding has been supplemented through other sources for years. Currently, supplemental funding has ceased so survey will need to be modified to match funding outlook.
- Hourly staffing issues: The bulk of the field staff funded on this project have always been hourly part-time employees (PTEs). This dramatically reduced the cost by eliminating the Department's full-time employee (FTE) fringe rate. However, recent Department policies in regard to the Affordable Care Act have limited PTEs to 29 hours per week, or 40 hours per week for no more than 168 consecutive days (24 weeks). Given most sea days exceed 10 hours, the 29 hours per week policy is restrictive, and the 40 hours per week for 24 weeks policy results in constant personnel turnover. Additionally, any PTE working over 40 hours in a week must be paid overtime at a 1.5 times rate.
- Full-time staffing issues: Although this project makes up the bulk of the vessel captain's time from May-December, no SEAMAP funds are directly associated with this position. Fifty percent of the Chief Scientist's time is occupied by this project May-December while none of this time is included in the budget. There is also no time accounted in the grant for data management and analyses conducted by the project P.I.'s.
- SEAMAP presently covers a little more than 50% the costs to fund this survey May to December (8 months, 44 sea days). GADNR has offset the annual costs for years with a combination of state and other federal fund sources to cover personnel services and vessel maintenance. However, these funds continue to be cut and can no longer support 8 months (44 sea days) of sampling.
- The FY2016 budget will eliminate two months of sampling (May and December are proposed), reducing total sea days from 44 to 33.

Expected effects in the near future unless additional funding is available:

- Modify the sampling periodicity to something greater than monthly – every six weeks or every other month
- Eliminate summer sampling – this will impact information collected for shark species. Reduces sea days from 44 to 24.
- Eliminate fall sampling – this will impact information collected for adult red drum. Reduces sea days from 44 to 20.

SEAMAP – Gulf of Mexico

Spring Plankton Survey

The SEAMAP Spring Plankton Survey began in 1982, with the objectives of collecting ichthyoplankton samples in offshore waters of the Gulf of Mexico. Data from the Spring Plankton Survey are used to calculate the abundance and distribution of Atlantic bluefin tuna larvae that

are used in stock assessments. Data have also been used in response to the Deepwater Horizon oil spill to determine the larval fish that were likely to be affected by the spill.

- State participation has been reduced by 5 days at sea since 2011.
- Approximately 14 stations will not be sampled due to funding limitations.
- Current funding levels do not allow additional sea days to allow for mechanical or weather delays that may further reduce the number of stations sampled.

Bottom Longline Survey

The SEAMAP Bottom Longline Survey began in 2007, complementing an existing long-term fishery independent longline survey currently conducted by NOAA Fisheries. The SEAMAP Bottom Longline Survey gathers data on coastal shark and finfish species within the shallow waters of the north central Gulf of Mexico. The data are used in stock assessments for coastal sharks and finfish.

- The Bottom Longline Survey design was changed in 2015 to standardize station selection. This design change does not allow a direct comparison between 2011 and 2016 sampling effort.
- The Bottom Longline Survey is currently at a bare minimum of stations where the Survey will be severely impacted if additional stations or survey seasons have to be dropped due to increased costs and level funding.

Vertical Line Survey

The SEAMAP Vertical Line Survey began in 2010 and samples reef fish over artificial reefs, oil and gas platforms, and natural reef areas. Data are used in reef fish stock assessments and provide estimates of natural mortality, fishing mortality, age and fecundity, and abundance estimates.

- The Vertical Line Survey has expanded from 2 states to 3 states now participating.
- Level SEAMAP funding has maintained 38 days at sea while the geographic coverage has increased from off Alabama and a small section of Louisiana to all of Texas, Louisiana, and Alabama.
- Mississippi and Florida use funding from NFWF grants to cover their participation in the Vertical Line Survey.

Reef Fish Survey

The objective of the SEAMAP Reef Fish Survey, which began in 1992, is to assess relative abundance and compute population estimates of reef fish found on natural habitat in the Gulf of Mexico. Relative abundance and life history data from the survey have been used in stock assessments for red snapper, gray triggerfish, gag grouper, red grouper, and greater amberjack.

- Only NOAA Fisheries and Florida participate in this habitat mapping and stationary video camera survey.
- NFWF and Sportfish Restoration funds support the majority of Florida's data collection in this survey.
- SEAMAP funds only support data collection at 75 stations while other funding sources support data collection at 185 stations.

Summer Shrimp/Groundfish Survey

The SEAMAP Summer Shrimp/Groundfish Survey began in 1982 to monitor size and distribution of penaeid shrimp during or prior to migration of brown shrimp from bays to the open Gulf; (2) to aid in evaluating the "Texas Closure" management measure of the GMFMC Shrimp FMP; and (3) to provide information on shrimp and groundfish stocks across the northern Gulf of Mexico from inshore waters to 60 fm. Data from the survey are used in evaluating the abundance and size distribution of penaeid shrimp in federal and state waters to assist in determining opening and closing dates for commercial fisheries; evaluating and plotting the size of the hypoxic zone off of Louisiana; assessing shrimp and groundfish abundance and distribution and their relationship to such environmental parameters as temperature, salinity, and dissolved oxygen; and providing juvenile abundance indices for red snapper, yellowedge grouper, and red grouper stock assessments.

- 12 days at sea representing a loss of approximately 90 stations have been lost due to level funding since 2011.
- Currently there are no back up days for bad weather or mechanical breakdowns. If bad weather occurs or if the vessel breaks down, those sea days are simply lost with no way to sample the impacted stations.
- Florida will use NFWF funds in 2016 to cover their decrease in SEAMAP funding. Without NFWF funding, the majority of the west Florida shelf would not be sampled in 2016.

Fall Plankton Survey

The SEAMAP Fall Plankton Survey began in 1984 and collects ichthyoplankton samples with bongo and neuston gear for the purpose of estimating abundance and defining the distribution of eggs, larvae, and small juveniles of Gulf of Mexico fishes, particularly king and Spanish mackerel, lutjanids, and sciaenids. Data provide a larval index for king mackerel, gray triggerfish, and red snapper that are used in stock assessments. Data have also been used in defining EFH for penaeid shrimp, Spanish mackerel, king mackerel, vermilion snapper, and red snapper.

- 6 days at sea will be lost in 2016 due to level/decreased SEAMAP funding.
- Due to lack of funding and vessel problems, the 2015 Fall Plankton Survey was not able to be completed. Not enough stations were sampled, so data from the 2015 Fall Plankton Survey will not be available for future stock assessments. Usually other partners can sample additional stations if vessel problems prevent a partner from sampling their stations. The lack of SEAMAP funding did not allow this to happen in 2015.

Fall Shrimp/Groundfish Survey

The SEAMAP Fall Shrimp/Groundfish Survey began in 1985. Data from the survey are used in evaluating the abundance and size distribution of penaeid shrimp in federal and state waters to assist in determining opening and closing dates for commercial fisheries; assessing shrimp and groundfish abundance and distribution and their relationship to such environmental parameters as temperature, salinity, and dissolved oxygen; and providing juvenile abundance indices for red snapper, gray triggerfish, and yellowedge grouper stock assessments. Data were also used to estimate shrimp fishery bycatch in the red snapper stock assessment.

- SEAMAP began sampling the west Florida shelf in 2008 as part of the Fall Shrimp/Groundfish Survey.

- Level funding has limited Florida's ability to participate in the Fall Shrimp/Groundfish Survey. Florida did not participate in 2011 and 2012 and very few stations were sampled off Florida during these two years.
- NFWF funding has allowed Florida to again participate in the Fall Shrimp/Groundfish Survey and sample approximately 160 stations on the west Florida shelf.
- Other states have lost an additional 4 days at sea since 2011.
- NFWF funds that supported Florida's participation in the Fall Shrimp/Groundfish Survey will probably be shifted in 2016 to support more of their work during the Summer Shrimp/Groundfish Survey. This will likely mean very few stations on the west Florida shelf will be sampled during the 2016 and future Fall Shrimp/Groundfish Surveys.

Winter Plankton Survey

The SEAMAP Winter Plankton Survey began in 1983, but because of budget limitations, only took place sporadically until 2007. An abbreviated survey was begun in 2007 with full surveys conducted in 2008, 2009, 2012, 2013, and 2015. The Winter Plankton Survey is now a biannual survey. The objectives are to assess the occurrence, abundance and geographical distribution of the early life stages of winter spawning fishes from the mid-continental shelf to deep Gulf waters. The data are used in stock assessments for various grouper species, mullet, and menhaden.