

# Atlantic States Marine Fisheries Commission

## South Atlantic State/Federal Fisheries Management Board

May 14, 2014  
8:00 - 9:30 a.m.  
Alexandria, VA

### 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 (*P. Geer*) 8:00 a.m.
2. Board Consent 8:00 a.m.
  - Approval of Agenda
  - Approval of Proceedings from February 2014
3. Public Comment 8:05 a.m.
4. Consider Spot Draft Addendum I and Atlantic Croaker Draft Addendum II for Public Comment (*K. Rootes-Murdy*) **Action** 8:15 a.m.
5. Overview of Sheepshead and Kingfish Fisheries (*K. Rootes-Murdy*) 9:15 a.m.
  - Consider recommendation to the ISFMP Policy Board to explore FMPs for sheepshead and kingfish **Possible Action**
6. Review and populate South Atlantic Species Committees Membership (*K. Rootes-Murdy*) 9:25 a.m.
  - South Atlantic Advisory Panel
  - Red Drum Stock Assessment Subcommittee Membership **Action**
7. Other Business/Adjourn 9:30 a.m.

The meeting will be held at the Crowne Plaza Hotel, 901 North Fairfax Street, Alexandria, Virginia; 703-683-6000

# MEETING OVERVIEW

**South Atlantic State/Federal Fisheries Management Board Meeting**  
**Wednesday, May 14, 2014**  
**8:00 a.m. – 9:30 a.m.**  
**Alexandria, Virginia**

Chair: Pat Geer (GA) Assumed Chairmanship: 10/13	Technical Committee Chairs Atlantic Croaker: Chris McDonough (SC) Red Drum: Mike Murphy (FL)	Law Enforcement Committee Rep: Doug Lewis (GA)
Vice Chair: Jim Estes (FL)	Advisory Panel Chair: Tom Powers (VA)	Previous Board Meeting: February 6, 2014
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 February 2014

**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.

<b>1. Consider Draft Addendum I to the spot Omnibus Amendment and Draft Addendum II to the Atlantic croaker Amendment I for Public Comment (8:15-9:15 a.m.) Action</b>
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<b>Background</b>
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| <ul style="list-style-type: none"> <li>• At the August 2013 meeting, staff presented an update of the triggers exercise with 2012 landings data as well as preliminary analysis of the fishery using a traffic light approach (TLA). The results of the trigger report found declines in the commercial and recreational landings for both Atlantic croaker and spot fisheries but did not trip the triggers. The Board tasked the Atlantic croaker TC and spot PRT to full develop the TLA with management options.</li> <li>• At the February 2014 meeting, staff presented the Board with finalized TLA with a management framework to consider. The Board tasked the Atlantic croaker TC and spot PRT to develop a draft addendum using the traffic light approach and management framework.</li> <li>• The Atlantic croaker TC and spot PRT have created a draft addendum for the Board to consider approving for public comment (<b>Meeting materials</b>)</li> </ul> |
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<b>Presentations</b>
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| <ul style="list-style-type: none"> <li>• Draft Addendum I to the spot Omnibus Amendment and Draft Addendum II to the Atlantic croaker Amendment I for Public Comment by K. Rootes-Murdy</li> </ul> |
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<b>Board actions for consideration at this meeting</b>
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| <ul style="list-style-type: none"> <li>• Consider the draft Addendum for public comment</li> </ul> |
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**5. Overview of Sheepshead and Kingfish Fisheries (9:15-9:25 a.m.) Possible Action**

**Background**

- Southern Kingfish have been considered for inclusion in the ISFMP in previous years. Data limitations have prevented a benchmark stock assessment from being conducted.
- Sheepshead has recently been offered as species for ISFMP consideration by some of the states.
- White papers with information on Sheepshead and Kingfish biology and landings (**Meeting materials**) have been created for the Board to review.

**Presentations**

- Overview of white papers on Sheepshead and Kingfish by K. Rootes-Murdy

**Board actions for consideration at this meeting**

- Consider and review fisheries for possible ISFMP.

**6. Update on South Atlantic Species Committees (9:25-9:30 a.m.) Action**

**Background**

- Participation in the South Atlantic Advisory Panel meetings has decreased over the years. Two positions have become vacant in recent years (MD and VA).
- The Red Drum Stock Assessment Subcommittee needs to be populated for the upcoming 2015 Benchmark Stock Assessment

**Presentations**

- Review of committee, advisory panel, and plan review team members for South Atlantic Species by K. Rootes-Murdy

**Board actions for consideration at this meeting**

- The Board should consider each of their state's participation in the Advisory Panel and provide any updates to their current representation as needed
- Appoint members to the 2015 Red Drum Stock Assessment Subcommittee including Chairman

**7. Other Business/Adjourn**

**DRAFT PROCEEDINGS OF THE  
ATLANTIC STATES MARINE FISHERIES COMMISSION  
SOUTH ATLANTIC STATE/FEDERAL FISHERIES  
MANAGEMENT BOARD**

**The Crowne Plaza Hotel – Old Town  
Alexandria, Virginia  
February 6, 2014**

**These minutes are draft and subject to approval by the South Atlantic State/Federal Fisheries Management Board. The Board will review the minutes during its next meeting.**

**Draft Proceedings of the South Atlantic State/Federal Fisheries Management Board Meeting  
February 2014**

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**INDEX OF MOTIONS**

1. **Approval of Agenda by Consent** (Page 1).
2. **Motion to approve proceedings of October 28, 2013** by Consent (Page 1).
3. **Move that the Board task the staff and TC to develop a draft addendum, with an appropriate suite of options that will adopt and employ the traffic light approach to manage spot and croaker. This will be an interim approach until the next stock assessment** (Page 9). Motion by Dr. Wilson Laney; second by Joe Grist. Motion carried (Page 12).
4. **Move that the South Atlantic Board request the Assessment Science Committee consider developing a spot benchmark stock assessment** (Page 12). Motion by Dr. Daniel; second by Russ Allen. Motion carried unanimously (Page 12).
5. **Move to approve state compliance reports and 2013 FMP Reviews for Spot, Spotted Seatrout and Spanish Mackerel for the 2012 fishing year** (Page 14). Motion by Spud Woodward; second by Louis Daniel. Motion carried (Page 14).
6. **Move to approve *de minimis* status for the states of New York (Spanish Mackerel), New Jersey (Spanish Mackerel, Spotted Seatrout), Delaware (Spanish Mackerel), South Carolina (Spot), and Georgia (Spot, Spanish Mackerel)** (Page 14). Motion by Spud Woodward; second by Louis Daniel. Motion carried (Page 14).
7. **Move to accept Virginia's proposal to lower its commercial maximum size limit from 26" to 25" and increase the Virginia commercial possession limit from 3 to 5 fish** (Page 15). Motion by Joe Grist; second by Martin Gary. Motion carried unanimously (Page 16).
8. **Adjourn by Consent** (Page 16).

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**ATTENDANCE**

**Board Members**

Russ Allen, NJ, proxy for D. Chanda (AA)	Spud Woodward, GA (AA)
John Clark, DE, proxy for D. Saveikis (AA)	Patrick Geer, GA, proxy for Rep. Burns (LA)
Bill Goldsborough, MD (GA)	Jim Estes, FL, proxy for J. McCawley (AA)
Tom O'Connell, MD (AA)	Martin Gary, PRFC
Joe Grist, VA, proxy for J. Bull, (Acting AA)	Wilson Laney, USFWS
Louis Daniel, NC (AA)	Steve Meyers, NMFS
Bill Cole, NC (GA)	

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

**Ex-Officio Members**

Chris McDonough, Croaker Technical  
Committee Chair

**Staff**

Bob Beal  
Kirby Rootes-Murdy  
Pat Campfield

Melissa Yuen  
Toni Kerns

**Guests**

Kelly Place, VA Watermen's

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The South Atlantic State/Federal Fisheries Management Board of the Atlantic States Marine Fisheries Commission convened in the Presidential Ballroom of the Crown Plaza Hotel Old Town, Alexandria, Virginia, February 6, 2014, and was called to order at 3:15 o'clock p.m. by Chairman Patrick Geer.

**CALL TO ORDER**

CHAIRMAN PATRICK GEER: My name is Pat Geer and welcome to the South Atlantic Board. I'm the new chairman.

**APPROVAL OF AGENDA  
APPROVAL OF PROCEEDINGS**

CHAIRMAN GEER: You all have an agenda and the proceedings. If there are no comments about the proceedings from the August meeting and are there any changes to the agenda? Hearing none, the only thing I would like to add is that we have to elect a vice-chair, so we will do that at the end of the meeting.

If there are no other comments about that, we will consider the agenda and the proceedings from the August meeting approved.

**PUBLIC COMMENT**

CHAIRMAN GEER: Now is the time for public comments. We've had one person who wants to make a very, very brief comment. He is going to send out an e-mail to all of us with the photograph that is associated with it. Kelly.

MR. KELLY PLACE: Mr. Chairman, I didn't expect to be here, but I just wanted to bring something to the board's attention that has a pretty significant trophic implication at least in the Chesapeake Bay. That is basically that the super abundance of channel bass, puppy drum, red drum that we see right now in the Bay; as far as I can tell from my research is far in excess of whatever has been seen in living memory or recorded history.

I won't trouble you with the empirical observations we've made over time except to say I've never in this cold of temperature seen

fish dig crabs out of the mud as deep as they ever go like they are now. That is the one picture I think that Kirby will e-mail to you. I've spent my life kind of protecting red drum. I've never opposed any restrictions.

My family has fished for red drum since the 19th Century and pretty much revered this fish; but I do want to bring to your attention that the sheer unprecedented biomass in all the rivers and estuaries in Virginia and from what I understand Maryland, too, I believe crest ages unsuccessful year classes of just about all the finfish that we will see; and apparently with crabs, too – not my words but the Bay Foundation.

I would suggest people read their centerfold article on the red drum, the reason for their abundance and what the effects will be. You can get it online through the Bay Foundation. But two quick quotes is when drum populations rise, crab populations fall; and that predatory fish, including red drum and striped bass, are likely suspects in this crab disappearance. We had a great abundance of juvenile crabs last year probably as a result of significant crab restrictions that VRMC put on, which were quite warranted. Everybody is happy with the success.

All of a sudden the super abundance of juvenile crabs has just disappeared. I believe that the unprecedented biomass of channel bass there will probably in the future bring some requests to you. I would not be surprised if people come asking that the recreational fishery bag limit, which is three, be trebled or that the commercial fisheries ask for a small bycatch allowance.

I just wanted to put that on your table because from I can see, if it is accurate, we're going to have some serious trophic implications with regard to survival of the young of the year of all of our catadromous and anadromous species as well as any other species such as crabs that are subject to predation from this super abundance. I just wanted to put that on your radar. I'm not asking for action. I suspect someone will in the future. Thank you very much.

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**REVIEW OF UPDATED  
TRAFFIC LIGHT ANALYSIS FOR  
SPOT AND CROAKER**

CHAIRMAN GEER: Thank you very much, Kelly; we appreciate that. Okay, the next item on the agenda – at the last meeting back in August we had a discussion about the traffic light analysis for spot and croaker. I think it was Mr. Woodward had asked that the Croaker Technical Committee and the Spot PRT go back and look at that and hash it out a little bit more. They have done that and Chris McDonough from South Carolina is going to go ahead and give us an updated presentation on that.

**TECHNICAL COMMITTEE REPORT**

MR. CHRIS McDONOUGH: Okay, the concern – and what Harry Rickabaugh – when you guys heard this before in August, was that the current annual trigger exercises for both spot and croaker, because they typically cover the year or two previous index averages for the various trigger indexes, don't really look at changes that occurred over longer periods of time.

In the case of croaker it was looking at 70 percent of the previous two-year average at a minimum where examination of the data would be required; and with spot it was looking at the tenth percentile of those index values. Both species used commercial and recreational harvests as well as the NMFS Fall Groundfish Survey, the SEAMAP Survey in the South Atlantic and then a couple other individual state surveys.

Both of those management trigger schemes, as I said, don't really illustrate long-term declines or increases and don't make comparisons over those longer time periods. Because they're both short-lived species compared to something like red drum, you're going to get a high degree of annual variability.

Looking at an index that is like the traffic light, the advantage is that it fits well with both limited and extensive data-set species. You can set

reference points based on stock assessment parameters. You can set them based on long-term catch models, trend analysis. The concept and the color scheme with red, yellow and the green is fairly intuitive, easy to explain for both professionals and non-professionals, and it does take those long-term fluctuations in the population into consideration.

Now, the commercial and recreational harvest for the traffic light analysis typically shows an earlier indication of declines or has shown earlier indication of declines compared to the 70 percent trigger that we're currently using for croaker. In most cases it was about three or four years ahead of time.

The levels maybe weren't as abrupt, but you would start to see that decline earlier. Then in the fishery-independent indices for both adults and juveniles the variability is higher, particularly in the juvenile indexes because, of course, you've got recruitment variability compounding it, but you still had a greater degree of sensitivity. One thing to note – and you will see this with the figures a little bit in the next couple of slides – there were some discrepancies between the harvest indices, which are the commercial and the recreational landings, and the fishery-independent abundance indices. This is mostly detailed in the full report.

However, in a nutshell, you've got difference in age structure between the data sets, particularly with croaker. The commercial and recreational croaker catch is dominated by age three-plus; whereas, most of the fishery-independent indices are dominated by ages zero through two. When you take that age structure into consideration; the composite figures for the traffic light analysis match up a lot better and those trends match up.

This is the commercial and recreational composite figure for croaker and you do see a lot of red on there; but compared to the 70 percent trigger, it only triggered a few times; whereas, you see the proportion of red, which just represents those annual declines, increasing in

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recent years where we had that kind of big pulse and numbers were high throughout the late nineties and mid-2000's.

And then with the adult index – this would be with the fishery-independent indices – you see a similar trend in the nineties with the red, but actually this is where you see that difference. You see a much lower proportion of red, a greater proportion of green. This is representative of the difference in the age structure with the two data sets.

And then this is the juvenile croaker; and this one basically is much more red. Mainly that has to do with you've just got much greater fluctuations in the recruitment year to year. Although in recent years you see – particularly in 2010, '11 and '12, it has really seesawed back and forth. However, the relative level of red in the index compared to the adults may be a bit exaggerated just because you've got such a high degree of change in that variability.

Now, for the update the commercial and the recreational traffic light particularly for spot was much more indicative of the change than that 10 percentile. The spot fishery; the independent indices offered a pretty good tool for examining year-to-year changes in the index values and it had much more sensitive reference points that can be set using historic data levels and abundance levels that are known, as well as harvest levels.

The current tenth percentile trigger for spot rarely tripped; and when it did, it always occurred at a level that was among the lowest values in the index. Just to give you some examples of this on these figures; this is for the commercial and the recreational harvest. That red line on the bottom is the tenth percentile; and then the blue lines where they overlap are where the traffic light boundaries would sit and how those proportions and whether it is red, green or yellow are set; but basically what you can see is that tenth percentile falls fairly low; and so it is only going to trip when those numbers get down pretty far. Again, this is particularly true with spot.

The same is true with the fishery-independent indices. You see it with the top left one there, which is the NMFS Survey, and the SEAMAP Survey on the bottom where that tenth percentile is only going to trip or only tripping when that index reaches pretty much the lowest levels in the time series. That as a trigger mechanism or using it as a management trigger is not very effective.

Okay, but for the traffic light and looking at these composition diagrams, you will see reflects what you saw in the abundance trends on those previous graphs where you see the increasing proportion in red in recent years for the combined commercial and recreational landings. We have much more limited aged data on spot compared to croaker in trying to differentiate the difference in the age structure between the commercial and recreational harvest data sets and the fishery-independent indexes.

But for the most part what we know about the size and age range, the same trend holds true although they don't have the age range that croaker typically do. Then for the fishery-independent indices, we actually see the opposite occurring. This is a composite of the NMFS Fall Groundfish Survey and the SEAMAP Southeast Atlantic Survey also from the fall where in recent years you start seeing an increase.

This is mostly attributable to quite a big increase in the NMFS Fall Groundfish Survey. Spot have been increasing in numbers in the Mid-Atlantic basically; and that is definitely reflective in this figure. They have been increasing in the South Atlantic, too, but not nearly at the same rate. An example of how the traffic light method is used; one current example is North Carolina's blue crab adaptive management framework.

Basically they implemented the traffic light model such that there were two management-level responses; and they're tied to the relative proportion of red within each of those characteristics. The way they did them, they did them at 25 and 50, but basically the moderate

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management-level response occurs when a proportion of the red for the traffic light characteristic reaches 50 percent.

This can result in things like limiting harvest, restricting trip-level harvest for sponge crabs, instituting minimum and maximum size limits. Then an elevated management reaction would occur when the characteristics reach 75 percent or that proportion. This is just going to result in more restrictive management actions such as prohibition of sponge crabs or restricting the peeler harvest or closure of the fishery.

In comparing that to spot and croaker, there are some things that we can use in the same way; things like size limits, possession limits and seasonal closures. However, they're not all going to work in quite the same way. In croaker, which is the one that has been up there, that same tiered approach the technical committee looked at and we came up with – you know, felt that it was a fairly viable tool.

Now, one thing that North Carolina does differently, their production characteristic is actually related to the recruitment indices and life history aspects of blue crab versus what we're using or the way we're listing it here in our example is actually a harvest characteristic, which would be the commercial and recreational landings.

Now, the level for the management response levels for the red proportion, the technical committee came out at 30 percent for a moderate management level and 60 percent for an elevated management level. We arrived at these basically – we looked at, relative to the different proportion levels, how frequently the index might have tripped relative to how it related to the 70 percent trigger and felt that these two levels at least as a start represented a pretty good balance between where a lot of changes would occur and how those indexes would trip.

Those moderate management levels can include catch limits in numbers for recreational pounds. For commercial it could also include closures, and those could be specific areas within the

state, and then gear modifications. One thing; the effort controls may not be as much of a viable option at least for Atlantic croaker and for spot due to the inability to enact limited entry or monitor a quota with those species, because they just aren't as closely monitored compared to a lot of other species.

Bag limit, size restrictions and area closures and possibly gear modifications are probably more effective. And then each level of – similar to the North Carolina one with the traffic light plan, each level of the management response could be enacted on a three-year time series; and then if those management changes occur, they could be held in place for three years to provide a consistent measure throughout the coast and allow for sufficient time to evaluate the impact of those measures.

And then for spot, very similar – and one thing we actually didn't make it on this figure was catch limits on the top there; but that would also be included on here. But with spot, they've got a shorter life history; and there is a little less of kind of that one-to-one applicability to that approach; and that is mostly due to the lack of age data.

The comparison there would be looking at a two-year timeframe and enacting measures over a two-year period and evaluating them. Considering the management tools and limited options that are available again in constraining effort and trying to improve recruitment, reduction of landings through catch limits, size limits and those types of things are probably going to be more effective.

In the areas where we have listed for closures, those were determined based on coast-wide recreational harvest estimates by wave over the last two years and assessed based on when that harvest was highest. Similar to Atlantic croaker, each of those management responses, looking at them over the two-year period you're going to have a better idea of how the management action may affect it.

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And then also particularly with spot, we do know typically most of the age data sets we have for spot, most of them don't go above age three, maybe four up in the Mid-Atlantic, but we do have some historical records. I know we've got spot in South Carolina that come out of impoundments that are six and seven years old; so they can live a much longer time.

Implementing some of these measures might potentially allow for improving abundance as well as expanding the age structure of the population as a consequence. Okay, in conclusion, both species, the application of the overall harvest percentage or application of an overall harvest percentage reduction using a combination of those management tools that were listed in the tables that we saw before at each tier could also be an option for a state-by-state management measure rather than implementing it coastwide.

Basically you're saying at those tiered levels that instead of trying to implement that type of thing coastwide, you could tell the states, okay, you have to come up with a 10 percent reduction or something like that and allow them to make those decisions as another possibility. The proposed management framework for Atlantic croaker and spot is intended to act as an interim measurement measure between stock assessments and not to be implemented in substitution of a stock assessment.

The measures are proposed are aimed at addressing the multi-year changes in trends; and the accuracy of their impacts can only be improved through better age data, particularly with spot, and further highlight the need for updated stock assessments for both species. Croaker have actually had a couple of stock assessments. Spot have actually never had a baseline stock assessment.

However, the traffic light analysis method for use with both croaker and spot do provide – the technical committee and the plan review team for spot feels it provides a better measure of changes in the population and better ways to respond to it. We request that the board review

the draft of the management framework and the traffic light analysis for consideration in the interstate fisheries management of Atlantic croaker and spot.

**DISCUSSION OF POTENTIAL  
MANAGEMENT OPTIONS**

CHAIRMAN GEER: Thank you very much, Chris, that was very informative. We've done something similar with blue crabs in Georgia and it has worked out really well. It is something that the industry understands. The concepts are easy for the industry to work out. The problem we had was we got them to buy into the approach; but then with the management actions we spent like three years trying to develop those, and that was all-out war. I want to take any comments or any questions you have for Chris at this time. Dr. Daniel.

DR. LOUIS DANIEL: I'm going to bring this up again at this meeting because I'm catching a lot of heat at home for it; and there is the perception – I think it is a perception – that the reason why we're seeing all the red in the stop light model, which I don't think surprises any of us, is the shrimp trawl bycatch in the South Atlantic.

I'm wondering if you all looked at and considered that. Our history in looking at shrimp trawl bycatch for these sciaenids is fairly long and sordid in that we did a stock assessment and tried to incorporate bycatch of shrimp trawls in the weakfish stock assessment back in '96, I believe it was, for Amendment 3. The numbers were all over the board and so the SAW/SARC threw it out and told us not to use shrimp trawl bycatch estimates in the stock assessment and just concentrate age two-plus F; and that is what we've done ever since; so for 15 years now.

We did a croaker assessment; and as I recall when we went to the peer review for the croaker assessment, they wouldn't consider our biomass estimates because we hadn't considered the shrimp trawl bycatch in the assessment. We have gotten sort of a schizophrenic response

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from peer reviewers on the validity, the accuracy, the utility of shrimp trawl bycatch estimates.

Is there any evidence that you are aware of as the technical committee chairman or any member of the board; is there any evidence to suggest that the reductions, the lack, and the problems with spot and croaker right now not only in North Carolina but in the further south states but more importantly in some producer areas north of North Carolina is directly attributable to shrimp trawl bycatch?

MR. McDONOUGH: Well, I can't say directly. However, it seems like every time both the spot and the croaker committees meet, we set aside at least a 45-minute time period at every meeting to discuss the shrimp trawl bycatch. As you pointed out with the stock assessment, we did look at that during the 2010 assessment, but we were using fish-to-shrimp ratio bycatch methods, which were not great, but that's what we had. There were some studies from the early nineties when the first implementations of BRDs and TEDs and looking at bycatch affecting this, and there were some estimates in terms of – and we did try and incorporate that, but we just couldn't get satisfactory estimates of the level of bycatch; and that's where it would hit the snag at the peer review every time.

I was going to say North Carolina has actually – I think they're in the second and possibly going into the third year of doing a bycatch study; and we're eagerly anticipating the results of that to see if those shed some light on this. Some of our original estimates that we did in the stock assessment showed that the bycatch levels were in some cases annually greater than the total commercial and recreational harvest. Particularly in the southeast we know that croaker and spot make up a huge component of the bycatch. That all is on the research recommendations and everything else to get a good effective look at that, but it just hasn't been done yet.

MR. PATRICK CAMPFIELD: Mr. Chairman, I just wanted to let the board know related to that

question, the SEDAR is holding a procedural workshop later this year to look at shrimp data and the bycatch problem. We're going to try to answer a couple of questions; is it possible to do better South Atlantic shrimp assessments but also try to get a better grip on bycatch of sciaenids and other species. I don't have specific dates, but it is supposed to be some time in 2014.

CHAIRMAN GEER: There is another one that is coming up before that, a crustacean meeting, a workshop, but the one that you're discussing was they're still looking for a date.

MR. CAMPFIELD: Yes, correct, there is a SEDAR Workshop that I was referred to, and there is also a SEAMAP Crustacean Meeting.

DR. DANIEL: And just to follow up – and you're correct; we are in the progress of a bycatch study. The bycatch is high as it always has been. Using ratio methods, which nobody really likes, you're looking at millions, tens of millions of individual fish; and what we're seeing in the study so far is that spot, croaker and weakfish tend to be the top three for North Carolina.

Now, that may be a little different in the more oceanic conditions of the more southern states where they don't allow as much trawling nearer shore than we do; so trying to fit all the pegs into the proper holes is going to be difficult on that because we are so variable north to south in the shrimp trawl fishery.

One of the things that we're moving forward with in North Carolina is in two weeks my commission will be meeting to adopt a new shrimp fishery management plan to require an additional BRD of the fisherman's choice, an additional federally certified BRD in the net while we work with industry to come up with new devices to try to increase our bycatch – our goal is 40 percent. Now, whether or not we can reach that or not, I don't know.

But what continues to be the \$64,000 question is we have seen fairly significant reductions in our

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shrimp trawl bycatch over the last several years, which would make one think that the bycatch problem has been mitigated somewhat by that along with the reductions from the TEDs and the BRDs; and we're still seeing this substantive decline in the spot and croaker and weakfish populations.

One would think that with all the efforts that have been done through this board and the weakfish board to eliminate the flynet fishery south of Hatteras and have all these reductions in shrimp trawl bycatch in the South Atlantic; that we would have seen some quantified number, somewhere or something, would have shown a positive result.

I am not sure we have ever seen any positive result of those management actions; and so those haven't done any good to bring around the spot and croaker populations. We have got a hint from the technical committee on what the problem is with weakfish. I like your approach and I think the technical committee did an excellent job.

This is exactly what I was hoping to see; very consistent with what Georgia has done in blue crabs and what North Carolina has done with blue crabs. I encourage us to use this information, but I would also encourage us to move forward as the technical committee I believe thinks is appropriate to schedule at some point in time a spot stock assessment. We have seen four- and five-year-old spot fairly recently in North Carolina samples and in Virginia.

I mean Gulf menhaden live to be five years old and they get assessed every year. This is an incredibly important fish from I guess New Jersey and New York down to Florida, and they're gone. There is bound to be something that we can do. The big problem we're going to run into is bycatch in other fisheries and how these things are used as bait in a lot of fisheries and the culling requirements that are going to have to take place in states like North Carolina and Virginia and other multi-species fisheries states where they do have high quantities and

size limits are going to create an issue. Those are my comments, Mr. Chairman; thank you.

DR. WILSON LANEY: Mr. Chairman, I have the benefit of being on the technical committee so I've heard all of this. I also commend Chris and the folks that worked more directly on it for having done a tremendous job. I agree with what Louis said; so my question is what is the next step?

I guess at this point do we ask the technical committee to go ahead and refine those potential management measures and come back to us at the May meeting with some specifics about what measures would be triggered by those levels? I know they had put 30 and 60 percent in there as levels for consideration. Does the board need to discuss those further and give them some additional guidance as to what they would like to see in that or just send it back to the technical committee and say, "Hey, guys, take a look at this and come up with some specific recommendations to which the board can respond."

CHAIRMAN GEER: I believe the technical committee and PRT would like the board to give them recommendations of what they want to do with the traffic light analysis model and potential management actions. I hear silence.

MR. McDONOUGH: Well, actually, I'd like to add one thing that Louis brought up and that is with spot in particular. Beyond their importance as a recreational species and commercial species in many cases in different states; but similar to menhaden spot is an extremely important mid-level prey species for just about everything.

That is something that we have brought up frequently in South Carolina for small sciaenid management issues as a way to get people to pay attention to it. It is like, you know, oh, they're spot; but you know what, they're really important for red drum and striped bass and whatever. Everything that is out there is eating them.

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MR. JOSEPH GRIST: Mr. Chairman, just two points. Going back to the comment about the spot assessment – and, Chris, you should remember this and Wilson on some of these discussions the committee has had in the past. I think the only reason the combined committees have never recommended a spot assessment to this date has been because of the bycatch issue in the shrimp trawl and trying to get that resolved knowing that was the problem with the croaker assessment.

Knowing they already had a problem in the croaker assessment with it and spot follows along the almost exact identical data set, they knew it needed to be resolved. I think the North Carolina Study, once it is resolved, I would not be surprised to see the committee recommending an assessment not long after they get those results. With that, talking about assessments when is the next croaker assessment scheduled?

MR. McDONOUGH: I was going to say it is either 2015 or '16?

MS. TONI KERNS: It is penciled in for 2016.

MR. SPUD WOODWARD: One thing I think we've got to be very careful about is using any bycatch characterization studies out of North Carolina and applying it southward, as Louis has already alluded to. I mean, those fisheries are prosecuted very differently; and while everybody is still using the same gear, we've certainly seen shrimper behavior change over time in terms of units of effort expended and how many hours of trawling take place during a trip.

It is going to remain a very elusive thing that we're trying to get our hands around. From a management standpoint, if we were to implement something like this and then it translates into management actions that affect the established commercial and recreational fishing for those species, that is what we're going to get hit with.

Well, you know, what is their pound of flesh; what are we going to take away from the

trawlers so that there is an equal distribution of the reduction in mortality? That is going to get very difficult to grapple with because we're not going to have the definitive information we need. It's nobody's fault; it is just an exceedingly complicated situation.

DR. LANEY: Well, I agree with everything that has been said about bycatch. I think the thing we have to keep in mind is while it is very elusive to try and get a handle on, I think the problem with the rejection of the previous assessments was not because bycatch was included but because of the variability associated within our inability to come up with an estimate of discard that peer reviewers found credible. That was the problem.

Louis and Spud are both correct; it is a very difficult thing to estimate and to come up with any degree of rigor. But, in the interest of moving us ahead here, I think I'm hearing around the table that everybody likes this approach, again as Chris stressed, as an interim management measure and not a substitute for stock assessments but something that is better than what we have in place now. Again, the devil is in the details; you know, what levels do you want to set for management measures.

I guess for spot we don't have a size limit in place I don't think right now. We've discussed maybe an 8-inch limit, I think. Chris, you might help remind me there. Again, it seems to me, Mr. Chairman, that in the interest of efficiency the best thing to do might be to give technical committee a positive signal that we really like this approach and give them the latitude to refine the list of potential management measures and bring them back to the board at the May meeting if the board is not prepared to go ahead and discuss them and select from that table that you've already presented to us today.

CHAIRMAN GEER: Wilson, would you consider an addendum?

DR. LANEY: Yes. Is that the process, Bob, we would to use; we would have to do an addendum to basically adopt the traffic light approach as a

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substitute for the present management triggers that we're using for these two species?

MS. KERNS: That is correct, Wilson.

DR. LANEY: Then would you entertain a motion to that effect, Mr. Chairman?

CHAIRMAN GEER: Let me get Joe first.

MR. GRIST: Mr. Chairman, just a quick question, and I will direct this for the technical committee. Is there any concern from the technical committee with whether the assessment is two or three years off for croaker; that if we change our trigger strategy midstream before that, that we're going to have any impact on the data inputs to the assessment?

MR. McDONOUGH: The short answer to that is no. I can't say that the issue has been specifically discussed, but we've discussed just about everything else and that concern has not been brought up as something that would be an issue; so I wouldn't think so.

DR. LANEY: Mr. Chairman, I guess **I would move that the board task the staff and technical committee with development of a draft addendum that would employ the traffic light approach, which they have developed, for use in management of spot and croaker. This would be with the understanding that this would be used as an interim approach until we have approved stock assessments for both species.**

CHAIRMAN GEER: Seconded by Joe Grist. Is there any discussion? Louis.

DR. DANIEL: If Wilson is all right and Joe is all right, I think it would be clearer, maybe, to say "develop a draft addendum that will adopt and employ the traffic light approach." That way we're doing an addendum that changes it from the method we use now to the traffic light and would give us the ability to go ahead and select management measures based on what the technical committee's recommendations are.

DR. LANEY: Yes; I'm fine with that, Mr. Chairman, as a friendly amendment. Louis, the one other thing that occurred to me is do we need to say anything in there about tasking the technical committee to provide a suite of management options for our consideration or do you think that is understood when we ask them to develop the draft addendum, that would be part of that?

MS. KERNS: Wilson, I think it is understood, but it might be helpful for the technical committee and the PRT for you to give them some direction. They have given you guys some examples of what they have put together, and then they were asking you all for feedback on do you want us to go higher or lower, what range are you all looking for.

DR. LANEY: The ranges that they included in there were fine with me; but there again in the interest of full closure, I was part of the group that discussed them and helped develop them. I would love to hear feedback from other board members as to whether they think those levels are appropriate or not conservative enough or too conservative or what.

MR. RUSS ALLEN: Well, obviously, I think you should have – when you're developing an addendum, you have your status quo and you might have different percentages in there. I have looked it over a little bit. I can't say that I've been studying the traffic light approach. We haven't used it in New Jersey too much. I think the 30 percent and 60 percent are fine, but maybe 15 percent, 45 percent just to fill in the gaps. That is pretty similar to other species that we've done. We can do those kinds of approaches if that's okay.

MR. McDONOUGH: When we were looking at those kinds of proportion levels actually on the figures, the horizontal grid lines were all in the 10 percent increments. We were trying to figure out, okay, you don't want it tripping too much, but we don't want it – you know, like the tenth percentile, you don't want it tripping once every 40 years when it just absolutely crashes.

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Then we looked at the way we have been doing it with, say, the 70 percent trigger with croaker and how often that had been tripped, so that there could be some continuity going from one to the other and they're just not going off to something completely different. But, yes, I think in moving forward, we'd take a much deeper look at those proportions and where things change and how frequently based on the whole time series.

DR. DANIEL: I would like to see the PRT and the technical committee look at I think the range of options of status quo, maybe 25/50 and 30/60, and then consolidate the reports like you've done in your presentation for spot and then indicate where we've tripped triggers and then what those management measures would be and then do the same thing for croaker.

What I would find particularly enlightening would be if all the stars align and we end up putting this into place and we end up monitoring spot and croaker with the traffic light approach, then we get some better estimates of shrimp trawl bycatch that we may be able to include in the croaker assessment and then a spot assessment, and then see how the stock assessment reflects what we did with the stop light approach. Was it close, were we heading in the right direction with the stop light approach?

For a lot of these data-poor species that we all deal with not only at this level but at our home level and the council level, this could be an opportunity to show the utility of that method that is far less data-intensive and far less complicated, for lack of a better term, and it is something that the fishermen generally can buy into and agree.

If we find that those assessments are consistent with what we've done with the stop light, that would be very valuable information on two stocks that right now we're seeing pretty extraordinary and historic lows in those populations.

CHAIRMAN GEER: Are you suggesting that we have those specific percentages put into the motion?

DR. DANIEL: No; just as direction. I think, as Toni said, they were looking for direction from the board to the technical committee and the PRT, and that was my intent of my comment.

DR. LANEY: Well, perhaps if my seconder would agree, if we just add after the word "addendum", stick a comma in there and put "with an appropriate suite of management options," then maybe that gets us to where we need to be. Is that sufficient guidance to the technical committee, Chris? We had talked about what some of those are and those are on the record. Russ mentioned some and Louis mentioned some.

From my perspective, that seems to be sufficient guidance to the technical committee. The only thing we haven't really talked about is when we did put the table together, we did not put any numbers in there in terms of a potential size limit for spot or potential bag limits for spot, but there again we have routinely just put pick a range there of status quo, which would be no size limit to whatever the minimum would be to allow reproduction at age one or something like that. I don't know whether that is six or eight or what, but those are the kinds of things I think we would expect to see included in the addendum for the board's consideration and for public input, I guess.

MR. WOODWARD: How about bag limits for the two of them? I don't see those.

DR. LANEY: Yes, we left those with an X, too, Spud. We had it in the table but we didn't pretend to begin to discuss those. I know right now there are none, I guess, for either species. I know, Louis, in particular North Carolina and probably the other South Atlantic states as well have fairly significant and large pier fisheries for these species.

It is not uncommon for people to depart the pier with several coolers full of spot and/or croaker.

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There again I would look to the technical committee for advice on that point; what sort of numbers. If board members have any thoughts on that, that would be good to give the technical committee some further direction.

MR. WOODWARD: We actually do have a bag limit. It is 25, which is obviously a very liberal bag limit, but it is a bag limit, nonetheless. We're leaving shrimp trawl bycatch off the table for management? I just want to make sure of that. You start talking about closures of this and closures of that; is that –

DR. LANEY: Well, I think, Spud, based on the record that we've generated, I don't think we're leaving it off the table. I think we clearly said that North Carolina has got a study underway; and as soon as that study is completed and the technical committee has an opportunity to look at the results, I think we said what we'd like to do is go ahead and generate a new stock assessment and try to come up with a definable estimate of bycatch discards; so too me that is not off the table.

That is just saying that for this interim measure for the moment, unless we run into something unanticipated, then I think the suite of management measures that is proposed at the moment doesn't include addressing the bycatch directly although we know North Carolina is attempting to address it by making some changes to their trawl fishery.

Again, I guess North Carolina right now from the standpoint of the amount of trawling that is going on in inshore areas where they're encountering large numbers of juvenile sciaenids, probably that is the place where most of it is happening. South Carolina and Georgia and Florida all have management measures in place that greatly restricts the amount of inshore trawl use, so it may be less of an issue there. I don't know; but I wouldn't say we're taking it off the table.

I would say we're just deferring consideration of it, maybe, but I would leave that up to the technical committee. If there is some

management measure that could be put in place that addressed the commercial side, then, fine. I don't know what that would be at the moment. I don't remember, Chris, that we talked about that a whole lot.

MR. McDONOUGH: Well, what we discussed at least for commercial fisheries, it definitely did not really – I don't think any of the discussions had the shrimp fishery in mind. It was looking at more like the directed bait fisheries, scrap fisheries and things like that. At this point I don't think the technical committee would be comfortable trying to put a management action in that would in some way, shape or form impact the shrimp fishery because we just don't know. We know there is an issue, but we don't have the data to support it, so we can't necessarily start telling them what to do.

DR. DANIEL: My thought would be that with the traffic light approach, we would address those issues that the technical committee has already developed and then if; and when we get a stock assessment that incorporates shrimp trawl bycatch and we can point to a definitive impact of shrimp trawl bycatch on those stocks, then we might have to go back and start looking at better mousetraps on bycatch reduction or something else; but I see that three, four-plus years down the road before we go in that direction. That is my thought.

MR. GRIST: Just a point on the motion; on the last line, "This will be an interim approach until the next stock assessment" – I know croaker has the next stock assessment, but spot is not on the list. Is this implying that we will now put on the list spot for a stock assessment?

CHAIRMAN GEER: That would be up to the board and it is not scheduled at any time.

MS. KERNS: It is not on the stock assessment list currently.

DR. DANIEL: Where are we, Toni, with the – how far along are we on the list; how late does it go?

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MS. KERNS: 2016.

DR. DANIEL: And is that staff recommended to the Policy Board in the Action Plan?

MS. KERNS: Management and Science Committee makes those recommendations to the Policy Board.

DR. LANEY: Mr. Chairman, is that really a problem? The fact that one is not scheduled; that just means the traffic light approach is going to be our management approach until there is one. We know one is coming up for croaker or at least one is scheduled for croaker within a couple of years so we could deal with croaker once that assessment is completed.

Then we would just continue to use this method until at some point we have the sufficient amount of data to do a spot assessment if that is something that the board decides they want to do. I guess I don't see a problem with it. I think we've heard pretty definitively that this approach is better -- you know, would be a more effective management tool than what we have in place currently, so to me this represents progress.

If we can't afford to go ahead and schedule and do a spot assessment and we may not have sufficient data to do a spot assessment, then this would just remain in place, wouldn't it, until at some future date when we do have the resources to do a spot assessment? I don't see that as a huge problem, but correct me if I'm wrong.

DR. DANIEL: Let's take care of this -- my suggestion would be to take care of this motion and then I'd like to have some more discussion on that. That is going to bottle up this motion I think if we want to move forward with this approach. I do have some comments on a possible option with a spot assessment.

CHAIRMAN GEER: Also, the FMPs are independent of each other, so that is something to consider. The motion stands so I'm going to read the motion: Move that the board task the staff and technical committee to develop a draft

addendum with an appropriate suite of options that will adopt and employ the traffic light approach to manage spot and croaker. This will be an interim approach until the next stock assessment. Motion by Dr. Laney and seconded by Mr. Grist. All those in favor; opposed; abstain; null. **Okay, it carries unanimously.**

DR. DANIEL: We have tasked the staff with a lot of stuff this week. Bob and I have talked about this, and I think Bob and Doug and I are going to be sitting down and prioritizing what we're going to be able to accomplish by the May meeting. It is my intent to put this as one of my priorities, so we will see how it carries out to the May meeting after our discussion.

We haven't tasked the Management and Science Committee with anything this week, and I don't want them to feel left out. **What I would like to do is make a motion that the South Atlantic Board request the Assessment Science Committee consider developing a spot benchmark stock assessment.** I'm up for any perfections, Toni.

CHAIRMAN GEER: We have a second by Russ. Dr. Laney.

DR. LANEY: Just a process question, Mr. Chairman. I know normally we would have this done by a stock assessment subcommittee of the Spot Plan Development Team or technical committee. I don't recall that we have tasked the Assessment Science Committee with doing a stock assessment. There is no reason we couldn't, but I just I'd ask the process question.

MR. CAMPFIELD: We do not have a Spot Stock Assessment Subcommittee because we haven't attempted an assessment yet, but I believe the Spot Technical Committee could -- members from that could --

MS. KERNS: You don't have a Spot Technical Committee.

MR. CAMPFIELD: We need to develop an assessment team. We will seek nominations.

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CHAIRMAN GEER: Okay, are there any other comments on the motion? Those in favor raise your hand; those opposed; null. **Carried unanimously.** All right, moving on to the next item is the consideration for the FMP Reviews and the State Compliance Reports.

**FMP REVIEWS AND STATE  
COMPLIANCE REPORTS FOR SPOT,  
SPOTTED SEATROUT, AND  
SPANISH MACKEREL**

MR. KIRBY ROOTES-MURDY: In the interest of time, I'll try to go through these quickly; but again if you have any questions, feel free to stop me at the end. First is the Spot FMP Review. As was noted by the traffic light analysis, we've been noticing declines in both commercial and recreational landings. In 2012 total landings were estimated at 3.2 million pounds; a decrease of 59 percent from 2011 and a 60 percent decrease from the previous ten-year average.

For 2012 the breakdown was approximately 39 percent commercial and 60 percent recreational. Virginia accounts for the highest percentage of any state for both recreational and commercial landings. With regards to recommendations, research and monitoring is a top priority as was noted in the previous agenda item.

Other elements are continue to state monitoring and reporting on the extent of bycatch and fishing mortality and to evaluate the effects of mandated bycatch reduction devices. With regards to state compliance and de minimis, the PRT finds that all state compliance reports are consistent with the Omnibus Amendment.

In terms of de minimis criteria, a state qualifies for de minimis status if its past three-year average of the combined commercial and recreational catch is less than 1 percent of that combined commercial and recreational catch during that period. When states qualify for this, they are not required to implement any monitoring requirements, which none of them are included in the plan. Current requests of de minimis were South Carolina and Georgia for

the 2012 fishing year. The PRT finds that these states meet the de minimis criteria. That's for spot.

If there are no questions, I will move on to spotted seatrout. Seeing none, with regards spotted seatrout, a coast-wide stock assessment has still not been conducted given the largely migratory nature of the species and lack of data on migration and where it occurs. State-level stock assessments have been conducted for Florida, South Carolina and North Carolina and Georgia in the past years.

With regards to the commercial and recreational breakdown, from 2002 to 2011 commercial landings averaged approximately 292,000 pounds. In 2012 commercial landings were estimated at approximately 408,000 pounds, which represented a 161 percent increase from the previous year's harvest and approximately a 40 percent increase from the previous ten-year average.

North Carolina accounted for approximately 65 percent of the total coast-wide catch, with Virginia and Florida comprising the next largest at 19 and 15 percent, respectively. Regarding recreational catch, the catch and release of spot and croaker has had a strong upward trend, increasing from 1.1 million fish in 1981 up to 8.8 million fish in 2012.

Harvest has remained relatively stable at about 1 million fish. In 2012 the recreational harvest was approximately 1.8 million fish; and Georgia anglers take approximately 29 percent of the harvest while North Carolina has the second highest of that at 27 percent. Recommendations with regards to research and monitoring, continuing the state-specific stock assessments is key in collecting data on size and age data, as well as work on stock structure at the regional level.

The other priorities, but not quite as high, are identifying essential fish habitat requirements and working to better understand environmental factors that might have influences on the stock status. Because it is part of the Omnibus

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Amendment as well, spot, spotted and Spanish mackerel, the PRT finds all state compliance reports are consistent with the Omnibus Amendment. The de minimis requirements are the same. The state of New Jersey requested de minimis status and the PRT finds that New Jersey has met that criteria. Are there any questions?

If there are no questions, I will move on to Spanish mackerel. The last stock assessment for Spanish mackerel was SEDAR 28. I don't believe the board was given an update on that. Essentially, as you see in the charts above, Bmsy has recently, in the last seven years, gotten above the target and the overfished ratio currently is below the Fmsy.

As such, the resource is determined to not be experiencing overfishing of the stock and it is not overfished for the Atlantic Spanish Mackerel. With regards to landings, total landings in 2012 were approximately 4.7 million pounds. The commercial fishery consisted largely of this harvest; whereas, the recreational side was 30 percent and commercial was approximately 70 percent.

Spanish mackerel total landings represented less than a 1 percent increase from 2011, but an approximate 9 decrease from the previous ten-year average. With regards to commercial numbers, as was noted the commercial numbers make up largely the bulk of landings at 3.5 million pounds with Florida having the highest percentage of that at 73 percent.

With regards to recreational landings in 2012, 835,263 Spanish mackerel were harvest in numbers of fish with Florida harvesting approximately 30 percent of the total coastwide. With regards to recommendations, again research and monitoring are high priorities with regards to length, sex, age, catch-per-unit effort for improving stock assessment accuracy; evaluating weight and length at age data is also critical; and the development of fishery-independent methods to monitor stock size.

And then last, medium priorities, yield-per-recruit analysis is also something that the PRT noted. The PRT finds that all state compliance reports are consistent with the Omnibus Amendment. States requesting de minimis status are New York, New Jersey, Delaware and Georgia. The PRT finds that these states meet the de minimis criteria. I'll take any questions that folks have. One other thing to note the PRT requests that these FMP reviews and state compliances be approved as well as the de minimis status requests.

CHAIRMAN GEER: Are there any questions or comments? Okay, we're going to need a motion. Mr. Woodward.

MR. WOODWARD: Do these need to be done separately or can they be bundled all together, because I can bundle them real easy.

MR. ROOTES-MURDY: It is basically that you can do the FMP Review and the State Compliance Reports as one and the de minimis criteria as a separate motion.

**MR. WOODWARD: Okay, I move we accept the state compliance reports for spot, spotted seatrout and Spanish mackerel as presented.**

DR. DANIEL: Second.

CHAIRMAN GEER: Seconded by Dr. Daniel. Is there any objection? Hearing none; **the motion is carried.**

**MR. WOODWARD: Move to approve the de minimis request as presented to spot, spotted seatrout and Spanish mackerel.**

DR. DANIEL: Second.

CHAIRMAN GEER: Seconded by Dr. Daniel. Okay, I will read this one: move to approve the de minimis status for the states of New York for Spanish mackerel; New Jersey, Spanish mackerel and spotted seatrout; Delaware, Spanish mackerel; South Carolina for spot; and Georgia for spot and Spanish mackerel. Motion by Mr. Woodward and seconded by Dr. Daniel.

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Are there any objections? **Seeing none; the motion is carried.** Okay, the second to last item we have on the agenda is the proposed change by Virginia for the red drum commercial management measures for 2014. I will turn it over to Kirby.

**VIRGINIA PROPOSED COMMERCIAL  
RED DRUM MEASURES FOR 2014**

MR. ROOTES-MURDY: The next item is the Virginia proposed commercial red drum measures for 2014. With regards to just a quick background on the red drum, Amendment 2 to the FMP was approved in 2002. It set a few requirements for state compliance. The major one for management measures was with regards to size limits.

The maximum size limit for red drum was at 27 inches. The other key component was that states must have measures in place that keep the spawning stock ratio at approximately 40 percent. That can be done through the combination of the slot limits and bag limits. I have a table at the end of this if anyone has any questions on how that ratio was calculated.

It was done back in I believe 2000, but it is in the amendment. With regards to Virginia commercial landings over the last five years, this gives just a breakdown of how it has fared with regards to coastwide. Red drum is managed in two regions essentially. There is the northern and southern.

For the northern region, which is the states of North Carolina through New Jersey, recruitment at age one has fluctuated widely without any apparent trend since about 1989. The trend in the three-year average SSPR indicates that it was low at the beginning of the time series from about 1990 to 1997; and since then the average SSPR has been well above the overfishing threshold, which is approximately 30 percent; so the SSPR is set at 40, with the exception of just one year, which was 2002. Since then it has been considerably higher than that.

There is high probability that the stock in turn is not subject to overfishing and that the average SSPR is likely well above the target, as I mentioned. With regards to Virginia's proposal, it is included in the meeting materials, but the change is in that 2013 Virginia's slot limit was 18 inches to 26 inches and three fish possession limit.

The proposed measure is to reduce the slot limit by an inch and increase their possession limit by two fish, from three to five. The technical committee reviewed this proposal; and as was mentioned in the memo it is largely done to reduce the discard mortality. All technical committee members were in agreement that the proposed measures don't pose significant risk to maintaining the spawning potential ratio of approximately 40 percent.

The only concerns technical committee members had raised was with regards to the language in the Amendment 2 for allowing states to make changes to their measures. It was pointed out that there are at least two sections within Amendment 2 that allow for states to have alternative management regimes so long as they achieve an approximate 40 percent spawning stock ratio.

These are in Section 4.5, which is the alternative state management regime; and 4.6, adaptive management. In terms of next steps, the board must consider or Virginia asks the board to consider approval of their proposed commercial measures in 2014. I would ask that if anyone has any specific questions about this proposal, we have Joe Grist in attendance and he'd be happy to expand on anything that I just provided.

CHAIRMAN GEER: Does anybody have any questions? Louis.

DR. DANIEL: I'm trying to go back in an old file box in my head. We have a one-fish bag limit, 18 to 27; and that meets the criteria; so just dropping the upper bound two inches gives you five fish? Never mind!

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CHAIRMAN GEER: Joe, is there anything you want to add?

MR. GRIST: I will offer a motion when the board is ready.

CHAIRMAN GEER: At your pleasure.

**MR. GRIST: Move to accept Virginia's proposal to lower its commercial maximum size limit from 26 inches to 25 inches and increase the Virginia commercial possession limit from three fish to five fish.**

CHAIRMAN GEER: Joe, while we wait for that to get up, is that just for 2014 or ongoing?

MR. GRIST: Ongoing. And as a point of clarification to the board while it is getting up, we still have to take this to our own state commission and for public hearings; so this isn't a done deal out of this board. We still have to get it through our commission process; so we could still end up at the same place we are right now, but this allows us to move forward with that process.

CHAIRMAN GEER: Okay, is there a second to that; Martin.

MR. ROOTES-MURDY: Joe, if you can just clarify that the motion is correct.

MR. GRIST: In perpetuity looked kind of good to us. (Laughter) That looks correct.

CHAIRMAN GEER: That was by Martin Gary; Mr. Gary seconded. Is there any other discussion? All those in favor raise your hand; all those opposed. **That looks like it is unanimous; the motion carries.** Okay, last but not least, we need a vice-chair. Mr. Woodward.

**MR. WOODWARD: I would like to nominate Jim Estes from the beautiful sunshine state of Florida.**

DR. DANIEL: Second.

CHAIRMAN GEER: It there are no other considerations, all those in favor –

MR. WOODWARD: Let me try. Move to close nominations and cast one vote for Jim Estes.

CHAIRMAN GEER: There we go. Seeing no objections; the motion carried. Is there any other business to come before this board at this time? Dr. Daniel.

DR. DANIEL: Just one real quick thing; most everybody was affected by the Polar Vortex. We have some pretty substantive ice down in North Carolina. When that ice started to melt on Friday and Saturday, we had probably the biggest cold stunt event on speckled trout that I've seen; very widespread.

It was termed catastrophic in some water bodies; and so I issued a proclamation on Monday that went into effect Wednesday at noon, closing the fishery for everybody until after peak spawning, which we define as June 1<sup>st</sup>. It is going to be closed until June 15<sup>th</sup> to try to let what made it through the cold event to spawn this spring. It is part of this board's purview and I just wanted to let you all know what we had done.

**ADJOURNMENT**

CHAIRMAN GEER: Okay, thank you. Is there anything else? Motion to adjourn; we're done.

(Whereupon, the meeting was adjourned at 4:35 o'clock p.m., February 6, 2014.)

- - -

**These minutes are draft and subject to approval by the South Atlantic State/Federal Fisheries Management Board. The Board will review the minutes during its next meeting.**

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*Atlantic States Marine Fisheries Commission*

**DRAFT ADDENDUM I TO THE OMNIBUS AMENDMENT FOR  
SPOT AND DRAFT ADDENDUM II TO AMENDMENT I TO THE  
INTERSTATE FISHERY MANAGEMENT PLAN FOR ATLANTIC  
CROAKER**



**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 the document.**

*Vision: Sustainably Managing Atlantic Coastal Fisheries*

May 2014



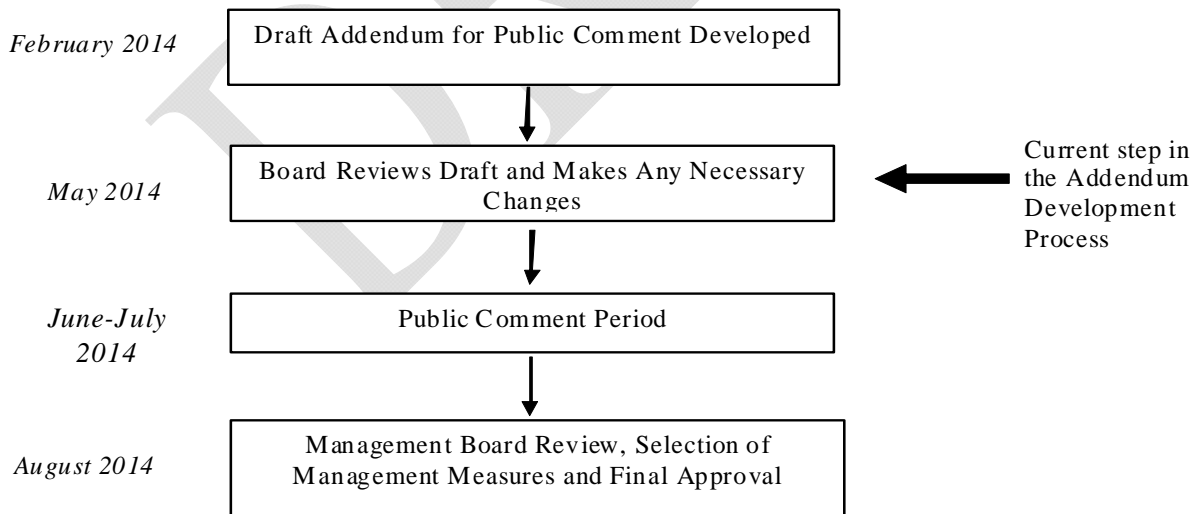
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**Public Comment Process and Proposed Timeline**

In February 2014, South Atlantic State/Federal Fisheries Management Board (herein after referred to as “Board”) approved a motion to initiate the development of an addendum to the Interstate Fishery Management Plans (FMP) for Atlantic Croaker and Spot to employ the traffic light approach in order to better manage these species. This draft addendum presents background on the Atlantic States Marine Fisheries Commission’s (ASMFC) management of Atlantic croaker and spot, the addendum process and timeline, and a statement of the problem. This document also provides options for Atlantic croaker and spot management for public consideration and comment.

The public is encouraged to submit comments regarding this document at any time during the public comment period. Comments will be accepted until 11:59 P.M. (EST) on XXX. Comments received after that time will not be included in the official record. Comments may be submitted by mail, email, or fax. The Board will consider public comment as it selects the final management measures contained in the addendum. If you have any questions or would like to submit comment, please use the contact information below.

Mail: Kirby Rootes-Murdy  
Atlantic States Marine Fisheries Commission    Email: [krootes-murdy@asmfc.org](mailto:krootes-murdy@asmfc.org)  
1050 North Highland Street, Suite 200A-N    (Subject: Croaker/Spot Draft Addendum)  
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## **2.0 Introduction**

ASMFC has coordinated interstate management of Atlantic croaker (*Micropogonias undulatus*) and spot (*Leiostomus xanthurus*) from 0-3 miles offshore since 1987. The management area extends from New Jersey to the east coast of Florida for Atlantic croaker and Delaware to the east coast of Florida for spot. Atlantic croaker is currently managed under Amendment 1 (2005) to the Atlantic Croaker FMP. Spot is managed under the Omnibus Amendment (2011) to the Spot, Spotted Seatrout, and Spanish Mackerel FMPs. Management authority from 3-200 miles from shore lies with NOAA Fisheries.

The purpose of this draft addendum is to consider alternative management programs for Atlantic croaker and spot with the application of the Traffic Light Approach (Caddy and Mahon, 1995; Caddy, 1998, 1999) as a precautionary management framework. The Board initiated this addendum at its February 2014 meeting following the development of the Traffic Light Approach (TLA) report and management memo by the Atlantic Croaker Technical Committee (TC) and Spot Plan Review Team (PRT). The TC and PRT recommend both species for a benchmark stock assessment with the proposed Traffic Light Approach providing guidance in the interim period.

## **3.0 Overview**

### **2.1 Statement of the Problem**

Under the current management program for Atlantic croaker, annual changes in recreational and commercial landings are compared with the average of the previous two years' index value. If the index value drops below 70% of the previous two year average, at a minimum, examination of the data is required by the TC.

Under current management program for spot, index values are compared to the 10<sup>th</sup> percentile of the indices time series. If two of these indices (one of which must be fishery-independent) are below the 10<sup>th</sup> percentile the PRT is to recommend to the Board that it consider management action.

Both the Atlantic croaker and spot management triggers are limited in their ability to illustrate long-term declines or increases in stock abundance. Under the current annual trigger exercises, the high degree of variability in year to year index values make it difficult to respond to gradual but persistent decreases in the trigger indices without a formal management framework in place.

### **2.2 Background**

Atlantic croaker and spot are small sciaenid forage species that support commercial and recreational fisheries in the Mid and South Atlantic regions. Both species migrate seasonally along the coast, moving northward and inshore to estuaries and bays during warmer months (spring-fall) and southward and offshore to more oceanic waters in the winter. Both species feed on planktonic organisms as post-larvae and young of the year, and as juveniles and adults prey on bottom dwelling organisms as such as worms and crustaceans. While both species reach maturity by approximately age two, spot are considered a short-lived species rarely living

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beyond six years. Atlantic croaker can live up to 17 years, but more commonly live no longer than 10 years.

The last benchmark stock assessment for Atlantic croaker was conducted in 2010. Unlike previous assessments it evaluated the resource as a single coastwide stock. The assessment indicated that the resource is not experiencing overfishing, biomass has increased, and age-structure has expanded since the late 1980s. However, it could not determine stock status given uncertain model estimates due to limited data on shrimp trawl bycatch and fishing mortality. While state level stock assessments for spot have been conducted over the years, a coastwide benchmark assessment has not yet been done. As such the stock status of spot is unknown.

Amendment 1 to the Atlantic Croaker FMP tasks the TC with conducting annual trigger exercises to assess the stock in years between benchmark stock assessments. This level of monitoring - with the stipulation of initiating a stock assessment based on the results of the trigger exercises - was enacted to enable the Board to better monitor changes in stock abundance. The Omnibus Amendment initiated annual trigger exercises to monitor the status of spot resource while also directing the Board to consider management action depending on the results of the trigger exercise. Without coastwide minimum management measures for either species, the current trigger exercises do little to provide effective management in between stock assessments.

Additional concerns have been raised over the significant level of bycatch and discards that may be occurring through the shrimp trawl fishery for both spot and Atlantic croaker (ASMFC 2010, 2011). While bycatch monitoring programs have been enacted in some states, such efforts have not encompassed the entire management range for either species. Though bycatch reduction devices have been introduced in the shrimp trawl fishery, there has not been observed increases in abundance for either spot or Atlantic croaker in recent years. Addressing these bycatch concerns, as well as the potential for increased regulatory discards in directed fisheries caused by changing the current management program for both species will need to be considered by the Board.

In relatively short-lived species like spot or a fast-growing, early maturing species like Atlantic croaker it is preferable to respond to persistent periodic declines that occur over several years rather than respond to rapid annual changes. Declines that occur over several years require close monitoring in order to anticipate when or if management action may be required. With this in mind, management responses that use techniques showing multi-year changes and trends would be more useful than simply examining year to year changes. Knowing the level at which to respond or initiate some type of management action should be based on long-term knowledge of general stock indications as well as how that stock has changed over time. The Traffic Light Approach offers the ability to illustrate trends based on relevant stock characteristics that can include historical abundance, life history parameters, and response to fishing pressure; this approach can also incorporate assessment based reference points.

*Traffic Light Approach (TLA)*

The TLA was originally developed as a precautionary management framework for data poor fisheries whereby reference points could be developed that would allow for a reasonable level of

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resource management. The name comes from assigning a color (red, yellow, or green) to categorize relative levels of different indicators for either a fish population or a fishery. These indicators can be combined to form composite characteristics within similar categories and can include biological indicators, such as growth and reproduction; population level indicators, such as abundance and stock biomass estimates; or fishery indicators, such as harvest/landings and fishing mortality. However, each indicator must be evaluated separately to determine its appropriateness for use in management.

In general practice when applying the TLA, the green/yellow boundary is typically set at the long-term mean of the data series reference period (Halliday et al., 2001) of the indicator and the yellow/red boundary is set at 60% of the long-term mean, which would indicate a 40% decline from the series mean. Index values in the intermediate zone can be represented by a mixture of either yellow/green or yellow/red depending on where they fall in the transition zone. Since increasing proportions of red reflect decreasing trends away from the time series mean, the relative proportion of red of the indicator may offer one way of determining if any management response is necessary.

*North Carolina Blue Crab Adaptive Management Framework*

One current example of the TLA was recently implemented for the North Carolina blue crab fishery (Table 1) by the North Carolina Division of Marine Fisheries (NCDMF). The NCDMF developed a management framework that applies the TLA to stock characteristics (adult abundance, recruit abundance, and production) derived from fishery-independent data (NCDMF surveys). Within the management framework, two levels of management response were developed based on the relative proportion of red within each characteristic. A moderate response is required when the traffic light characteristic meets or exceeds 50% red for three consecutive years and can result in actions that limit harvest such as restricting trip level harvest for sponge crabs, institution of minimum and/or maximum size limits for female crabs, or seasonal closures in spawning areas. An elevated management level response is initiated when the traffic light characteristic meets or exceeds 75% proportion of red for three consecutive years and can result in more restrictive management actions such as prohibition of sponge crabs, no peeler harvest, or closure of the fishery through season closures, gear restrictions or both.

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**Table 1. North Carolina Blue Crab Adaptive Management Framework**

<b>Stock Characteristic</b>	<b>Moderate management level (50% red)</b>	<b>Elevated management level (75% red)</b>
<b>Adult abundance</b>	A1. Increase in minimum size limit for male and immature female crabs A2. Reduction in tolerance of sub-legal size blue crabs (to a minimum of 5%) and/or implement gear modifications to reduce sublegal catch A3. Eliminate harvest of v-apron immature hard crab females	A4. Closure of the fishery (season and/or gear) A5. Reduction in tolerance of sub-legal size blue crabs (to a minimum of 1%) and/or implement gear modifications to reduce sublegal catch A6. Time restrictions
<b>Recruit abundance</b>	R1. Establish a seasonal size limit on peeler crabs R2. Restrict trip level harvest of sponge crabs (tolerance, quantity, sponge color) R3. Close the crab spawning sanctuaries from September 1 to February 28 and may impose further restrictions	R4. Prohibit harvest of sponge crabs (all) and/or require sponge crab excluders in pots in specific areas R5. Expand existing and/or designate new crab spawning sanctuaries R6. Closure of the fishery (season and/or gear) R7. Gear modifications in the crab trawl fishery
<b>Production</b>	P1. Restrict trip level harvest of sponge crabs (tolerance, quantity, sponge color) P2. Minimum and/or maximum size limit for mature female crabs P3. Close the crab spawning sanctuaries from September 1 to February 28 and may impose further restrictions	P4. Prohibit harvest of sponge crabs (all) and/or require sponge crab excluders in pots for specific areas P5. Reduce peeler harvest (no white line peelers and/or peeler size limit) P6. Expand existing and/or designate new crab spawning sanctuaries P7. Closure of the fishery (season and/or gear)

*Applying the Traffic Light Approach to Atlantic Croaker & Spot*

The TLA has utility in addressing declines in harvest or production of Atlantic croaker and spot fisheries. Additionally, some of the management tools utilized in the blue crab adaptive management framework could be applied to the Atlantic croaker and spot fisheries, particularly size limits, possession limits, and seasonal closures. While the Blue Crab Adaptive Management Framework uses the TLA as a stock assessment, the TLA can provide management guidance in lieu of a current stock assessment for either spot or Atlantic croaker. The TC and PRT recommend both species for a benchmark stock assessment with the proposed TLA providing guidance in the interim period.

For Atlantic croaker and spot, the TC and PRT determined a more appropriate production characteristic for both species would be a ‘harvest’ characteristic comprised of composite commercial landings and recreational harvest data. These indices are currently used in the annual trigger exercises for these species. Similarly, a composite of fishery-independent survey indices could be used to derive the adult abundance characteristic. As the TLA is not considered a stock

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assessment for either species, the characteristics would be understood as population characteristics rather than stock characteristics. For both species, the TC and PRT would utilize the best available data and modify the TLA as needed in an annual review and update.

#### **4.0 Management Options**

If options 2 or 3 are approved by Board action, they will replace the current annual trigger exercises for Atlantic croaker (under Amendment 1) and spot (under the Omnibus Amendment).

#### **4.1 Croaker Management Options**

##### **Option 1 - Status Quo**

Under this option, there is no change to the annual trigger exercises. The current trigger exercises specify that if either the most recent year's commercial landings or recreational harvest are less than 70% of the previous two year average for their respective category a new stock assessment will be initiated. Additionally, if the TC notices substantial changes in one or more of the remaining trigger categories (biological data monitoring, commercial fisheries effort vs. landings, recreational catch rates, or surveys), the TC can also request that a stock assessment be conducted.

##### **Option 2 - Coastwide Management Framework based on threshold**

###### ***Proportion Thresholds***

Under this option, the thresholds for the proportion of red in either population characteristic would be as follows:

30% - this represents moderate concern to the fishery with moderate management response

60% - this represents significant concern to the fishery with elevated management response

The TC determined these thresholds currently serve as adequate proxies based on fishery-dependent and fishery-independent data during the last 30 years. A minimum threshold significantly higher than 30% may not work effectively in addressing declining trends. An example of when these thresholds have been met or exceeded during the last 20 years are provided in Figures 1 and 2.

Management action should be enacted when either one of the population characteristics consecutively achieve or exceed a threshold during a three year period. Management measures would remain in place for three years to promote consistent coastwide measures and allow for sufficient time to evaluate population response (Table 2). Once management action has been taken, the thresholds will not be applied to the harvest characteristics in assessing the fishery for three years, as the fishery-dependent data may be influenced by management action.

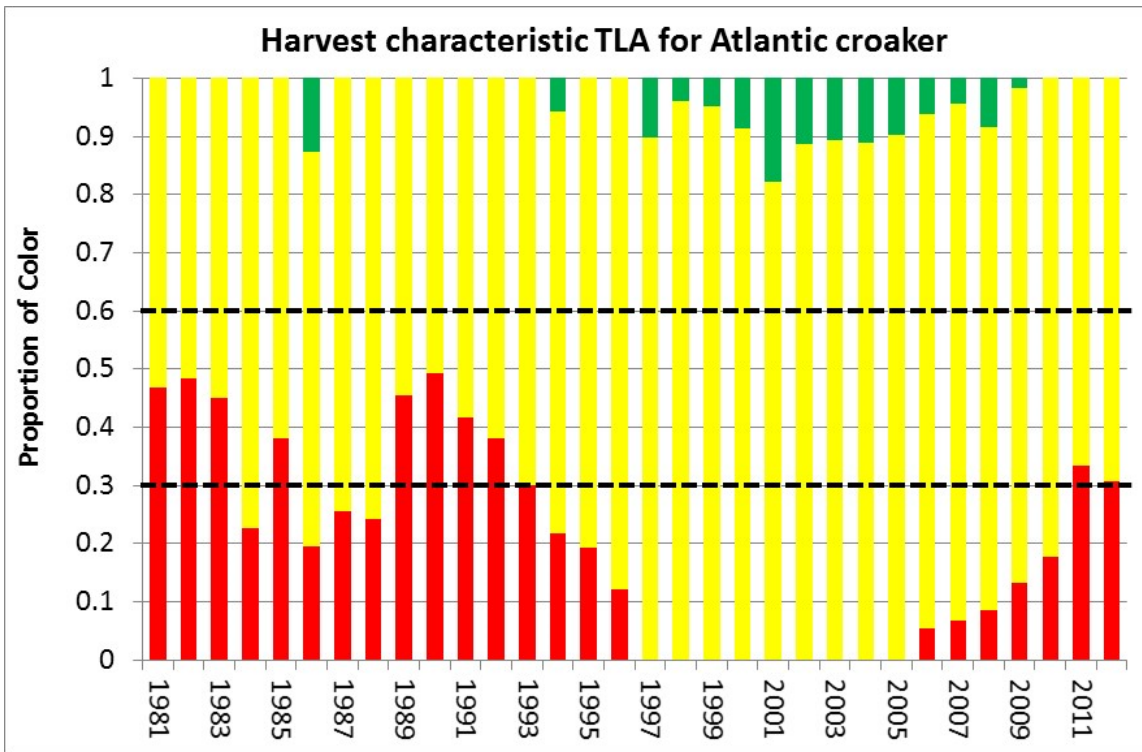


Figure 1. Composite TLA using Commercial Landings and Recreational Harvest for Atlantic Croaker with Management Thresholds of 30% and 60% Proportion Red (Base years 1996 – 2008).

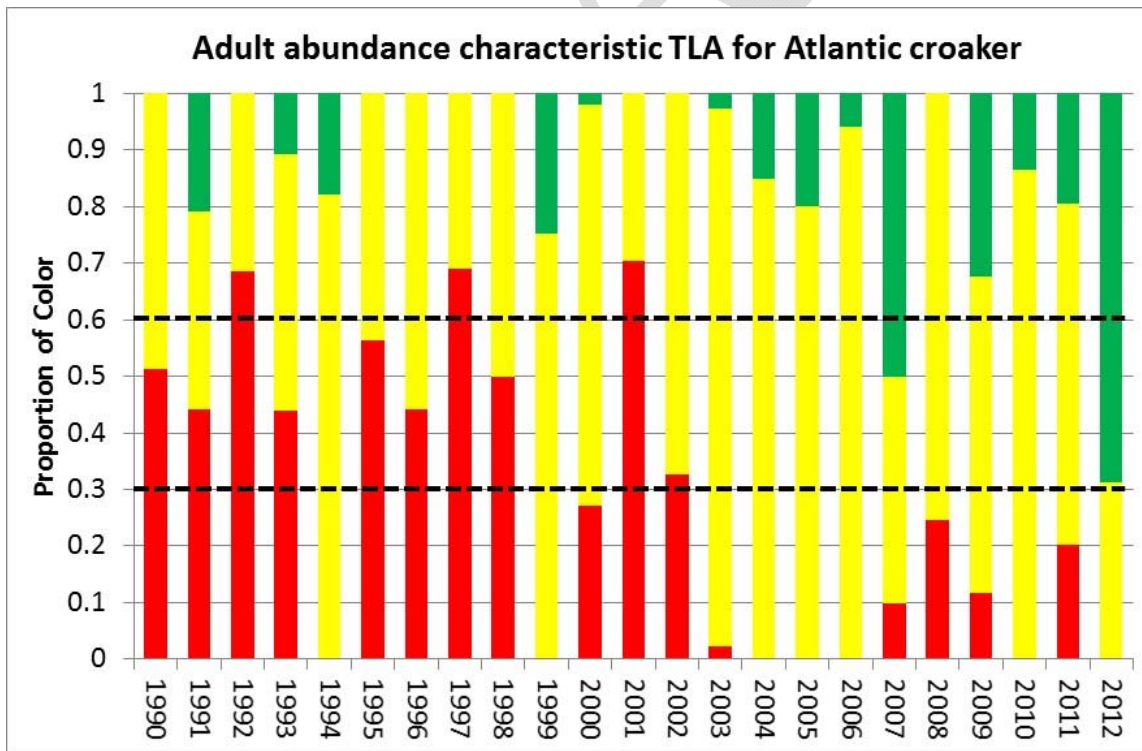


Figure 2. Composite TLA using Fishery-independent Surveys and Index for Atlantic Croaker with Management Thresholds of 30% and 60% proportion red (Base years 1996 – 2008).

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***Management Measures***

The TC would determine the appropriate percent reduction in harvest needed and these measures would be applied on a coastwide basis.

Under this option, possible management tools for consideration once the above thresholds are exceeded include bag limits, size restrictions, time & area closures, and gear restrictions. An example of each of these tools is provided in Table 2. Seasonal closures were determined from inspection of coastwide recreational harvest estimates during 2010-2012 and assessed based on the time period during which harvest was highest. Size limits were determined based on evidence of size at first maturity.

The TLA may allow for conservative measures to be utilized and still provide flexibility for more or less restrictive measures depending on performance of the fishery. Effort controls may not be a viable option as a management tool for Atlantic croaker recreational and commercial fisheries due to the inability to enact limited entry, define the appropriate unit of effective effort, or monitor quotas in real-time.

**Table 2. Coastwide Fishery Management Measures for Atlantic Croaker Management Framework**

Population Characteristic	Moderate management level (at least 30% red for 3 consecutive years)		Elevated management level (at least 60% red for 3 consecutive years)	
	<u>Recreational</u>	<u>Commercial</u>	<u>Recreational</u>	<u>Commercial</u>
<b>Adult abundance Or Harvest</b>	Size limit: 8” minimum (coastwide)  Bag limit: X number/day limit (coastwide)  Closures: state specific areas closure for 20 days after May 1 & before Oct 1	Catch limit: 8” minimum (coastwide); Trip Limit: X pounds/day limit (coastwide) Closures: NA	Size limit: 9” minimum (coastwide)  Bag Limit: X number/day limit (coastwide) Closures: state specific areas closure from Aug 1-Sept 1  Gear Restrictions: (e.g., landings from gillnets prohibited from August 1-30)	Catch limit: 9” minimum (coastwide); Trip Limit: X pounds/day limit (coastwide)  Closures: state specific areas from Sept 1-Nov 1 Gear Restrictions: (e.g., landings from gillnets prohibited from August 1-30)



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**Option 3 – State-by-State Management Framework Based on Threshold**

***Proportion Thresholds***

Under this option, thresholds for the proportion of red in either population characteristic would be the same for initiating management action as under the Coastwide Management Framework (Table 2). These thresholds are listed below:

30%- this represents moderate concern to the fishery with moderate management response

60%- this represents significant concern to the fishery with elevated management response

***Management Measures***

The TC would determine the appropriate percent reduction in harvest needed and these measures would be determined on a state-by-state basis rather than be applied coastwide. This allows the states to meet the individual needs of their state's fisheries. The application of an overall harvest percentage reduction would be proportional to the magnitude of exceeding the trigger, using a combination of management tools that include size limits, bag/trip limits, seasonal closures, and gear restrictions.

**4.2 Spot Management Options**

**Option 1 - Status Quo**

Under this option, there is no change to annual trigger exercises. The current trigger exercises specify that the Board will be prompted to consider new management action when the terminal value in two of the relative abundance indices are equal to or below their respective data set's 10<sup>th</sup> percentile (for the entire time series). At least one of the relative abundance indices must be a fishery-independent index.

**Option 2 – Coastwide Management Framework based on threshold**

***Proportion Thresholds***

Under this option, the thresholds for the proportion of red in either population characteristic would be as follows:

30%- this represents moderate concern to the fishery with moderate management response

60%- this represents significant concern to the fishery with elevated management response

The PRT determined that these thresholds currently serve as adequate proxies based on fishery-dependent and fishery-independent data during the last 30 years. A minimum threshold significantly higher than 30% may not work effectively in addressing declining trends. An example of when these thresholds have been met or exceeded during the last 20 years are provided in figures 3 and 4.

Management action would be implemented when either one of the population characteristics consecutively achieve or exceed a threshold during a two year period. Management measures would remain in place for two years to promote consistent coastwide measures and allow for sufficient time to evaluate population response (Table 3). Once management action has been taken, the thresholds will not be applied to the harvest characteristics in assessing the fishery for two years, as the fisheries dependent data may be influenced by management action.

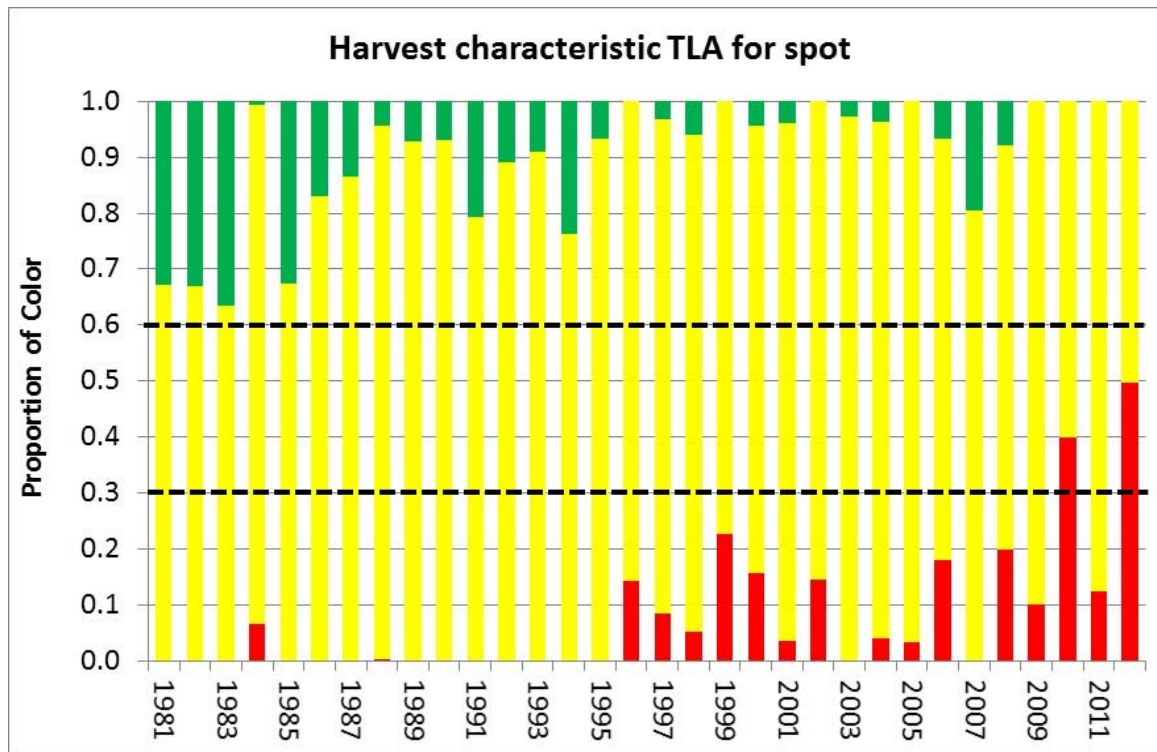


Figure 3. Composite TLA using Commercial Landings and Recreational Harvest for Spot with Management Thresholds of 30% and 60% Proportion Red (Base years 1989 – 2012).

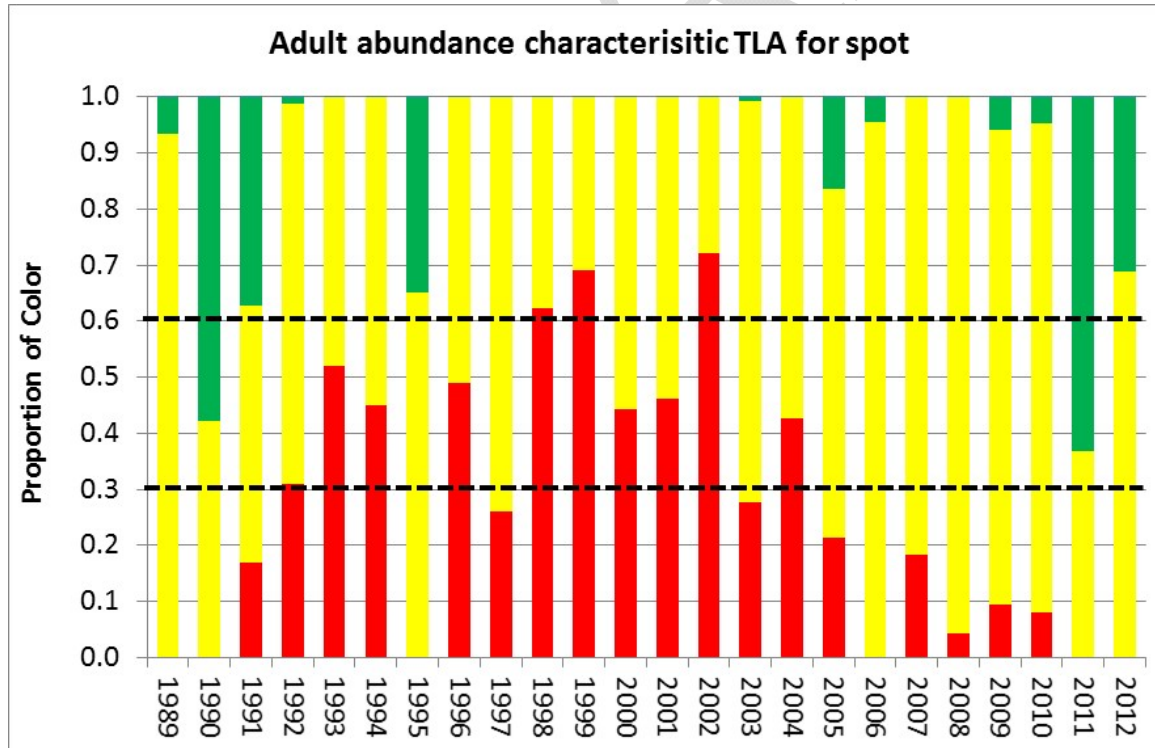


Figure 4. Composite TLA using Fishery-independent Surveys and Index for Spot with Management Thresholds of 30% and 60% Proportion Red (Base years 1989 – 2012).

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***Management Measures***

The PRT would determine the appropriate percent reduction in harvest needed and these measures would be applied on a coastwide basis.

Because the Omnibus Amendment does not have reference points for spot management it is difficult to determine the impact of proposed measures particularly in light of the observed natural cycles of abundance. Limited options are available to constrain effort in spot fisheries. Reduction of landings through seasonal closures and timed gear restrictions may provide some benefits for production of the stock. An example of how each of these measures may be implemented is provided in Table 3. Seasonal closures were determined from inspection of coastwide recreational harvest estimates during 2010-2012 and assessed based on when harvest is highest. Each level of management response could be enacted based on observed characteristics during two consecutive years and subsequently hold management measures in place for two years to provide consistent coastwide measures and allow for sufficient time to evaluate population response. A two year period rather than three was considered more appropriate given the short life span of spot. Implementation of these measures, while potentially improving abundance, may allow for an expansion of the age structure for spot, as current data indicate that few spot are observed beyond age three although this species may live four or more years.

**Table 3. Coastwide Fishery Management Measures for Spot Management Framework**

<b>Population Characteristic</b>	<b>Moderate management level (30% red for 2 consecutive years)</b>		<b>Elevated management level (60% red for 2 consecutive years)</b>	
	<u>Recreational</u>	<u>Commercial</u>	<u>Recreational</u>	<u>Commercial</u>
<b>Adult Abundance Or Harvest</b>	Minimum Size Limit: 6” Bag Limit: X” Closures: May 1- June 15	Trip limit: X pounds/trip Closures: NA	Minimum Size Limit: 6” Bag Limit: X Closures: Sept 1- Oct 15	Trip limit: <X pounds/trip Closures: Sept 1- Oct 1 Gear Restrictions: (e.g., gillnets prohibited from Sept 1-30)

**Option 3 – State-by-State Management Framework Based on Threshold**

Under this option, thresholds for the proportion of red in either population characteristic would be as the same for initiating management action as under the Coastwide Management Framework (Table 3). These thresholds are listed below:

- 30%- this represents moderate concern to the fishery with moderate management response
- 60%- this represents significant concern to the fishery with elevated management response

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***Management Measures***

The TC would determine the appropriate percent reduction in harvest needed and these measures would be determined on a state-by-state basis rather than be applied coastwide. This allows the states to meet the individual needs of their state's fisheries. The application of an overall harvest percentage reduction would be proportional to the magnitude of exceeding the trigger, using a combination of management tools that include size limits, bag/trip limits, seasonal closures, and gear restrictions.

**5.0 Compliance: To be determined by the Board**

5.1 Atlantic Croaker

5.2 Spot

**6.0 References**

ASMFC, 2005. Amendment 1 to the Interstate Fishery Management Plan for Atlantic Croaker. Approved 2005. 92pp.

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ASMFC, 2011. Omnibus Amendment to the Interstate Fishery Management Plans for Spanish Mackerel, Spot, and Spotted Seatrout. Approved 2011. 131pp.

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Halliday, R.G., L.P. Fanning, and R.K. Mohn. 2001. Use of the Traffic Light Method in Fishery Management Planning. Canadian Science Advisory Secretariat, Research Document No. 108, 41pp.