SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL

SCIENTIFIC AND STATISTICAL COMMITTEE

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Transcript

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Dr. Fred Scharf, Vice Chair
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Dr. Walter Bubley
Dr. Jie Cao
Dr. Scott Crosson
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Attendees and Other Participants

Rick DeVictor
Frank Helies
Dewey Hemilright
Nikolai Klibansky
Kyle Shertzer
Erik Williams

Additional attendees and other participants attached.

The Scientific and Statistical Committee of the South Atlantic Fishery Management Council convened at the Town and Country Inn in Charleston, South Carolina on October 25, 2022, and was called to order by Dr. Jeff Buckel.

INTRODUCTIONS

DR. BUCKEL: Good morning, and welcome to the October 2022 South Atlantic Fishery Management Council's SSC meeting. My name is Jeff Buckel, and I'm the Chair, and to my left is Fred Scharf, who is the Vice Chair. Thank you all for attending. We're going to first do voice recognitions, and then we'll get into the meeting items, and so if we can start with Anne Lange.

MS. LANGE: Anne Lange, SSC.

DR. SEDBERRY: George Sedberry, SSC.

DR. REICHERT: Marcel Reichert, SSC.

DR. BUBLEY: Wally Bubley, South Carolina Department of Natural Resources.

DR. NESSLAGE: Genny Nesslage, University of Maryland Center for Environmental Science.

DR. CURTIS: Judd Curtis, South Atlantic staff.

DR. BUCKEL: Jeff Buckel, North Carolina State University.

DR. SCHARF: Fred Scharf, UNC-W.

DR. FLOWER: Jared Flowers, Georgia DNR.

MR. ADDIS: Dustin Addis, FWC, stock assessment.

DR. DUMAS: Chris Dumas, UNC Wilmington.

DR. SWEENEY-TOOKES: Jennifer Sweeney-Tookes, Georgia Southern University.

DR. SCHUELLER: Amy Schueller, NOAA Fisheries.

DR. CAO: Jie Cao, NC State University.

DR. BUCKEL: Okay, and then if the SSC reps online, or folks online, could do their voices.

DR. SERCHUK: Fred Serchuk, SSC.

DR. JOHNSON: Eric Johnson, University of North Florida.

DR. CROSSON: Scott Crosson, NOAA Fisheries.

DR. BUCKEL: All right. Thanks, everyone. Next, I want to introduce any council that are online, and Carolyn Belcher is our SSC liaison, and is Carolyn there? Okay. Jared just said she has a meeting this morning, and so hopefully she'll be able to join us later today, and then Southeast Fisheries Science -- Thanks, Chip. Erik Williams is here from the Southeast Fisheries Science Center, and any NOAA counsel? Is Shep -- All right. Okay.

Next, I want to point everyone, if you haven't gone to it, at the South Atlantic Fishery Management Council's webpage, there is a page for the October 2022 SSC meeting, where all the items for this week's meeting are present. Importantly, the orange tile that says, "Overview", that's where the overview document is located, and then the agenda is Attachment 1a. Are there any changes to the agenda that any SSC members have? Seeing none, the agenda is approved.

Next, we're going to move to the meeting minutes, and that's Attachment 1b. Does anyone have any edits to the minutes from our August 2022 meeting? All right. Seeing no hands raised, we consider the August 2022 SSC meeting minutes approved.

On the agenda, I did not assign SSC members to particular items, given they're mostly informational items that we have today, but there are action items, as I pointed out in the email, for each of those, and so everyone knows their strengths. If you're an assessment scientist or do MSE, that would be one area to take extra notes on, to help us with the final report, fleshing out the final report, et cetera. If your strengths are in other areas, please take good notes on those presentations, so you can help with the final report.

All right. Next, moving on to public comment on the general agenda, and, just to let the public know, there will also be -- We will also provide times for public comments on specific agenda items, but, if there are general comments, this is a good time to provide them.

PUBLIC COMMENT

DR. CURTIS: Jeff, I don't see any hands raised on the webinar. I would like to draw the SSC to some written comment that was provided, and so, if you go to that meeting website, the webpage, and you go over to the right side of "Read Public Comments", there's a couple of comments there for you all to read in your spare time. The Read Public Comments link is over here on the right side of the screen, and so please go there, on your own time, to read some of the public comments that were submitted. Thanks.

DR. BUCKEL: We thank Captains Jimmy Hull and David Nelson for sending those in, and those are comments related to the red snapper stock assessment. All right. Okay. Moving on into the next agenda item, which is a -- Chip has got something. Go ahead, Chip.

DR. COLLIER: This might be a little out of place, but I did want to recognize one of the SSC members. Marcel Reichert was given the award of excellence by the South Atlantic Council, and I believe there were some nominations from individuals in this room, and so congratulations, Marcel.

DR. BUCKEL: Yes. Congratulations, Marcel. Well done. All right, and so the next agenda item is the Interim Analysis Strategy developed by the Southeast Fisheries Science Center, and I saw

Cassidy, Dr. Cassidy Peterson, is here to make the presentation, and is Nikolai online? Okay, and so presentation by Dr. Nikolai Klibansky and Dr. Cassidy Peterson.

SEFSC INTERIM ANALYSIS STRATEGY

DR. KLIBANSKY: Hi, everybody. I am Nikolai Klibansky, in NMFS Beaufort, and I'm a stock assessment scientist, and I'm going to be presenting some work that I've been working on, with a number of others at the Beaufort Lab, Cassidy Peterson, Kyle Shertzer, Matt Vincent, and Erik Williams, and I'm going to be talking about evaluating procedures for updating catch advice of reef fishes between stock assessments with management strategy evaluation. I think what I'm going to do is present half of this and then take questions on the methods and then go through results. We are, you know, always trying to -- Do you see like my shortcuts and stuff? It doesn't matter, and I don't know that I can change it anyway. Okay.

Anyway, we are, you know, always trying to make our stock assessment processes more efficient, and we're often being asked to do stock assessments more quickly, do more stock assessments, and this is a real priority for NMFS, to make this whole process more efficient, and so a paper came out, recently, by Huynh et al., showing that catch advice, through a simulation approach, that catch advice could be modified between assessments, based on indices of abundance, with outcomes that were similar to doing assessments even more frequently.

This being a simulation study, we wanted to try to add more realism and kind of tune an analysis similar to that in a way that would be, you know, really very specific to stocks in the South Atlantic, and so we set out, on this project, to look at whether or not interim assessment approaches would be appropriate for stocks in the South Atlantic.

I am going to be talking a fair bit about management procedures in this presentation, and what a management procedure is, the way I'm going to be talking about it, is it's really the entire process of collecting data from a fishery, from a population, developing some kind of method to estimate stock status, developing a control rule, implementing a quota, and then, you know, ultimately, implementing that in the fishery, and then this diagram here is a circle, because this is a cyclical process, and so the cycle may operate every year, or it may operate every few years, but, overall, management procedure is this whole formal rule that defines how fisheries are managed.

You know, if we want to -- When we're operating with these management procedures, it's sort of this long-term strategy, and, if we want to try to think about how to change those strategies, change those management procedures, to achieve better outcomes, then we need some kind of a large-scale simulation approach, and so this is where management strategy evaluation comes into play, and so management strategy evaluation, or MSE, is a framework to build and test candidate management procedures across a range of uncertainties using a closed-loop simulation.

The reason it's really helpful to be doing this in a simulation context is that we can -- You know, we can know everything in the system. We can know the reality, and we can know, you know, our sampled version of reality, and the tricky sort of downside is you always have to try to make sure that that simulation is matching your actual reality, as much as possible, and so these management strategies are broken down into multiple parts.

We have an operating model, looking at these different blue circles here, and we have an operating model which basically simulates true dynamics of the system. We have an observation model, which is going to be, effectively, some kind of simulated sampling program, sampling the fishery, sampling the population, and the data from that, in this simulation, feed into some kind of estimation model, and usually we use some kind of an age-structured stock assessment, and that could be some kind of a more simple approach. In some of the cases today, it's going to be these interim approaches, and so that's used to develop a catch control rule.

That feeds into an implementation model, which we can change in different ways to change how well the rules are implemented, and that's going to have feedback on the population, on the fishery, and the cycle goes, you know, over and over again, usually on an annual basis, in the MSE. Then, in order to evaluate if that management procedure is a good one, and to compare it to other management procedures, we look at different performance metrics, and it could be reference points, or it could be probability of overfishing, things like that.

We're going to be looking at a specific comparison between a couple of aspects of management procedures, where we're really looking at changing the way that -- Changing the model that we use to provide catch advice, and so, in one type of management procedure, we're doing stock assessments every few years, in this case about every five years, and we're doing stock assessments and then fixing the TAC between stock assessments, and then we do another stock assessment, and we adjust that TAC, and then, in this particular example, the TAC kind of jumps up after that second stock assessment.

The approach that we're looking to compare to is the one described by Huynh et al. where, in between stock assessments -- We're still conducting stock assessments, but, in between stock assessments, we develop -- We're monitoring the fishery, and we're monitoring the, you know, estimated population size relative to levels that we observed in the assessment, and so we're able to make adjustments to TACs and to, ultimately, catches between assessments, to hopefully improve efficiency and avoid getting too far from the condition we want the stock to be in.

We, effectively, in this project, started out really with the code that was used and provided by the authors here. We started with that and then continued to modify code to, as best we could, match what actually happens in the Southeast. We used the software developed by several of those authors, and this is openMSE software available online, and it runs in R, and it's broken down into a few different packages, and you may be most familiar with the Data Limited Toolkit, which I think is the first of the packages to be developed, and it's been around for a while now, but it's this combination of the Data Limited Toolkit, Management Strategy Evaluation Toolkit, and Stock Assessment Methods Toolkit, and so it really provides this whole framework for conducting MSE, and it's very flexible, but, also, you can get results very quickly, and so we found it a really good environment to work in.

We built operating models for four of our stocks, and so the operating model is really the information about the population and the fleet that is fishing that population and the sampling conducted on that population, and so we built these operating models for red porgy, black sea bass, snowy grouper, and vermilion snapper, and most information used for those operating models comes right from the most recent stock assessments.

I am getting a little down into the weeds here, with some of the details of the methods, but I think that's helpful, should be helpful, for you to understand what we did and then for us to understand if you like what we did and have suggestions on what we should do differently in the future, and so there's just a few slides kind of down in the weeds, methods-wise.

These operating models can be then broken down into a few pieces. There is a stock component, or sub-model, that includes biology and life history and other stock-level information, the fleet sub-component, that includes information about catch and fisheries, the observation component, which includes sample sizes and observation error information, and that's kind of where you would, you know -- You could simulate more sampling, or less sampling, and then there's this implementation component, which is where you specify how effectively the management works, and are they catching the TAC? Are they catching more than the TAC? Is it very variable?

Then there's kind of catch-all object that you can put a lot of custom information into these models, the Cpars bit, which gives you a lot of flexibility. You don't have to put anything in there, and it's optional, but that's something that we leaned on a lot to try to match BAM assessments, as much as we could.

In this project, we've been working on a couple of packages that are available that are sort of in beta versions, and one is this bamExtras package that has a lot of functions to support stock assessments with BAM, but also develop a lot of the functions in doing this project, and then this bamMSE package, which is really pretty specific to working between BAM and openMSE, and so it's really helpful for this project, and then will hopefully be helpful in future work on MSEs in the Southeast, and so both of these are on GitHub, and I'm continuing to develop them.

Now a little bit more detail on how we actually get the information from BAM into these operating models, and there's a function to help do that, this Assess2OM function, and we take age by time matrices from BAM, estimates from BAM, such as the numbers-at-age over time, fishing mortality, natural mortality, weight and length at maturity, and these go in there and are stored, and then also used to compute other values, and we put in the Beverton-Holt steepness and R0 values from BAM. For age matrices, we do have to do a little bit of extrapolating to age-zero for a lot of our models, since we usually have our models start at age-one, and then you just start at age-zero for the software.

The von Bertalanffy growth parameters go in there, and we add whatever indices of abundance we want, and so, for the historical part of our simulations, the historical period being the period over which period has already happened, and, you know, it's sort of up to the end of the most recent assessment, and we put all the indices in there, but, for the projection period, kind of projecting into the future, we are only using indices that were available in the terminal year of BAM, and so that was a decision we had to make to just assume that indices that are defunct are going to continue to be defunct, and so that ended up -- For three out of the four models, we just have a single index of abundance. We just had one of the MARMAP trap, or trap-video, or SERFS, I should say, trap-video index indices. Snowy grouper had that, but also a longline index, which is also fishery-independent.

For our observations sub-object, we were able to add sample sizes and CVs based on BAM data, and so, in our simulations, when we're generating, you know, age compositions, those are based on sample sizes that we observed in BAM, and so, if a stock tends to have low numbers of age

comps in our assessments, it's going to have low numbers of age comps, age samples, in the simulations.

For this implementation sub-object, there's a lot of interesting things that you can do. However, we decided, for the purposes of this project, we would just assume that management was doing what we expected, what it's supposed to do, and that management was effectively perfect, and so I'm not sure that is likely to occur, but it shouldn't really have -- It should just kind of leave that out of the equation for now, which is fine.

We also simplify the fleet structure a bit from what we usually have in BAM, and so, normally, we have lots of time series of landings and discards, but, for the way that the models are structured in the software, we just had a single time series of removals and corresponding selectivity, and that was based on the BAM total removals, and so it's just all removals, all in one.

This slide is just intended to give you an idea of how well the simulated information matches the time series information in BAM, and these different panels are showing different variables. The values from BAM are in this dashed-blue line, and the simulated values are in the black line, and so, in some cases, they're actually the same information that was put in there, but, in others, they're computed. They're computed from what we put in, but the point of this slide is really to give you the sense that the historical information that's in the simulations is basically BAM, what was in the BAM models.

Now this is one slide on the way that the assessments work in the simulation, and so, in the management procedures that we're going to run, they are closed loop, and we're projecting information forward, but then we're conducting stock assessments in the projection period, and that's going to feed back into the future simulation years, and so we run these stock assessments, and we're not using the BAM code, but we're using a function that's as similar to BAM as we could make it.

In the SAMtool package, there's an SCA function, and the information we put in there, and I will start by describing the years information. For time series information, we have the entire historical period, and so the BAM information, plus projection years, up to two years before the simulated assessment year, and so, if the assessment, in the simulation, is occurring in 2022, the terminal year of data would have been 2020, and so we added that lag for realism, to try to match what really happens in our assessment process.

The age matrices have the same max age as we would see in BAM, but, as I mentioned before, they all start with age-zero. Life history information, we have length-weight equations from BAM von Bert growth models from BAM that are fixed, age-varying M. For data that we're fitting to, we have a single catch time series, which I mentioned, and we have multiple indices of abundance, and then a single series of age compositions, which is associated with the catch and fitted with the multinomial distribution.

We are estimating selectivity associated with the catch, but the selectivities associated with the indices are fixed, and so that's partly why you don't need comp data for the indices. For recruitment, we are modeling recruitment with a Beverton-Holt stock-recruit function. Steepness is fixed, and rec sigma is fixed, and then, in terms of what years we're modeling, or estimating recruitment deviations, the procedure for that, the kind of algorithm for determining those years,

is similar to what's done in BAM. We have the Baranov catch equation, and equilibrium F is fixed, and we use MSY-based reference points.

All of the management procedures that I'm going to show you are running these statistical catch-at-age assessment models. The thing that is varying, in regard to those, is how often they're conducted, and so they're conducted either annually, every five years, or every ten years. In the assessment years in the simulation, the TAC is equal to MSY, but then, between assessments, the TAC is being set in different ways, and so that's really what sets the MPs apart.

Here are nine management procedures that we're going to be looking at. The first three, we're conducting stock assessments every year, every five years, every ten years, and the number in parentheses here is just how often a stock assessment is conducted for all of these methods. In between those assessments, the TAC is fixed.

Then we have two projection MPs, where the TAC is projected between assessments, and then these last four are interim analysis MPs, where we either have the TAC adjusted by a three-year moving average of the index, and so that's average I, or the take is adjusted by the recent index buffered by the standard deviation of that index, and so that's buffered I, and, again, the five and ten is just how often the assessments are conducted.

This slide is just to talk about the lags between when the data are available and when management goes into effect, and so, as I mentioned, we assume a two-year lag between the terminal year of the assessment, both the terminal year of the data and the assessment, and then management goes into effect the next year. I assumed no lag for the interim adjustments between, you know, when the index was -- The terminal year of the index, and so, if a survey ended in a particular year, assume that the interim adjustment is available that same year, but then management doesn't go into effect until the next year.

Most of what I've been talking about characterizes the base scenario, and it is what we believe to be the most realistic parameterization of what's happening in the South Atlantic, both in terms of the stock dynamics and the assessment dynamics, sampling everything, and we looked at a lot of different scenarios, and, you know, at least twenty scenarios, and I'm going to show you five today, and we're not going to look at them in too much detail, because, frankly, the results weren't that much different, but, the ones that I did include, and the same thing is in the report, and so all of this should be -- It's really right out of the report.

We have the first two are -- We made the index of abundance that's used for the assessment and for the interim approaches to have a higher CV, and so it's just a messier index. For low CV, it's a much tighter index, with half the CV of a base scenario, and we have a scenario where the index is biased, and so it's actually the index of abundance is increasingly underestimating population size, and then we had two runs, two scenarios, where we simulated either a situation where the TAC was being set kind of more aggressively, at 1.25 times MSY, or more conservatively, at 0.75 times MSY.

Then I think this is my last slide before -- After this slide, I'm going to just pause and take some questions and see if you have questions or comments about methods, but this is just a reference to the performance metrics that we used. I mentioned, in one of those diagrams earlier on, that we run all these management procedures, and then we have to evaluate them in some way, and it's

kind of like what's your test statistic, that kind of thing, and so there's a lot of different things we can look at.

We might look at reference points like total catch, relative catch, which is the catch relative to MSY, stock status, fisheries status, or average annual variability in yield, and so that's characterizing just how variable the catches are among years, and this can be important for industry, and then other metrics, like average long-term yield, and so looking at the yield late in the projection period, in this case the last ten years. The probability of having a healthy stock status among simulation runs, the probability of not overfishing, or probability of stable yield. That brings us to the end of the methods section. Before we get into the results and discussion, I wanted to see if you all have any questions or comments about what we looked at so far.

DR. BUCKEL: Genny.

DR. NESSLAGE: I am confused about what the three different -- What the three different periods are, sequential time periods. Is it how you break up the projection period? I know you haven't gotten quite to that, but I think it would help me as you go through the results.

DR. KLIBANSKY: Yes, and that was just a decision that we made in looking at the results, and we broke that plot up into an early, medium, and late period, which are arbitrary periods, and they were just a way that we wanted to try to look at those box plots and demonstrate that those values changed over the projection period, and so we could have looked at them, you know, with two periods, or one period or five periods, and maybe we made it more confusing by doing that, but so it's just a way of breaking up the data so that we could look at -- So that we could look at how those estimates vary over time, the projection period.

DR. BUCKEL: Fred Serchuk.

DR. SERCHUK: Thank you, Chair. A couple of questions. Did you discriminate assessments that are in a rebuilding period, versus the assessments that are not in a rebuilding period, and I say this because, quite frankly, if you have sort of a ten-year horizon for some stocks to rebuild, or fifteen or twenty, it seems to me that you would want to be more -- You would want to know more times in the interim between the assessments whether the stock is actually going in a direction to achieve rebuilding, and that's the first question.

The second question is did you take into consideration that existing assessments also have, may have, a bias, in that they're either overestimating or underestimating parameters based on the subsequent assessment? That is, you think that recruitment is going to be this much, and then, when you do the next assessment, you find out that recruitment is either much higher or much lower, and, therefore, there is a systematic bias in the assessments. Maybe you've done all these things, but I'm not sure, and so I'm asking these two questions. Thank you.

DR. KLIBANSKY: Sure, and I think the answer is no to both, and so we didn't -- You know, we didn't react differently if the stock was in a rebuilding period, and that's something that could be put into a management procedure, but we didn't do that, and then -- Were you suggesting -- For your second question, I think, no, we didn't look into that, but were you suggesting a particular change, or just suggesting that we would avoid certain assessments?

DR. SERCHUK: It's been my experience that there are assessments that have a retrospective bias, and they assume either fishing mortality -- They make estimates of fishing mortality, and/or recruitment, and we find out, when we have empirical estimates later on, that they are not in line with that, and so they're often -- For example, they often apply an assessment Mohn's Rho, because, quite frankly, they see that there is some sort of systematic underestimation or overestimation of various estimates coming out of the assessment. I only raise these uncertainties because they can mislead you to where you think you are relative to the operation of the assessment, and they are common problems. Thank you.

DR. KLIBANSKY: Thanks for that, Fred. I think I can say that the assessments that we used -- They were assessments that, you know, passed review and were used for management, but I think that the things that you're suggesting would definitely be worth considering in future simulation runs, but, at this point, we're kind of trying to figure out, you know -- We're getting our feet wet and figuring out if this is worth doing, and part of what we're going to get from today, I hope, is we'll figure out if you all think that it's worth us doing more of this, but those kinds of thoughts, I think, would definitely be helpful for building, you know, additional scenarios and additional management procedures and modifying what we've done for our future work. That may sound like a cop-out, but we definitely need input from you all at this point.

DR. BUCKEL: I think it's a great point, Fred, that it may not be that the interim analysis can work for all assessments, and so I think Nikolai monitoring some other performance, or some other indicator, of retrospective bias, for example, and comparing that to how things -- How it performs might be helpful, because then you could use that as an indicator in the future, if the interim analysis would be appropriate or not, if I'm following Fred correctly. Any other questions for Nikolai or comments on the previous -- Chris.

DR. DUMAS: Hi, Nikolai, and thanks. That was a great presentation. I've got a question regarding using MSE to do sensitivity analysis, and, as you were doing these MSE runs, could you get a -- Do you have any kind of sense of whether doing this MSE would allow us to do better sensitivity analysis, in terms of identifying critical parameters in the overall system relative to sensitivity analysis that is already being done with BAM, or has been done in the past with BAM, and does MSE allow us to do sensitivity analysis better? Do you have any kind of feeling for that? Better than what we've done in the past, I guess.

DR. KLIBANSKY: I guess the quick answer is I'm not sure, but I think -- I mean, there's a lot of ways that you could conduct sensitivity analysis, and like look at the sensitivity of an MSE to a particular parameter, but I think that you're kind of asking -- Are you asking if it can help identify types of sensitivity analysis that we should be running in our stock assessments?

DR. DUMAS: Do you have any sense that using these MSE methods allow us to do sensitivity analysis better than we were doing it before, just using BAM?

DR. KLIBANSKY: I see, and so maybe like actually doing the sensitivity, and let's say a sensitivity to a change in M, but then running the MSE instead of just running BAM?

DR. DUMAS: Right.

DR. KLIBANSKY: I mean, it's definitely an interesting thing to think about, and, I mean, I think that it would certainly tell you more, I think, and the trick is that, you know, when we're honing BAM, we're doing it so precisely that -- You know, we got the system, in this software, to be as close as possible to BAM, but I'm not sure it's similar enough that -- I'm not sure how you would interpret the MSE based on the sensitivity, if it would be appropriate or not.

DR. DUMAS: Thanks. That's great, and I'll think about it some more, too. Thanks.

DR. BUCKEL: Jie.

DR. CAO: I guess a question regarding uncertainty, and I might have missed it, and I'm not sure if there is any process error in the operating model, for example like stochasticity using recruitment deviations, stuff like that, and I'm just curious.

DR. KLIBANSKY: There is a lot of different elements where -- I didn't get into this at all, I know, but a lot of elements of the system and the projection period where we're, you know, resampling from either distributions around steepness over a range or, yes, with recruitment deviations, and there's -- We're simulating error around recruitment deviations, and so there's actually quite a lot of uncertainty going into the MSE, and, wherever possible, we used values from BAM to do that, and so there's, frankly, a tremendous amount of documentation and plots and things that we've gone through that, you know, would just take a long time to wade through, but, yes, we definitely put a lot of uncertainty in the models.

DR. BUCKEL: Okay. It looks like there's no other hands in the room, and Judd is saying no other hands online, and I have one quick question, Nikolai, and that's the -- It sounds like, within the MSE package, you're using a statistical catch-at-age model that's not BAM, and I was just curious if that's -- So, if BAM is not included, how much does that SEA that's within the package differ from BAM and if you're concerned at all about the results that come out compared to -- Right, because we used, BAM, and so I'm just curious if you could -- How those two differ. Thanks.

DR. KLIBANSKY: Thanks. I mean, I think, our first meeting, when we talked about this project, it was should we try to use a package that's available, or should we try to develop our own software, and we went back and forth, and we thought that it's going to take a long time for us to develop MSE software to work with BAM, and we felt that the assessments conducted, the way that you could parameterize these assessments through openMSE, was going to offer sufficient realism to match BAM as well as, really, we needed, and, in fact, the folks that are working on this, the developers of openMSE, and I think a couple of them might be there today, they keep developing it and making it more flexible, and, in fact, like there are ways in which you can now make the fleet structure more complicated.

I didn't have time to, you know, build that in and redo everything before presenting today, but there's a lot similarities that you can build in, and it's very flexible, and then there's places where the software makes certain assumptions, like fixing the selectivities of the indices, which I don't know exactly how that affects the results, and I think that it's overall, you know -- At least for the question we're asking, it's not a problem, but my sense is that it's actually pretty helpful, or maybe even necessary, for running the software, just because it makes the model so much stabler, much more stable, and run more quickly, and so that's my final portion of the answer to what has become

kind of a long answer. I think that there's a sufficient amount of realism, and there's a couple of places where we could add more, but I think it's really quite a good match.

DR. BUCKEL: Great. Thank you. All right. Seeing no other questions, Nikolai, if you want to continue on with your presentation.

DR. KLIBANSKY: Yes, sure.

DR. BUCKEL: Thanks.

DR. KLIBANSKY: Thanks, and I'm glad we did that. I think that was good, to sort of take a pause in between, and so this first bit of results is really just an example of what the simulated indices look like, and so this is the base scenario, and most of what I will show you is in the base scenario, and this is for the management procedure where stock assessments are conducted every ten years and then TACs are fixed in between, and so what we're looking at, in these panels, is the time series of -- These red indices of abundance are the primary indices of abundance, and they are chevron trap-video, or just the chevron trap survey, for snowy grouper.

You can see the solid line to the left of the first dashed vertical line, and that's the historical period. That's coming right out of BAM, and we chose to leave those effectively fixed and not include uncertainty around those, but then, in the projection period, you see this shaded area around those indices, and that's the 95 percent confidence bands around the median values among 250 simulation runs for each stock for each management procedure.

I wanted to put this up just to kind of, you know, give you a piece of what is in the models and give you an idea of just how variable, how differently variable, these indices are, and all the Y-axes are the same, and so, for some stocks, the index is much more variable than others, and, also, I will point out, and particularly with black sea bass it's pretty evident, that, because these are closed-loop simulations, there is an effect of the assessments and the changes in management on the data going forward, and so the assessments and management that we're simulating are having an effect on the population, and that's having an effect on the index, and so, for black sea bass in particular, you can see there is something that happens when the stock assessments are conducted every ten years, where we end up at this sort of like periodicity in the stock size for black sea bass.

You can kind of see it goes up, and then it goes down, and it goes up and down. In the other ones, they tend to kind of level out more over time, but not to get too hung up on that particular detail, but just to get a sense into some of these sort of proximate results.

This is the first of a few slides looking at these box plots that Genny was referring to, and so, here, what we're looking at are stock status, SSB over SSB MSY, for each stock in a different -- In each panel, and then, across the bottom, you see the nine different management procedures, and I put this table in a lot of these slides, on the bottom-left, just to remind you what they are, because I know it's hard to remember the abbreviations.

The SSB over SSB MSY is variable throughout the projection period, and so we decided that it would be worth showing -- Just kind of arbitrarily breaking up the results into three periods of that fifty-year projection period. We project fifty years beyond the terminal year of the assessment in all of these management procedures, and so, when you look at any three of these box plots, and

let's just say the first three in the top panel, there is three blue boxes for -- There is different sequential chunks of time in that projection period, and so, for all of these, what you see is kind of a trend among those three boxes.

They tend to kind of start -- There tends to be more of a change between the first two time periods, and then there's kind of this leveling-off, sort of convergence, if you will, in the last couple of time periods, and so I would mostly look at the last time period, kind of a longer-term result, and, when you look across -- This is the main thing to get from these plots. When you look across these dark-blue boxes, within any one of the panels, they really are not that different, and so you see stock status relatively similar in that last period of the projection, regardless of which one of these management procedures we're using.

Now we're looking at F over FMSY, and it's somewhat more variable within and between MPs, but you still -- Again, I think, looking across those box plots, for the same time periods, you don't see a lot of difference in the central tendency, and this is -- Again, I mentioned earlier that we look at a lot of different parts of the results, different performance metrics in here, just different kind of reference points, and so now we're looking at total catch.

This also -- Again, it's very variable, but, you know, you don't see any major differences among those blue boxes for any of the stocks. Now, when we look at this metric, the average annual variability in yield, or AAVY, you do see more consistent differences, and so, you know, in some ways, that's not surprising, because this is a proxy for an estimate of how variable the yield is among years, and that is dependent partly on how often you're changing your catch advice, and so, particularly for these first three -- The first one is pretty steady, partly because this is where stock assessments are occurring every year, and they're able to maintain the -- You know, they're make a lot smaller changes in advice over the years.

SCA five and ten, they're fixing the stock. Excuse me. They're fixing the TACs for long periods of the simulation, and so they're tending to be a bit lower. The projection MPs tend to be a little bit more variable, but then the ones that -- At least for vermilion snapper, red porgy, and snowy grouper, you tend to see the somewhat higher variability in yield for those interim MPs, the average I and buffered I, more so for the buffered I than the average I. That pattern is a little bit less clear for black sea bass, and black sea bass does not really seem to -- There's just a lot more variability in the results for black sea bass in general, and so we don't really see that pattern.

The second type of results that I wanted to look at are -- These are really -- In a lot of ways, they're the same -- It's the same data, but just we're looking at it kind of in different ways, and so, here, we're looking at actual time series of median values of different metrics, and so, here, we're looking at catch over MSY, and then medians among the 250 simulation runs, and each line here represents a different management procedure. You know, given the goal of this project, trying to understand how well do the interim approaches compare to what we, you know, are currently doing, what we're kind of largely looking for is any large differences between those interim MPs and assessments conducted with fixed TACs in between.

When we look at these, the most consistent trends we see are in the red lines across any of the stocks, and it's more obvious for black sea bass, because the black sea bass results are kind of all over the place, and there's just a lot bigger fluctuations, but the red line is the annual assessment, and so some of the steadiest approach. The green line is the projection approach, and, you know,

it tends to be the most variable, for most of the stocks, again with the exception perhaps of black sea bass, which has these really large fluctuations after the assessments, when you're making large changes in the TACs after the assessment is occurring every ten years.

Particularly, when you look at vermilion snapper, red porgy, and snowy grouper, you really don't see too much difference between the median values for the two interim approaches or the SCA ten, then ten-year assessments with fixed TACs, and then this is just looking at the MPs where assessments are done every five years, and you are going to tend to see like -- There is kind of even a dampening of that variation. Running the assessments every five years is just making everything more consistent.

Now, looking at patterns in F over FMSY, you see kind of similar dynamics that we saw with the relative catch, although the fluctuations in the projection MP are a little bit more -- They're less pronounced, and it's kind of tending to show itself as a bit of a more conservative approach, and it's tending to up with lower F relative to FMSY, and this is just looking at those same results, but for the five-year assessment frequency, and, again, all of those medians kind of converge.

Now it's looking at stock status over time, SSB over SSB MSY, and you do see these fluctuations for black sea bass. They tend to dampen over time, but, generally speaking, the different approaches are, you know, not so far off from one another, and then especially when you're doing assessments at five-year intervals, and even that five-year -- Even when you're doing assessments at five-year intervals with fixed TACs for black sea bass -- You know, all of these lines are pretty close to each other, and so suggesting that they're really not giving you very different results.

Another way that we can look at these results is to look at these tradeoff plots, which is looking at, you know, bivariate relationships between different performance metrics, and so, on several of these, we have, on the X-axis, this probability that the fishery -- Probability that the average annual variability in the fishery is pretty stable, is below 20 percent, and then, on this one, the stock status is on the Y-axis, and so there are some exceptions, but the general trend that I see, looking in these tradeoff plots, is that most of the differentiation -- Most of the separation among the different MPs is in regard to variability in yield, and less so with these other metrics.

In a couple of these, you will see these green dots, and the projection MPs separate out for vermilion snapper, and it's just a more conservative approach, and so you see this as having a probability of, you know, a positive stock status, and, again, this is the same X-axis, but with fishery status on the Y, and so you're generally seeing variability on -- Either the points are kind of all clustered together, like with red porgy, or most of the variation is along the axis of variability in yield, and this is now mean relative yield, on the Y-axis, with variability in yield on the X, and you see kind of the same separation, mostly along the X-axis.

Now this is stock status on the X-axis, and relative yield on the Y-axis, and now the points are all just kind of clumped together, and, again, with now fisheries status on the X and stock status on the Y, kind of like the axes like you would see in a phase plot, and they're really not differentiating too much, except for these two projection points for vermilion snapper.

The final couple of results plots I have is just to look at all of the simulation results, the phase plots for all of the simulations all together, for year-five of the MPs, the ten-year assessments, and then the annual assessment MPs, and, again, just to point out that they're really not separating out too

much, based on these metrics, and then even less so when the assessments are done every five years.

Now, our take on what we've done so far was just to observe the average performance of the interim MPs, in this base scenario, really didn't seem to be better than the fixed TAC MPs, but we did see that the yield was more variable for the interim MPs, for kind of obvious reasons. A quick slide about the alternative scenarios, and there is tons of interesting information to look at in alternative scenarios, and even some of the other ones that we looked at, but, for the purposes of what we're trying to get at today, suffice it to say that, although there are specific differences, the results are generally similar to the base scenario, and you just don't see, you know, very generalizable, clear separation among the different MPs.

I have the last few slides where I want to just kind of get some discussion going and kind of summarize a little more about the work that we've done. In what we've done so far, you know, the performance of the interim MPs didn't seem to be much different than status-quo approaches, but our analysis is generally focused on the average long-term performance of MPs, and so there could be other performance metrics that suggest different relationships among the MPs, and so there could be other things that we look at that are of interest that might, you know, tell a different story.

Also, with regard to variability in yield, if that's a concern, there are ways to develop MPs so that you might end up with good performance, but not have such variability in yield, and so, for instance, in the current simulations, the TACs are just modified every year, with those interim MPs, but we could set up some kind of threshold approach, where the TAC isn't actually changed unless a change in index exceeds a certain value, and so maybe it shows a concerning decrease and then you do something. That also seems like it could really reduce the burden on management, who, you know, our simulated managers are scrambling every year to modify TACs for all these species. Those are things that we could estimate, or investigate, with more MSEs.

I tried to impress upon you that we tried to make the base scenario as realistic as possible, match BAM as much as possible, but we still made assumptions. We assumed stationarity, and we assumed known model misspecification, and no implementation error, and so those are more things that we could experiment with in future scenarios and more MSE work.

We mostly dealt with the performance of these MPs, but we talked a lot about logistical considerations and the time and effort that, you know, would go into some of this, and, in some ways, to go into the different MPs -- In some ways, that was outside of what we were getting into for this project, but it's actually really relevant, in certain ways, for designing more MSEs and, you know, even honing the MPs that we've done, because a part of what we need to put into these MPs is, you know, how quickly can the new TACs actually be implemented, and how often can they can actually be implemented, and so part of the evaluation really requires that kind of detail.

This is something that folks in the Gulf of Mexico have given some thought to recently, and they have determined that, for running interim analyses, it only takes a week of analyst time per year, and so the scientific effort per stock per year is not such a heavy lift.

However, at present, it takes about twelve to eighteen months between the interim analysis being completed and the implementation of management, and I don't really know what the effort is

associated with that, and I'm sure some folks listening today have a much more personal relationship with the effort that goes into actually putting all of these things into effect, and so someone presented to the Gulf Council in August, and presented this nice talk that's linked here, where they proposed a process that could shorten that timeline and, you know, somewhat automate the changes that would need to take place to go from the recommendations from the interim analysis to actual TACs being set.

Another logistical consideration that has kind of emerged is just thinking about those lags that we talked about between when the data are -- When the data are generated, say by a survey, and when management can actually go into effect, and it turns out that, you know, my assumption of having the survey be completed and the interim analysis completed in the same year is probably a little bit optimistic.

It sounds like it actually takes more like, I don't know, nine months to a year between the end of a particular survey, and let's say the SERFS survey ends in the fall of 2022, and it's probably not until the fall of 2023 that you even have the estimate that you could generate an interim TAC from, and then my guess is it's somewhere into the next year before you could put that TAC into effect, and so it seems like, at present, we probably have like a two-year lag between the end of data from the index to management goes into effect.

My last slide with real content is just a few questions that we tossed around in our group and kind of pose to the SSC. How well would the interim MPs have to be perform in order to compensate for increased variability in yield, and that's assuming that the increased variability in yield is desirable, and what performance metrics would be most important to the South Atlantic Council? Then, really, how quickly could catch advice from the interim analysis be implemented? Is it realistic that there could be some kind of automatic mechanism where the general approach of the interim analysis is approved and then, going forward, you just have TACs automatically go into effect?

I am asking that largely because, from the modeling perspective, that's what we're assuming in the models, and, if it's not working that way, if there is going to be a mechanism for, you know, delaying, or having that process take a longer time, depending on what the estimates say, that would affect how you run your simulation. Finally, I will leave you with a view of a pretty tree to contemplate while we talk more about this and ask questions, and so thanks, everybody.

DR. BUCKEL: Thank you, Nikolai and the team. That was an incredible amount of work. We have a question from Fred Serchuk. Go ahead, Fred.

DR. SERCHUK: Thank you, Chair. Thank you, Nikolai, for really a very informative presentation. Can I ask you two questions? Can we go back to one of your slides that showed the F over FMSY, the results for the base? Okay. What drew my attention is what happened in red porgy, in the ten-year thing? It looks like, as opposed to all the other plots for all the other species, all of a sudden, that particular set for ten is way out of line with everything else, and is there any reason for that?

DR. KLIBANSKY: The quick answer is I don't know.

DR. SERCHUK: Okay, but you would agree that the pattern is really quite different?

DR. KLIBANSKY: Yes. Agreed.

DR. SERCHUK: Okay. The second question is, and, again, it relates to red porgy, and I don't know if you can go back to -- Or go ahead, I guess, to a plot where you looked at SSB over SSB MSY for the ten-year assessment interval. It's the line plots.

DR. KLIBANSKY: The line plots, yes. I will say one thing, generally --

DR. SERCHUK: You had it right there, and it looks like this stock never rebuilds.

DR. KLIBANSKY: Sorry, and --

DR. SERCHUK: For red porgy, you see that the SSB over MSY hardly gets to one over a forty-year period. Are the dynamics of red porgy somehow different than the rest of these other stocks that you looked at?

DR. KLIBANSKY: Yes, and so red porgy definitely caused some heartburn. You know, the red porgy stock was at really low levels, and so I think that caused some of that, and so that may have caused even some of what you're looking at from the F over FMSY plots, that it is just really variable, depending on how the different simulations worked, you know, if it was getting to extremely low levels or not, and so I think you're getting some of those really high F values if the stock was getting really, really low, and so, yes, this was actually -- Red porgy is one where we did talk about, you know, needing to maybe modify the management procedure to have some mechanisms for doing things differently when the stock was at really low levels, because I think that is maybe part of what is going on with red porgy.

DR. SERCHUK: Okay. Thank you for that. When I see a plot like that, saying the stock can't be rebuilt over a forty-year period, it suggests to me that perhaps there's a change in the productivity of the stock that suggests that the previous dynamics are no longer appropriate, and that's just a quick evaluation, saying that there's something going on in the environment that's affecting this stock very much differently than the other ones, but, again, that's just a guess on my part. Thank you.

DR. KLIBANSKY: Yes, sure. There's definitely -- I mean, one thing I will say about this project, and getting into the results, for a lot of it, just in terms of time and the sheer amount of results that we generated, I -- We often were taking kind of the ten-thousand-foot view and not having time to really look down into some of the details of, you know, some of these aspects of results, just because there's just so much to look at, but it would be certainly interesting to drill down and get into some of these things more.

DR. SERCHUK: The only reason that I raise it, Nikolai, and not to beat a dead horse, but I think one of the things that management really has, in terms of what it views as -- They like to have a success story, and, if they have a ten-year rebuilding program, or a twenty-year rebuilding program, you know, they would like to say that, yes, we've set out on a rebuilding plan, particularly for those stocks that are not rebuilt, and we hope we have success, if we said that the rebuilding period was ten years or twenty years, but, when it's forty years like this, most of the managers that set the requirements for rebuilding in 2020 are no longer on the council, forty years later.

DR. KLIBANSKY: Correct, and, I mean, just to note like, in these simulations, we're not -- You know, we're not being gentle with red porgy, and so they're being managed in the same way that these other stocks are, and so we know that, in reality, red porgy is in tough shape, and the council is responding to that, and so this is not necessarily the trajectory that we would expect to see, but I guess that's where we depart, maybe, from the realism, in this particular example, is we're not -- You know, we're setting the TAC at MSY and not necessarily doing what the rebuilding plan is suggesting, and so, hopefully, the real trajectory will look better than that.

DR. BUCKEL: Amy.

DR. SCHUELLER: I have a follow-on question, and so, I mean, Fred is looking at the SSB over SSB MSY, but, if you flip a slide before this, and another slide, there is the five-year and ten-year F over FMSY, and red porgy is above one there, and so I guess I am not surprised by how SSB over SSB MSY looks, and then I guess my other question is maybe we need talk a bit more about -- So, in all of these scenarios, you're basically fishing at FMSY, or you're setting the -- I don't understand, I guess, and what's happening with management, because, clearly, they are not meeting a catch set at MSY if their F over FMSY is two.

DR. KLIBANSKY: Right, and so there is actually a cap on F, and I think F is set to not be able to exceed -- I think F is set not to be able to exceed three, and so it does bump up against a limit, and so it doesn't always fish at FMSY.

DR. SCHUELLER: That made me more confused, Nikolai, and so the catch is supposed to be the catch at MSY, right, and, if that's true, then the F at FMSY should be one, right?

DR. KLIBANSKY: Right. Are you -- I mean, are you asking how the TAC is being set?

DR. SCHUELLER: No. I'm asking how the median F over FMSY is at two when we're setting the catch at MSY. I mean, Cassidy, I see you're over there, and you should come to the table, if you can answer the question, because I'm just a bit confused about what management is actually doing here, especially since we have no uncertainty associated with management actions, and this doesn't really make sense to me.

DR. PETERSON: One thing to note is that these results are medians over all of the different operating models, and so, if the operating model is not matching the estimating model, then some of the MSY-based reference points might be biased, and so this could be a reflection of biases, or alternate assumptions, in the operating models, if that helps.

DR. SCHUELLER: Sorry, and so, I mean, one of the questions I had before I even stepped in this room today, when I was reviewing the materials, was how well does this system replicate what we've done in the past, and I'm not really sure we have an answer for that. I mean, it kind of showed some of the plots that said, yes, okay, we're matching the data, but, I guess, if we're not matching the operating model with our estimation model in a simple case, what is this telling us? I mean, are we -- I'm a bit concerned about that.

DR. PETERSON: I can comment just briefly, and so, in the base operating model, it does closely match the estimating model, if my memory serves, and Nikolai can correct me, but it's important

to remember the difference between an MSY and sort of the best assessment paradigm, and so the MSE is intended to sort of torture test different management procedures, and so that includes the assumption if we're wrong in our estimating model, or we are incorrect in our biological reference points, and so this isn't a best prediction of what the future will look like with these different management procedures, and it's looking at how they perform through this sort of torture-testing arena that we've developed for them, and so these results are accounting for incorrectly-specified estimating models and sort of different assumptions made in the operating models. I think, in the report, Nikolai has presented results for each operating model, and hopefully those should match a little bit better.

DR. KLIBANSKY: One thing that I'm remembering that's fairly important, I think, about trying to understand this is that, when we're talking about F over FMSY, or, you know, SSB over SSB -- Any of the reference points, and the reference points in the denominator are from the operating model, and they're the true values.

Then the Fs, or the SSB, the numerators, are what is observed by the simulated stock assessments, and so, you know, in some cases, the stock assessment is, you know, estimating an FMSY and reacting to it in the simulated management, but it's not -- It may not be matching the true value, and so that's one way you can get the deviation from what you might expect.

DR. BUCKEL: Thanks, Cassidy and Nikolai. That was helpful to help answer your question, Amy, or do you have a follow-up?

DR. SCHUELLER: I don't have a follow-up, and I guess my comment, or maybe the SSC would agree to this comment in the report, but clearly we need to torture this a bit more, with respect to the management process, like if -- I mean, there's only one option here, the way I understood it, and so I think that's something that needs to be explored a bit more.

DR. BUCKEL: Could you give an explicit example, maybe, of what -- Or one example of what you're --

DR. SCHUELLER: I mean, if they're just setting catch at MSY, we don't typically do that, and there's some buffer, right, with P*, and so, I mean, that's one example, and I could come up with a litany of different examples, but I think that's a pretty clear one. I mean, my question becomes like, given the uncertainties within this, what does management need to do to make sure that they're actually under FMSY, and we might need a much bigger hammer than P*, potentially.

DR. BUCKEL: Thanks, Amy. I had Genny next, and is that right? Go ahead, Genny.

DR. NESSLAGE: Thanks, Jeff. I had a question about openMSE and the implementation object, and would it allow you to simulate how we are consistently not able to get the discard F under control in the South Atlantic, as far as implementation error is concerned, and that would be my biggest stumbling block towards recommending anything off of this MSE, and so, if we're going to do additional torture testing, that would be where I would put my effort, and what I would suggest, because that is our biggest challenge, I think, here right now, for many of our stocks.

DR. KLIBANSKY: Genny, are you just asking could you simulate continually overfishing discards, or generating discards that are too high?

DR. NESSLAGE: Exactly, yes, and that's my question.

DR. KLIBANSKY: I think so. You certainly can do that overall, like for overall catch. You know, right now, we have the discards and the catch combined, and I think that you can do that, and, if not, maybe in the newest version of openMSE you can do that.

DR. NESSLAGE: Cassidy is nodding her head, for those that can't see.

DR. BUCKEL: Okay. These are great suggestions for -- That's one of the action items, by the way, that we'll get to, is recommendations to the analysts, and so these are excellent. I think Jie was next, and then we'll get to Chris.

DR. CAO: I just want to get clarified on these figures, and my understanding is that you can -- So the F over FMSY, the FMSY are the estimates from the assessment methods, and is that correct?

DR. KLIBANSKY: Yes, and so the FMSYs are -- We had the operating model that is where the reference points are fixed, and so there is a true FMSY in this whole simulation process, and that is constant, but the Fs in this ratio is the F that is being estimated from each assessment, and so there is -- The FMSY is the true value of FMSY, and the F is the estimate that is coming out of a particular stock assessment or other approach in the model.

DR. CAO: Okay. I guess I have two, basically, suggestions. The first one is -- Because, if I understand this correctly, the interim management procedures are kind of, you know, conditional on the states of knowledge that are assumed in the assessment, which may not, you know, reflect the underlying truth, and so it will be interesting to see the consequence of misspecifying your assessment models. For example, if you have an incorrect assumption in the assessment model, how robust those management -- Like interim management procedures are to those model misspecifications. The second one is, for those long-term -- Like long assessment intervals, like five or ten years, I mean, perhaps it's going to be useful to have some trigger values, the values that trigger the reassessment of the stock, which just basically reduces the risk of overfishing.

DR. KLIBANSKY: Thanks for that, and so it sounds like your second point is, you know, kind of with reference to observing -- Maybe observing an index, so you have some sense where you are between assessments, but then reacting to different levels of increase or decrease to trigger when an assessment would be conducted, and is that kind of what you're talking about?

DR. CAO: Yes, something like that, and perhaps you can look at a direction of your index, and, for example, if it changes direction or if you can, for example, set a bounds of your projected abundance. If you go beyond the boundaries, you have like the 25 or 35 quantile of your projected abundance, and then you might just think about if you want to reassess them.

DR. KLIBANSKY: Yes, and so we had some discussion about that very thing recently, just about -- It's sort of a different -- I think a different way of using these monitoring indices, and we're kind of -- The interim approaches are kind of using that index to actually regularly adjust TACs, but, in that case, you might use it to just -- Not even necessarily adjust the TACs, but just to decide if you needed to do an assessment more quickly, or sooner or later, and so that's another, you know, type of management procedure that we could build and evaluate.

DR. BUCKEL: Any other questions from online folks? Chris.

DR. DUMAS: In these model runs, the operating model was assumed stationary, and is that right?

DR. KLIBANSKY: Yes, and, in a sense, the operating model kind of defines the -- You know, the true dynamics of the system, and so, I mean, there are cases -- I'm not sure if it's in any of the ones that I presented, but, you know, there are cases where you could have it -- We set it so that the operating model could actually vary through time, in a sense, and so one run that we did, that we didn't get into today, was to look at, you know, what happens if there is some kind of a change in the average level of recruitment in a population, and I know that's something that we've been concerned about for some of our populations, if perhaps there's a regime change going on, and so that's something that, you know, can be varied, but, yes, in the runs that we're looking at, it's stationary, and so we're observing -- Ideally, the model would be correctly identify MSY, or FMSY, every time. Certainly I think that's where we get into the kind of estimation model not quite matching the operating model.

DR. DUMAS: Right, and so the question of regime change was what I was getting at, and it seems that, in many of the recent SSC meetings, the question has come up of, you know, is there some underlying regime change going on, or is this data point just a small, random fluctuation around a constant regime, and so, you know, if the MSE could help us better identify when is a regime change occurring, that might be useful, and I guess is that equivalent to when is the operation model not stationary, and, if the operation model is not stationary, then a regime change is occurring, and then, with these different -- With these different methods that you're assessing, the Methods 1 through 9 that you've got in the slide that's showing now, these different methods, would one of these methods be better than another at identifying regime change, or identifying when the model is non-stationary, though you might do these same nine -- Run these same nine methods, but with a non-stationary model.

Like say something in the environment is causing the regime to change, and something in the environment is changing that is causing a regime change, and it's causing, you know, recruitment to slowly decline over time, for example, and there was a change in mean recruitment, and it's going down over time, and which of these nine methods would help us best detect that regime change, the fact that recruitment was going down over time?

Maybe have three different -- You know, run these nine methods on three different modeling OM cases, and, in one, OM is stationary, and you've done that here, and other would be the operating model is changing in an upper direction over time, and maybe the biomass, or recruitment, are increasing over time, and so the OM is non-stationary, and then the third would be recruitment and biomass are decreasing over time, and that would be non-stationary, on sort of the decreasing side, and then look at which of these nine methods would help us better detect those non-stationary cases. Then, if you detect a non-stationarity, then that might tell you that you need to do an assessment more frequently, as sort of the last questioner was talking about. Thanks.

DR. KLIBANSKY: Thanks for that. It's interesting, and, I mean, it's sort of a different way of looking at these, a different way of using an MSE approach, because we're not really looking at, you know, detecting changes in the -- You know, in the operating -- We're not really looking at detecting changes specifically, but that's something that we could do, for sure. I think that part of

my question about that would be figuring out what are the criteria that you use to identify regime change and identify when you really have -- You know, when you have a change, in let's say in the stock-recruitment relationship, that's consistent.

DR. BUCKEL: Okay. If there are no other questions in the room -- Marcel.

DR. REICHERT: Thank you. This is kind of a little bit of a different question, but did you guys have any thoughts about the assessment interval and maximum age of these assessed species, for instance short-lived species more frequent and longer-lived species less frequent, and how that potentially affects some of the uncertainty in the results? I mean, you guys chose the five and ten, and I'm just wondering if you guys thought about some of the other, potentially other, intervals.

DR. KLIBANSKY: That's a good question, and we didn't get into any other intervals. Certainly that could be something to look at. I don't know how much -- I am not sure how that would look, and I guess that would be an interesting thing to get into. I'm not really sure how that would kind of pan out, and my main question, at this point, about assessment interval is sort of logistical, in terms of, you know, what can we handle, and I think that there are sort of other things that happen when you have longer assessment intervals, which is just from a total operational standpoint, and it feels like it's harder to actually do assessments when you do them less frequently, because the data are --

You know, they haven't been looked at for a long time, or the person who generated the data for the last assessment isn't there anymore, and so that's sort of a deviation from what you asked, but I think there's really a lot of different things that we could look at with regard to judging assessment interval. The five and ten was kind of arbitrary, but, more specifically, it came from Huynh et al.'s paper, where they had also done five and ten. We started out, really, emulating what they did and then tried to match our assessments, as much as possible.

DR. BUCKEL: Marcel.

DR. REICHERT: Another quick question was on I think it's Slide 19, where you looked at the different scenarios, and I was wondering -- You looked at the scenario for decreasing, or the overestimation of the population, and you guys investigated an underestimation of the population, and did you think -- Because you said you had investigated it in a number of other scenarios, and I was wondering if one of the scenarios was an increasingly overestimating the population, and do you have any thoughts on that?

DR. KLIBANSKY: No, I don't think we did look into this, and I think that this particular idea, this Number 3, came out of, you know, wondering, if you were conducting -- If you were conducting a survey, and, you know, including habitat over time, where you were finding fewer fish, and so like I think the way the MARMAP and SERFS survey add stations -- You know, my sense is that they have the hotspots kind of dialed in, and we were just sort of imaging, well, what if you added more habitat over time, but it tended to be habitat with lower densities of fish, and what would that do, and then, yes, certainly the other way seems possible, but I think we were mostly thinking of surveys, and so we didn't see a situation where that would be likely, because, otherwise, it seems like the catchability of the surveys is really well controlled, and this is one of those things that you worry about in the night, you know, what if the changes in survey sampling universe could have some effect.

DR. REICHERT: Thank you.

DR. KLIBANSKY: Sure.

DR. BUCKEL: Are there other questions in the room or online? Seeing none, I think this is a good time for our mid-morning break, and so we'll break for fifteen minutes, and we'll see you back in here at 10:30.

DR. KLIBANSKY: Thanks, everybody.

(Whereupon, a recess was taken.)

DR. BUCKEL: All right. Back to the chairs, please. Now is the time for any public comment on this agenda item. Please raise your hands if you're online and you would like to comment on this. Seeing no hands, we're going to move on into the action items that are on the overview, but, before we get started, Erik Williams is going to give his thoughts and help guide us for these action items, and so please go ahead, Erik.

DR. WILLIAMS: Thanks, Jeff. I just wanted to help set the stage, hopefully, for your discussion and sort of the input that the Science Center wants, just to refresh everybody's memory why this is coming to you and why now, and so this is an initiative that the Science Center took on to start looking at ways, as Nikolai indicated, to increase the amount of assessment output or management advice that we can get to you guys in a timely way and as much as we can update in a rapid way, and so this is one of the tools we're looking at, and it's already sort of taking off in the Gulf, which is why we're doing it now in the South Atlantic.

With respect to that, what we're looking for, in terms of input from the SSC, is what -- We fully recognize that this analysis, as it stands now, is not going to give you all the answers, and it doesn't even come close, and, in fact, all the facts that people raised were spot-on, things that we have been talking about, things we might need to further investigate, and so what we're looking for is some input on what more can we do with this simulation, and what other simulations might we need to do, and what do we need to do, as a Science Center, to get you guys comfortable with pulling the trigger on these interim analyses, if it's warranted.

In other words, after looking at everything, does it look like we're going to get a bang for the buck, in terms of implementing these interim analyses and putting them into the system and providing the management advice that comes along with them, and so that's one of the questions sort of two you guys, to sort of keep thinking about that's where we're headed with this.

The train has left the station, a little bit, in the sense that, like I said, we've already started this analysis, and we're presenting it to you now, and the next step is actually we're going to conduct one of these analyses, index-based method, for vermilion snapper, and so you will see that in 2023, and that's on our books, on our plans to do, and so we are moving forward with this, and we just want to make sure that you guys -- That we're keeping up with you guys, or you guys are keeping up with us, whichever one it is, but I don't want to get -- I don't want the Science Center to get too far ahead of you all and make sure that we're incorporating your concerns, your issues, your

thoughts, any of that, and so that's hopefully setting the stage and letting you know what we're looking for, in terms of feedback from the Science Center, or for the Science Center, and so thanks.

DR. BUCKEL: Thank you, Erik. That's very helpful. Genny, did you have a comment to that?

DR. NESSLAGE: A question for Erik, if I may.

DR. BUCKEL: Yes.

DR. NESSLAGE: I hear you saying that one of the things that we need to focus on is assessment frequency and whether this approach can replace regularly-scheduled assessments, and I'm wondering if the second question, based on the structure of the MSE that's been done so far, is can we drop projections and just use constant TAC, which would be a major change from what the council normally sees, and your normal procedures, and is that actually on the table?

DR. WILLIAMS: I would think it's all on the table, honestly. I mean, this is -- In some sense, the initiative, or the idea, of wanting to explore interim analyses is the time issue with our current assessment schedule and how timely the advice is that's coming out of that right now for various species, and Spanish mackerel is a case in point, you know a ten-year-old assessment, and so we're trying to get away from that and get to a point where we are in a better, more reactive position, I guess is the better way to put it, in terms of how we're conducting assessments and providing management advice.

It becomes particularly important as we move into what is the beginnings of climate change that we're already, I think, starting to see some signs of some serious trends happening in our region already that, if we stick with the old SEDAR schedule type process, we're going to miss the boat, so to speak, on certain things that might be happening in the system.

I say that though in the sense that we do have enough indictors, such as -- You know, one of the more valuable things we get is fishermen's feedback, and they're telling us what's going on on the water, and that is critical, and that always affects, sometimes, our SEDAR schedule as well. You know, if they're seeing a stock disappearing, believe me, they let us know, and we often adjust the SEDAR schedule to accommodate that, but I think we need to be in a better system overall, because we now have a lot of these probes in the water, probes being our surveys and our port sampling, and we need to take advantage of those probes, in a more timely way, and a more efficient way, so that we are more reactive, and I think that's sort of the way I look at it.

DR. BUCKEL: Marcel.

DR. REICHERT: As a follow-up, Erik, do you see the role of the current stock assessments, whether you call it a research track or operational, and do you see that role change if this is ultimately fully implemented?

DR. WILLIAMS: I don't want to presuppose. I mean, it could or it couldn't. I think the answer is probably somewhere there in between, and I think we still -- There's a lot of benefits from a full-blown assessment, where we're putting all the data in, and we're running a full model and all of that, and there's certainly advantages to that. There's also advantages to just doing these interim analyses, where you're adjusting things based on indices of abundance.

I don't want to presuppose that, and I really want this to be an open discussion, an open idea, and, you know, here's an opportunity to maybe reconsider the whole management advice portfolio, is probably the way to think of it. You know, what is the best way to have science provide management advice, in a whole portfolio sense, and that includes the timing, and that includes all of those things.

DR. BUCKEL: Fred Serchuk.

DR. SERCHUK: I'm going to follow-up on Marcel, because I think we need to think a little bit more broadly, and I realize we have a process of benchmarks and operational assessments, and their timelines are generally about the same. If I were on the council, and that's a big if, and maybe I'm the wrong person to be on any council, I would like to know whether the management regulations that are in place are doing the job that is hoped to be done, and that also means that -- To follow-up on Erik, you know, some of the things that we might be looking at on a more timely basis are, you know, do we have the latest -- Can we have the latest recruitment index, and did the fishery meet its quota, and is the size of fish being landed any different, and so on and so forth.

Those are clues to how well the management system is working, irrespective of any sort of formal assessment. I don't know whether that information is currently being provided, but, if we assume that recruitment is X, and then we get a recruitment index that's twice X, or half X, that that may be something that one might want to consider relative to, okay, maybe our management regulations need to be revised, and I'm just wondering if that's another aspect that could be provided, either through the SSC or directly to the council, that would give us some idea of whether that assumptions that we made on recruitment, or the assumptions that were made on aspects of the fishery, are still holding up for the time period in which the TACs have been set. Thank you.

DR. BUCKEL: Thanks, Fred. Any other questions or comments for Erik? Okay. Next, we'll move into addressing the action items for this agenda item, and Judd has the action items up on the screen. The first is review, discuss, and provide feedback on the interim analysis strategy, and we've been doing that, and so, if folks want to provide some of those specific items that you brought up, we can get those documented here.

DR. CURTIS: Just as reference, you can see, on the right side on the screen, for those of you in the room, that's the overview and the questions that are in the overview, and on the left is Nikolai's presentation. People on the broadcast, you, obviously, can't see that screen, but those are the topics for consideration that Nikolai posed to the SSC, and there's some overlap and redundancy, certainly, but, just as a reference, that's where we're at.

DR. BUCKEL: Marcel.

DR. REICHERT: I have two. I think one of the hurdles is probably that you need a reliable index, and I know we have that for a number of species, but we may not have that for a number of other species, and so I think that's maybe a caveat in how you can apply the interim analysis. The other comment I had, and Erik and I talked a little bit about that, in terms of next steps in studying the effectiveness of interim analysis, the analysis that was presented was a forward-looking analysis, and, you know, it's easy to recommend that, and there's a lot of work involved, but it may be good to do a retrospective analysis, because we know what the index of a variety of species looks like.

If we would have done an interim analysis, at some point in the past, or a series of those interim analyses, how well would we have done, and so that may be something to consider, but, again, it's easy to recommend, and there's possibly a lot of work involved.

DR. BUCKEL: So maybe that would fall better under that last bullet of does the SSC have any advice for next steps in studying the effectiveness.

DR. REICHERT: Yes, and so to study the effectiveness of the interim analysis.

DR. BUCKEL: Yes.

DR. REICHERT: It's a slightly different approach. I addressed two different points, and one is the hurdles, and the other one is the last one, the effectiveness of the interim analysis. Sorry to jump back and forth.

DR. BUCKEL: So, Fred, you wanted that reliable index moved under --

DR. SCHARF: Yes, and I think that the lack of a reliable index would go under what hurdles might the SSC run across, and I think that's what Marcel was referring to, that if we don't have a reliable index.

DR. REICHERT: Then a related issue is it's a matter of how you use your resources, and how would additional indices of relative abundance, or absolute abundance, affect the uncertainty of the interim analysis, if we have only one, and I realize, again, if you have more, and they diverge, then you increase uncertainty, but, if you have more sources of information, that may actually help the interim analysis, in the long run.

DR. BUCKEL: Thanks, Marcel. Genny.

DR. NESSLAGE: Thanks, Jeff. Under the to-what-degree bullet, I think this is where my comment would go, if folks agree, and I think this analysis would support longer time periods between assessments, with or without interim analysis, frankly, but, before I would go there, I would want to see more implementation error, or any implementation error, scenarios, and so, at a bare minimum, that would really be critical for, I think, supporting the use of interim analyses and/or just simply having longer inter-assessment periods to reduce the workload, and, if that's possible, I would put that as the highest priority for if it's possible to do those and bring it back to us, and, personally, I would be --

If the results, particularly those for SSB relative to SSB MSY and F are as robust across all -- Or similar across all of the scenarios, after really kicking the tire on implementation error, then I think you would have a really strong argument, moving forward, for either increasing assessment intervals and/or switching assessments, especially updates to this interim analysis approach, for species that have good indices.

DR. BUCKEL: Go ahead, Fred.

DR. SCHARF: Sort of to that point, Genny, do you -- This may be a question, sort of a broader question, but also maybe a suggestion, but is there a potential for interim analyses to completely replace the need for projections?

DR. BUCKEL: Go ahead, Genny.

DR. NESSLAGE: I don't know, and maybe I'm misreading the results, but I think this analysis shows we should just get rid of projections and use constant TAC. It's an illusion that we have that much accuracy in our assessments and control over the process, the fishing process.

DR. BUCKEL: But, again, that's -- You would like to see how robust it is by having more implementation error, but, if that holds, yes. All right. Amy.

DR. SCHUELLER: I mean, I agree that we definitely need to kick the tires on this with the implementation error. I'm not sure that I'm 100 percent onboard with the projection statement, because, if you look at some of the figures, it kind of depends on the species, and so I think -- Like, for example, I'm on Slide 28, and vermilion snapper F over FMSY is maybe closest to one, at least in the years 2020 to 2025, under that Projection 10, and so, when I keep looking this, my thing that I see is there's no one option that seems to perform best across all species, and so I'm a bit concerned that we need to like kick the tires on this for every species individually before we end up picking which one we would use for that species, and so, I mean, some of these, you know, SCA 1 does the best, but maybe that's not like the best choice, because we're not going to be doing it every single year, right, where others, like vermilion, that green line looks the best right now.

I guess it also depends on what is the best, and so I'm -- A couple of recommendations. I think we need to kick the tires on the implementation error a lot more. Two, if we're going to implement this for different species, I think we probably need to look at it for each species before we make a decision. Three, we have to figure out what we think is best, and then sort of apply that across-the-board, and I don't know that I have a recommendation for what I think is best. Right now, in my mind, F over FMSY should be close to one, but there might be other things that we need to consider.

DR. BUCKEL: Thanks, Amy. Folks that have made these comments, please check Judd's text and make sure your comments are captured there. Fred.

DR. SCHARF: I should have asked this before we went to break, and so it can be maybe addressed by Nikolai or Erik or center staff a little bit, and, Judd, I don't know, and can you go back, on Nikolai's presentation, to -- I think it's page 21 that I'm looking at, the simulated indices of abundance, and so it occurred to me -- You know, so the end result, right, when you looked at all of these alternative scenarios, and you looked at the nine approaches, ones that didn't implement any interim analyses and ones that did, and the results were basically pretty similar across those, and then I --

The first question that came to mind, to me, was, well, is that mainly due to the fact that your simulated indices are flat, right, and so you have -- Other than a little bit of a bump in black sea bass, the simulated indices of abundance, which is the trigger for the interim analyses, moving forward, are really flat, much flatter than the retrospective period, and so I just wondered if the result that you got, in terms of the lack of differences between what the interim analysis would

have done, in terms of maybe, you know, short-term changes in landings, or yield, or changes in stock status, were constrained a bit by the fact that the simulated indices of abundance were really flat, moving forward into the future and whether or not that -- I know one of the alternative scenarios that Nikolai mentioned was one where you have a high CV, and so I wonder if that alternative scenario captured more variability in the index and you still didn't really see an effect of the interim analyses.

I just wonder -- I just wonder, broadly, right, before we make conclusions that, well, it doesn't really matter, right, and the interim analysis doesn't really seem to make any changes, and is there something, because of the abundance indices being really flat, and that's what we're using as the trigger, right, is the abundance index, and so, if there's no change in that, why would we expect the interim analysis to do anything different than just stock assessments every three, five, or ten years, right, and so I don't know if the staff might comment on that, for a second, just to -- I just want to understand, sort of broadly, maybe why you think there was no difference between interim assessments and not having them.

DR. BUCKEL: Cassidy.

DR. PETERSON: I'm sure that Nikolai can hit on this too, but the median line is just that. It's a median, and that whole shaded interval is more representative of the range of simulated indices, and so there was more variability, and, similarly, the results presented, they are medians, and so the individual results will look a lot different if you look at one iteration at a time and if you look at different operating model scenarios.

DR. BUCKEL: Thanks, Cassidy. Nikolai, did you want to add anything further?

DR. KLIBANSKY: I was going to basically say that, that certainly the individual runs do bounce around a lot, and I do think that that -- The fact that we're looking largely at medians is one of the tricks to interpreting these results, because I think that is -- You know, it washes out certain differences, but, at the same time, it just kind of gets down to the question of like what part of the response do you look at, and so we can look at other quantiles, and I know Fred loves to look at different quantiles of distributions.

I mean, seriously, here we're looking at medians, but you might think about looking at like, you know, something really risk-averse, like looking at how frequently do you have populations that are really in trouble, or crashing, or something like that, and you might not just want to react to the median, and that was kind of where we -- There's just so much data and results that you generate that you, at some point, have to just make certain decisions to condense things, but, yes, there's definitely a trick there, when you are looking at medians, and, kind of as Cassidy was saying, more concisely, individual runs really are varying a lot, and so it's just the median that is sort of smoothing things out.

DR. BUCKEL: Thank you, Nikolai. Okay, and so we've got some text. Go ahead, Chris.

DR. DUMAS: I wanted to go back to the stationarity thing, and so my understanding is these nine management procedures were compared assuming that operating model was stationary, which I'm interpreting as meaning no regime change is occurring, and a stationary model means no -- A stationary operating model means no regime change, and so, if that's true -- If I'm right in my

understanding, then that means we're comparing these nine management procedures assuming no regime change, and we're comparing the management procedure saying which -- Is that correct?

DR. KLIBANSKY: Yes, that's right, and so it's all of the life history information in the operating model is static, and so, you know, growth isn't changing, and natural mortality at-age isn't changing, and the stock-recruit relationship isn't changing, and all of that is fixed through time.

DR. DUMAS: Right, and I think it was good to do that, and that was the right place to start, but I'm interested in knowing how the nine management procedures compare when you do have regime change, when there's non-stationarity occurring, and does any of the nine management procedures help you to identify that regime change, or rule out regime change, better than the other of the nine management procedures, and so, even though the nine management procedures, in many cases in the analysis that you just did, seem to have produced similar results, I wonder if the nine management procedures would continue to produce similar results in situations with a regime change, when you've got non-stationarity in your operating model.

It seems like a lot of the applied questions that we have faced on the SSC, in the last several years, have involved sort of, quote, unquote, outlier data points and whether those -- Often, an outlier data point that was sort of the most recent observation was an outlier and whether that most recent observation, outlier, was an indication of regime change or not, or whether it was just part of the random variability in a stationary situation without regime change, and so being able to identify, you know, when is regime change occurring, and when not, I think would help us with knowing how to advise management, and it might be the case that one of these nine management procedures could help us identify regime change better than the other nine management procedures, and so I think that would be really interesting to look at.

What I would ask for, from a modeling perspective, is look at a few situations with a non-stationary operating model and compare these nine management approaches when the operating model is non-stationary and see if they continue to produce similar results or not. Thanks.

DR. BUCKEL: Thanks, Chris. Judd was typing, and if you could check. Are there other comments to the questions on the screen?

DR. DUMAS: Judd, I would say how can MSE/IA approaches use non-stationary operating models to compare the MPs against each other, the management procedures, or how do the MPs compare when you use non-stationary operating models?

DR. CURTIS: Does that capture it?

DR. BUCKEL: Okay. We skipped over can interim analysis be a tool to improve management during the interval between assessments, and, if yes, how should it be implemented, and it sounds like, based on what we have below, is that we're not quite ready to -- We're encouraged, but we're not quite ready to say yes, because we want to see some other model runs where there is implementation error added to the operating model, to see if the results -- If the nine different management procedures are still similar. Genny.

DR. NESSLAGE: I think it would -- If it's possible to go back to Amy's question, or perhaps suggestion, that we try to mimic our actual management procedure a little more closely than just

catch at -- Whatever the TAC would be at MSY, and that would be -- Include the buffer, and I think that would be -- In some way, and I'm not sure how flexible the tool is, but that would boost our confidence, I think.

DR. BUCKEL: Go ahead and finish typing that, Judd, and we'll maybe move that to does the SSC have any advice for next steps, and so I see the implementation error that Genny and Amy were talking about, and so what Chris recommended is one form of that, right, the non-stationary operating model, and are there other -- Maybe I'm wrong there, but I just wanted to know if you wanted to provide some specifics on the operating model, or the implementation error. Genny.

DR. NESSLAGE: Thank you, Jeff. I would -- I, specifically, would like to see something, like I mentioned before, about how we don't seem to have control over discard mortality as our -- Being our biggest challenge in the South Atlantic.

DR. BUCKEL: Thank you. Genny.

DR. NESSLAGE: Sorry, and I'm looking back at my notes, and is it possible, as well, to do some sort of -- To mimic what Jie was suggesting, I think, earlier about triggering assessment frequency based on the index, rather than have a regular frequency forced in the MSE tool, and is that doable within the modeling framework there?

DR. PETERSON: That's something that we could talk to Tom Carruthers and his team about at 1:30, but I think that would be tricky to implement right now, but I think there's a way to do it. I think we could build a wrapper, but I wouldn't take my word for it just now, and I would wait for Tom.

DR. BUCKEL: Genny.

DR. NESSLAGE: Just to follow up that, I think that might help the tension that Amy and I are having about assessment frequency, and so that if, for an individual species, it's not panning out, and the index is indicating that the longer assessment intervals are not helpful, or they are not helping us to manage the stock better, and, in fact, it's making it worse, then that might trigger more frequent assessments for some stocks and the other ones you can let ride.

DR. BUCKEL: Thanks, Genny. Amy.

DR. SCHUELLER: So, underneath that attempt to mimic actual management procedures, I guess my question is, if we do that, and there are some species in which we're still not comporting with Magnuson-Stevens, hence F over FMSY, I guess I don't have a really specific recommendation, other than like I want to know what it would take to comport with Magnuson-Stevens, and so, if we run what we currently do with the P*, and then we're still above it, and then --

I mean, that's going to be part of the exploration that the team would have to do, and like do we halve the catch, and will that get us there, three-quarters of it, and, you know, at what point -- How far do we have to go to actually get it to comport with what the law is requiring us to do? I think that's a big question, in my mind, because it's -- I mean, we run all this, and, if we're not getting numbers that come out according to what we need to do with the law, then it's not super useful.

DR. BUCKEL: Thanks, Amy. Cassidy.

DR. PETERSON: Amy, do you have like any kind of percentage in mind, or way to measure that? Are you saying no overfishing over the fifty-year projection period allowed, or is it like a 10 percent thing or how -- Just so we know how to measure it appropriately in our performance metrics as we move forward.

DR. SCHUELLER: I mean, that's a good question, because in some scenarios you're meeting it, and in some you're not, and, I mean, right now, this is the median, and so, 50 percent of the time, we're above, and, 50 percent of the time, we're below. I don't know. I mean, that's kind of a management question, right, and not a science question, but I would -- My gut is 50/50 is fine with me. I mean, I would like to see what it would take to even get to the 50/50, and then we can talk about it after that, because, if we're not getting to the 50/50 mark with some of these options for certain species, then what do we actually have to do?

DR. BUCKEL: How are we doing, Judd, with addressing our action items? If you want to maybe start at the top, and I feel like that first one is -- We're hitting on those as we hit the bullets below. Fred, go ahead.

DR. SERCHUK: Thank you, Chair. I want to bring up a subject that I know we've discussed before relative to how well the modeling works, and that is we've struggled, over the past, in terms of what recruitment to use in the projections, particularly when we have a stock-recruitment relationship that is embedded in the operating model, and we've been back and forth on this. In some cases, we believe that recent points don't comport with the stock-recruitment relationship, and, in other cases, we can detect no difference, but the how we project -- How we think about recruitment is really important and relative to the time between assessments and our ability to, one, either project what we think is the most reliable recruitment estimate, for however long the time will be between assessments, and so my feeling is that we need to pay really close attention to it, and I know we've struggled over this on the committee, in terms of, you know, do we use a recent mean, or do we use a stock-recruitment relationship, and so on and so forth.

Perhaps some of the retrospective analysis will help on this, but I think that's still a question that we have to deal with when we're talking about changing the time between assessments, and, of course, if we can look at a reliable index of recruitment during the time in which we have set recruitment, to see if there's any difference, that will be helpful, but I think that's going to be an important consideration, no matter what we do. Thank you.

DR. BUCKEL: Fred, to that point, are you -- I am trying to think, and are you bringing this up in terms of that these would be recruitment -- That we could somehow monitor recruitment in between assessments, and I know, for many of our species, we don't have recruitment indices, and folks can correct me if I'm wrong, but I just wanted to make sure I'm following your point, and is this comment specific to species where we would have -- In between assessments, we would have some recruitment index from some index of abundance?

DR. SERCHUK: Yes.

DR. BUCKEL: I think -- I don't think there is -- I am trying to think if we have any that we have an index of recruitment. Unfortunately, Fred, for most of these species, the recruitment that we

get is from the assessment, and the trap-video is larger animals, and we don't have anything that assesses age-zeroes or age-ones, except for, I guess, Spanish mackerel, the age-zero. There's Spanish mackerel, and there may be a few others, but, the bulk of them, we don't have a recruitment index from fishery-independent surveys.

DR. SERCHUK: Well, that might be a research recommendation, and maybe that's impossible, but my feeling is, if you're going to extend the time between assessments, and we were asked what was the most important thing you could do, and, to me, it would be to get a reliable index of recruitment, because, if you assume something, going forward, let's say for five years between the next assessment, or, actually, more than that, because, generally, it's two years before we -- There's a data lag, and you have to assume -- If you do Assessment X, you have to assume the interim years may be a couple of years before that, and then you go to a five or ten-year rebuilding period, and I think recruitment -- It may be impossible, and so I'm not trying to ask for something that cannot be done, but it seems to me that, if you're going to talk about longer periods between assessments, it's really important to have some idea of, whatever assumptions went into the recruitment, are they being born out.

DR. BUCKEL: Thanks, Fred, and Dr. Bubley has got some research going on that hopefully will have some recruitment indices in the near future, or methods to use for that. Genny.

DR. NESSLAGE: Perhaps Nikolai and Cassidy can correct me if I'm wrong, but I believe there's quite a bit of recruitment variability already built into the simulation tool, and so these results should reflect the ability of these alternative approaches to handle our uncertainty about how much recruitment variability is coming into the system, but -- I also -- I personally am rarely supportive of generating indices of real recruitment, young recruitment, and it has not panned out as being useful in assessments, world-wide, and so I feel like it's a ship that just never sails.

DR. SERCHUK: I guess it depends on what part of the country you come from, Genny.

DR. KLIBANSKY: Just to chime-in, recruitment is in these models, and it's based on what was in the stock assessments. They basically generate recruitment from the stock-recruit relationship, recruitment deviations observed in assessments, and, also, the recruitment deviations are corelated based on estimates of temporal autocorrelation from the assessments.

DR. BUCKEL: Thanks, Nikolai. Okay. Judd, if you can scroll back to the top, we have that -- Fred has got a comment.

DR. SCHARF: Just going back to the first question about how this interim analysis should be implemented, just thinking about what's being done in the Gulf of Mexico and what we can use to inform an interim analysis, are we -- I think Fred Serchuk mentioned some other metrics a little bit earlier, but are we just thinking about using a fishery -- Are we restricted to just using a fishery-independent index for the interim analysis, in terms of -- You know, the analysis that Nikolai presented to us just focused on an abundance index, but there are -- You know, there's other data from those indices that we can use, in terms of like the size and age composition within the survey themselves, right, that would indicate maybe changes in the stock, in terms of stock demographics.

There could be changes in the size and age composition in the fishery-dependent data, and are we -- In terms of how an interim analysis is implemented, and what data is used to inform and trigger

the analysis, are we just -- Should we look just beyond an index of abundance, is my question, and are there other things, in terms of size and age composition within the survey, or the catch, and Fred mentioned like how quickly the industry was hitting quotas, other things that might indicate a change in stocks, in terms of stock abundance, or changes in stock composition, or are we just going to focus on an index of abundance?

DR. BUCKEL: Wally.

DR. BUBLEY: I like that thought process with it, because we are looking just at the index, but one of the drawbacks that Nikolai was talking about was still having a lag between getting data, and so, if we're having to get the catch data and produce an index of abundance, we have a lag that it might not even make it to the next year, and it might be the year after, and length-frequency-type information would be almost instantaneous. We have that available as the fish are coming up, in some cases right then, and, in other cases, we have to actually enter the data, but it's not that long of a lag, and so that might be something to explore that would expediate the process.

DR. SCHARF: Just to follow-up, I mean, I was also thinking too about things like changes in distribution, right, within the survey, and so how might that inform an interim analysis, because that's something that we've heard come up with some of the stocks recently, right, where we're seeing maybe shifts in their distribution spatially, within the survey boundaries, and maybe even potentially outside of our survey boundaries, and so is that information that -- Is that the kind of information we can use to conduct and inform the interim analysis? I don't know.

DR. BUCKEL: Amy.

DR. SCHUELLER: I think, to answer the question of can it be used -- I think everybody around the table is thinking yes, but we need to kick the tires some more. I think the SSC could probably make the statement that, yes, this will be useful, and here's the things we would like to see, and it may or may not be species-dependent. I mean, I think we can make a statement. I mean, I guess, everybody speak up if you don't agree with that statement, but I think that the overall -- What I'm sensing around the table is this is a useful tool. It probably will be able to be used in the future, and we need to look at a few more things and then consider it on a species basis, if the results keep playing out similarly to what we've seen so far.

DR. BUCKEL: Well said, Amy. Thank you. Maybe one other thing to add to the list, and this is something that Erik mentioned, that the fishing -- That the folks on the water have provided information that like things are heading south, or maybe things are better than the assessment shows, and so the feedback from the advisory groups, maybe, is one way to add that in for other elements. Chris.

DR. DUMAS: Do we track, or keep a database, of that information that's coming in from advisory groups from fishermen on the water, for example, because, if we don't, we should, and then we could do a retrospective analysis on that and see how well that does, in terms of predicting, or projecting, what it might do, and it might do well, or it might do well on its own, or it might do well in conjunction with other data streams that we look at, and having a more formal method to use to analyze the advice that's coming in off the water might help us understand how best to use that advice to improve what we do. Thanks.

DR. BUCKEL: Thanks, Chris. Good idea. Judd, is that captured in any database?

DR. CURTIS: Yes, and that's typically captured, and correct me if I'm wrong, either Mike or Chip, but with the fishery performance reports, and like you kind of have a record of what is discussed at the APs, what they're seeing on the water, and so those are captured in those reports, and that's something that then could be used in this IA approach.

DR. BUCKEL: All right. How are we looking, Judd?

DR. CURTIS: I think we're good, if you want to come up with more of a blanket statement, just with that first bullet point, and Amy started kind of hashing it out, and, if that's where you want to stand right now, we can always go back and edit towards the end, if you want to think about it more as well.

DR. BUCKEL: I feel like the first bullet is everything that we below, and so maybe, at some point, we could have a summary paragraph there, but I think -- Let's see. How would the interim analysis strategy integrate with the proposed ABC Control Rule? We did not address that one, and does anybody want to summarize the proposed ABC Control Rule? I don't know if -- Who wrote this one, and that may help guide.

DR. CURTIS: Nikolai, this question came from some of the previous questions from the April assessment, and so maybe you can elaborate a little bit more on what you're looking for with this question.

DR. KLIBANSKY: Yes, and I'm not sure about this exact phrasing, but I was trying to understand how -- You know, right now, in the simulations, we have interim analysis estimates a TAC, and then that TAC just automatically gets put into place the next year, and, granted, that's an oversimplification, but my main question, with that, is like what does a realistic, you know, management procedure look like in terms of like how closely can we expect those TACs to be to -- Or the actual TACs implemented, and how close can we expect them to be to what the interim procedure suggests, and how quickly can they actually be put into place?

One thing that we started to wonder about, as sort of we're gaming this out, is, you know, what happens if, you know, between -- It seems like if, between assessments, we have a fixed TAC, and then the interim approach suggests that, hey, the index is looking really good, and we're going to increase the TAC, that seems, you know, somewhat more likely to go into place quickly, versus if the index is saying, woah, things look really bad, and you need to cut the TAC next year, January 1, and so, if there is variation in the way that the management is actually applied, depending on what the index says, then that kind of information needs to be put into the management procedure and the simulation, in order to get a good idea of how it will function. Does that make sense?

DR. BUCKEL: Yes, Nikolai, and Judd has added to the question there, if you want to -- Can you see the --

DR. KLIBANSKY: Yes, and particularly the part where we're figuring out how close -- I think people have talked about this a bit, you know, in terms of messing with the implementation procedure, and how do we expect the TACs to actually be set relative to what's recommended by the interim approaches, and particularly if there's a bias.

DR. BUCKEL: You said particularly if there's a bias, and is that --

DR. KLIBANSKY: Yes, because, you know, if it's just sort of a little bit over or a little bit under, when you look at the average over time, it's probably not going to show much, but, if there's some tendency to let's say not set more conservative TACs, when an index suggests that the population has decreased in size, then that's going to affect, likely affect, the performance of that management procedure.

DR. BUCKEL: Thanks, Nikolai. Chip.

DR. COLLIER: If you guys remember, in the development of the control rule that's going through the amendment phase right now, that is being developed, there is a risk level that the SSC sets, and so if, going forward, they are seeing that the stock is potentially in decline, you guys might reconsider the risk level that has been set for that species, and, therefore, that would adjust the catch level, and this is something that several other councils do, and they will look at some of these indices of abundance and just see how well it's performing.

If it's performing very well, it might be setting the ACL equal to the ABC. If it's not going as well, they might decrease the ACL, but this one would be slightly different, and you guys would be maybe considering changing the ABC based on some of these index values, and so it could be done in two different spots, either the ACL or the ABC, and we just need to figure out the best way to do it. This is a new approach, and so we don't have all the answers yet, but we can work on it, and, over time, hopefully get to the best answer.

DR. BUCKEL: Marcel.

DR. REICHERT: I assume this means that, after an interim analysis, the SSC is still going to be asked to provide an ABC or an updated ABC. The answer was yes, because I also can see a procedure where, you know, the SSC provided an ABC, and then, based on an interim analysis, there is a procedure in place that basically a TAC rolls out of that analysis, but it still comes back to the SSC to provide an updated ABC, is my understanding right now. Okay. Thanks.

DR. BUCKEL: I guess that's something that could be rolled into the ABC Control Rule, that automatic, but -- We just did this with yellowtail snapper. We got the interim analysis and set ABC based on that, and we had questions that there were missing data, right, that we said it sure would be nice to see the updated indices of abundance, et cetera, and so we have those listed above now, and so that's good. All right. I understand that bullet better now, Chip. Thank you, and thanks, Nikolai, for your input on it, and so Judd is typing furiously to get comments in there. Are folks happy with that text? Mike.

DR. SCHMIDTKE: Sorry, but just a slight wording clarification. In the new ABC Control Rule, the risk level would technically be set by the council. The SSC would recommend a risk level to the council, but, ultimately, that risk level would be coming from -- This is assuming they do their preferred alternative that they have right now, but it would be coming from the combination of biomass information and the stock risk rating, and so the SSC might recommend some, you know, alteration of the stock risk rating based on concerning changes, or they might recognize that there is a different biomass, relative biomass, level that is happening for that stock, based on the interim

analysis, but that would ultimately need to go to the council, and then they would have to make the decision to change the risk level.

DR. BUCKEL: Thanks, Mike. Okay, and so next bullet is to what degree can or should interim analysis replace current stock assessments or reduce the frequency of full stock assessments, and you can see the language that we have there now. Genny.

DR. NESSLAGE: I think you could get rid of the questions, and that's just restating the question, that first blue bullet there, and then the details about implementation error -- Did they end up above, our suggestions for what we would want to see for implementation error? Did that get captured?

DR. CURTIS: I think some of it was captured above, but if you want to restate it there, at that point, that would probably be helpful.

DR. NESSLAGE: Yes, I would agree.

DR. BUCKEL: I think, if you scroll back up, Judd, we can find where it is, and you can just copy-and-paste. I thought we had it written down.

DR. CURTIS: Genny, was it captured up there, or do you want to add more specific details down below here, in this bullet?

DR. NESSLAGE: I didn't see it.

DR. BUCKEL: Yes, I didn't either, and so --

DR. NESSLAGE: I think we need to add it, if you could, please, and so if you could add something about exploring implementation error with regard to our inability to control discards, however you can manage to make that approximate our problem in the South Atlantic, and I'll leave that to the analysts, and I'm sure they can do a good job of that, but no implementation error I think is -- Is a problem for us to make a decision off of at this point, as far as how supportive we would be, but a little bit of an exploration of that would be really helpful.

DR. BUCKEL: Genny.

DR. NESSLAGE: To the next point, I'm not sure that I agree with Amy, in that I think it would be fabulous if we could do an MSE like this for all our species, but I guess I would look to the Center to ask how feasible that is and, in other words, I think what Amy was suggesting was that, before we pull the trigger on increasing assessment frequency and/or using these interim analyses for all of our species, we would want to do this for the big ones that have assessments, right, and I don't know if that's feasible, frankly, and, if that's not feasible, then do we need to suggest maybe adding one or two more species to this docket that would cover the full breadth of the issues and live histories and good and bad abundance indices that we think we have on our plate, to see how robust this approach is.

DR. BUCKEL: Amy, since that was to you, I will let you go first.

DR. SCHUELLER: I agree with you. I mean, it's not super realistic. The reason I'm making that statement is I'm concerned, because a couple of these species do behave similarly, but then two of them do not, and so we're at a 50/50 chance of doing a good job or not, potentially, based on which one we choose, and that's a big concerning. I don't feel comfortable with that at this point, and so I think your recommendation is fine, to pick a few more species to consider, and I understand that we're not going to do that, but I just want there to be some recognition of the fact that this may not work the way we expect it to for every single species, given the results that we've seen, and how comfortable are we with that, and then what happens when it doesn't work and suddenly we do a full-blown assessment and the council is like, you know, basically freaking out, because this hasn't been working, and there's like -- You know, we're in a bad spot.

I mean, that's a risk. I mean, we just have to state that as that is a risk, and this balance out all kinds of things, right, like time and resources of the Center, time and resources of the council, but, also, the resource itself and the risks associated with that. There's no win option here, right, and it's sort of we do the best we can, and it is what it is, but it is a risk, and so that's basically why I brought up the comment, and I think we're on the same page. I just want to make sure that everybody understands that, if it isn't working for a species, then we could be in a bad spot, potentially.

DR. BUCKEL: Thanks, Amy. I have Fred and then Marcel.

DR. SCHARF: I was just, you know, agreeing with that comment that maybe we could have a statement, under the last bullet, for advice for next steps, and I was thinking about asking the Center, as they do more sort of simulation analyses, if, you know -- That maybe there's a way that they can identify traits that would makes some species more amenable to this and other species not, and it could be related to life history, and it could be related to just abundance history, and it could be related to, you know, how frequently the fleet behavior might change, and it could be lots of things, right, that could indicate whether this would be successful or not, and so maybe we could have a set of guidelines to say, hey, it's likely to be pretty effective for a species that has these traits, versus one that has these.

DR. BUCKEL: Marcel.

DR. REICHERT: Fred made my point. I agree with Genny and Amy, and I think that, in particular, the life history may be an important factor, as Genny mentioned, in particular maximum age, longevity. Those species may react differently than short-lived species or, for instance, a species like gag, where they have a very specific estuarine-dependent life stage, and so I think it would be good to look at that too if we're going to expand the simulations, and so thanks.

DR. BUCKEL: Thank you. I don't see any other hands up, and I wanted to go back up to implementation error, and so Genny mentioned one, which was discards. Are there other implementation error suggestions that we want to provide to the analysts, because that was a big -- I have it with exclamation marks, that that's something that -- The implementation error has been mentioned by several folks in addition to Genny's discards. Marcel.

DR. REICHERT: Maybe recreational effort. I am looking around the room, whether people agree with that or not, but --

DR. BUCKEL: Genny.

DR. NESSLAGE: Is that related to discards, or you're thinking more broadly?

DR. REICHERT: No, sorry, and I'm thinking more broadly. I mean, obviously, there is a relationship with discards.

DR. BUCKEL: Nikolai and Cassidy, do you have any input there? Are there some thoughts by your group, where you were thinking about, if we did kick this, these are some of the implementation errors that we would add?

DR. KLIBANSKY: I mean, it's an interesting process, because, in some regard, it's a little bit -- It's very helpful to get suggestions from you all, because we can program anything, you know, and, I mean, that sounds really cocky, but we can simulation anything, effectively, right, and the important thing is, if we're simulating something, that there's some expectations, from people who have a closer relationship with how the management, you know, actually goes from the assessment phase to the fishery to have an idea of how they might see the implementation being imperfect.

You know, my sense is that the implementation would tend to be, you know, biased toward higher TACs, and so my -- If I were to pick something, I would be sort of trending in that direction. This suggestion of, you know, trying to impose some kind of a bias maybe in the -- Or implementation error with regard to an inability to control discards, that's a really helpful, specific suggestion, and so I guess I could pose a question, and do you think that it's reasonable to look at simulations where TACs are biased in a particular direction? I don't want to make too many assumptions, and so that's why it's helpful to get feedback from you all.

DR. BUCKEL: Nobody is jumping to raise their hand here, Nikolai.

DR. KLIBANSKY: Okay.

DR. BUCKEL: Genny.

DR. NESSLAGE: To a different point, if that's all right?

DR. BUCKEL: Definitely.

DR. NESSLAGE: Thanks, and so, if I understand correctly, in all of these simulations so far, the management is implemented one year after the interim analysis is conducted, and is that correct, year-plus-one? I'm looking at Slide 18.

DR. KLIBANSKY: That's right.

DR. NESSLAGE: Okay. Thanks, Nikolai. How realistic is that, and I'm looking to like the Gulf, where this is being used more, and do they really just instantly jump on this, or is it more like our normal assessment process, where there is longer than a one-year delay in some of our -- Especially if the answer isn't good. That would be area for altering the number of years in which the management would be implemented.

DR. KLIBANSKY: I think that's kind of -- What is it, the $64,000 question, and I think that's an important question, but I don't know what the answer is.

DR. COLLIER: There is several different procedures for the council to implement catch level recommendations, and, depending on the severity of the change, it would likely impact which level of basically amendment would be used, and so, if you're talking about a 50 percent reduction, it's probably not going to go in fast, because they're having to change not only the catch, the season, the bag limits, the commercial catch limits, and so it really depends. I mean, if it's a 5 percent change in the ACL, or the ABC, that's probably not a big deal, and they're not going to change much management, and they could get that done very quickly, and so it's probably nuanced, and Myra is coming up, because she doesn't like my answer.

DR. BUCKEL: Myra.

MS. BROUWER: That is not true. That was a fine answer, but I was just going to add to it, and so, in the Snapper Grouper FMP, the council does have a procedure called an abbreviated framework procedure that is only utilized when there is only a catch level adjustment that needs to be done, and that can be done in a year, and so that is realistic, if it's just for snapper grouper and it's just to adjust catch levels and nothing else.

DR. BUCKEL: Thanks, Myra. That's helpful. Genny.

DR. NESSLAGE: So it's there, but would it be used, and so it is possible for the council to respond that quickly, which is awesome, but, in reality, would it? Like Chip was saying, if the change is huge, it might be much more slowed down, and so I, personally, if it's possible, would love to see a longer Y-plus two or three, or go farther, and go crazy. Go four, or go five, and how bad would it be if you delayed that long?

DR. BUCKEL: Right, because then you may start seeing that species-specific differences with the different short versus long life histories, and that may also push for the abbreviated -- For using the abbreviated approach more often, if that's -- So that is a recommendation to the analysts. Thanks, Genny.

DR. KLIBANSKY: Can I ask a follow-up question?

DR. BUCKEL: Yes, Nikolai.

DR. KLIBANSKY: Given that, and given comments that we just heard from Chip and Myra, it sounds like the implementation of the TAC from an interim analysis could be dependent on, you know, how big that change is, and, if that's true, and we're trying to figure out what the implementation process is going to look like, then it sounds like it may actually be, the larger the change, the less likely it is to go into effect quickly, which would be an important dynamic to put into the implementation simulation part.

I mean, we can look at multiple things, and it does -- You know, I will just note one thing about this whole simulation process. You can look at a lot of things, but you end up with what seems like a dream, or sort of a nightmare, and you have so much data to sift through and so it's really worth like figuring out exactly what we want to look at.

DR. BUCKEL: Fred Serchuk.

DR. SERCHUK: If we used an interim analysis to recommend a change in a management action, a procedure, or quota, or something of that sort, how many years forward would we provide that information? Would it be just for the next year, until the next assessment, until the next piece of data comes in? Have we thought about how long we would recommend a change, based on an interim analysis? Would it be a one-year projection, or two years forward, or until the next -- I think we need to think about that. Thank you.

DR. BUCKEL: Thank you. Good question. Others that are on the team, have they thought about that, or if anybody wants to provide information on what's happening in the Gulf related to this timing. If the TAC is changed, because of some interim analysis, how long is that new TAC in place? Chip.

DR. COLLIER: I mean, that would really be up to the SSC, based on their recommendations. The way that it's typically set up in the South Atlantic region is a TAC is set up, or the ABCs and ACLs are set up based on the timeframe that you give, and then, going forward from that last time period, it's set in place until modified again, and so it would really depend on what the SSC recommends, and then we would try to get you the analysis back at the end of that projected time period.

DR. BUCKEL: So this is back to Nikolai's point about all the different things they can do, and so, in this case, they gave the five and the ten-year, so we could see the impacts of having assessments happening more frequently, and is there something else we want on that, or do we want that continued, so we can -- For the next MSE analysis that we see? Genny.

DR. NESSLAGE: We were already seeing differences at between five and ten-year in this analysis, and so I guess I'm comfortable with the range, unless Fred, or someone else, is thinking of a different timeframe, but five and ten seems to be pretty common in the literature for this as well.

DR. BUCKEL: Thanks, Genny. Marcel.

DR. REICHERT: I just want to mention, in the past, if I remember correctly, we have recommended new stock assessments in the range of three to five, and so I would caution against five to ten. I think, for an interim analysis, that may be a little long. Someone mentioned earlier that there may be triggers that we see in the reports, or in the results of the interim analysis, or even in the results of the previous stock assessment, that may change our minds, in terms of that interval, and the other thing, and that's a more practical consideration, is, obviously, the workload of the Science Center and what they are able to actually provide us, and so I think even five years, for an interim analysis, may be a little long, for certain species, and that goes back to the life history, especially certain short-lived species, and five years may be a little short, and that's just my concern. Thanks.

DR. BUCKEL: I think, and Nikolai or Cassidy can correct me if I'm wrong, but I think the five and the ten were assessment and not interim analysis, and, Genny, you were speaking to stock assessments, five to ten, and is that -- Not interim analyses.

DR. KLIBANSKY: Jeff, just to clarify frequency of, you know, events and the simulations, the assessments, and all of those management procedures, whether they have interim procedures conducted in between or not, assessments were conducted every five and ten years, full assessments, and then the difference is that, for the interim management procedures, those interim adjustments were computed every year between assessments and put into place the next year for all years between assessments, and so also getting back to, you know, kind of responding to what Fred Serchuk was saying before.

In the current simulations, you're generating a new TAC from those interim procedures every year for each one of those stocks, and that TAC is going into place the next year, but just for that year, and then you use the next year's index value to adjust the TAC again, and so it's adjusting the TACs, maybe by small amounts, just depending on the way that you, you know, program the interim adjustment, but it's computing it, and you're simulating the whole process of doing that and, I guess, getting approval from the SSC and putting in place, into management, every year between assessments, and that's what the interim MPs that are simulated are saying.

DR. BUCKEL: Thanks, Nikolai. Marcel, to that point, and then I have Fred Serchuk online, but Marcel first.

DR. REICHERT: To that point, I misunderstood the question, in terms of the intervals, and my only question would then be that you are -- If that's on an annual basis, then the -- To go back to what Genny said earlier, in terms of the implementation and how that would -- You know, I foresee overlapping, and you haven't even implemented the previous one, while you're already looking at the results of the next one, and that may get a little complicated.

DR. BUCKEL: Okay, and so, Judd, if you could just clarify that five and ten-year stock assessment intervals are common in the literature, just so we're not confused with IA, and so, Marcel, we don't need that bullet of the -- That one, and you're okay with striking that, the one he just --

DR. REICHERT: Well, as I said earlier, in the past, we have recommended another stock assessment based on the stock assessment results and the uncertainty and where the stock was going, and we have recommended shorter intervals, like three years, but I'm okay with this.

DR. BUCKEL: Yes. Okay. Fred Serchuk.

DR. SERCHUK: Thank you, Chair. One other consideration I think we should be explicit about is whether the stock is in a rebuilding plan or not.

DR. BUCKEL: That may be its own bullet. Amy.

DR. SCHUELLER: I just wondered if we wanted to make a recommendation, and so the stock assessment interval is five years, or the stock assessment interval is ten years, and the interim analysis is done every year, in this scenario, and, to get to some realism, perhaps we should recommend like, for example, in the scenario where an assessment is done every ten years, and maybe the interim analysis is run every other year, or something like that, and there's a lag, right, and so like you run the interim analysis in year-two, and management is implemented in year-three, and then you run it in four, and it's implemented in five, or something.

I mean, I think that running the interim analysis every single year probably isn't going to be realistic. I mean, I guess that's the Science Center's call, but I would suggest it's probably not realistic, and do we really want to be doing that? I think probably we just don't, not only from the Science Center point of view, but from the council's point of view, and so changing the scenarios just a bit, to be a bit more realistic with respect to what we're going to functionally do would be useful. I don't know what that looks like, exactly, whether it means every other year or every third year, and, I mean, it's -- This is like, if we had infinite resources, and the best-case scenario, what would it look like, and the reality is that we don't have that.

DR. BUCKEL: I think it's a great point, Amy, and so this is good advice for these next MSEs, probably not doing the annual IA. Anne.

MS. LANGE: I thought one of the take-homes from the analysis was that, rather than going up and down and up and down, there was similar results for a long-based full assessment TAC, versus the interim analysis, that there wasn't a great difference, and so there wasn't necessarily a need to go up, you know, to vary it every year, and maybe I misunderstood, but I thought that there was a reason to not have to do an assessment every year, or even the IA, because you don't want to have keep -- The council doesn't want to have to change the TAC every year. Being able to bring it out longer, and maintaining it constant over a period of time, is better than changing it every year. I'm not sure that --

DR. BUCKEL: Fred, to that point?

DR. SCHARF: Yes, and so, I mean, I guess I never really thought about the interim analysis that way, in that it would be fixed, right, and I thought -- I mean, in listening to what Erik was saying, when he first sort of presented the overview after the break, it was that this was providing an ability for us to be a bit reactionary, and so I thought that the idea would be that we would put some triggers in place that would trigger an interim analysis, rather than every year we would do one, or every other year we do one, and that there would -- There would have to be some change that would initiate the interim analysis.

I think we would have to be pretty specific about what those were, right, because, otherwise, you're going to get calls from the constituents, and the user groups, to say, oh, we want you to do an interim analysis, because we think there's more fish out here, and so, at every turn, we would be responding to that, and so I think we would have to have some very specific triggers that would cause the interim analysis to happen.

DR. BUCKEL: Anne.

MS. LANGE: I think that's what my understanding was, that there would be something like suddenly the index is ten-times what it was the previous year, or it was a third of what it was for the time series, and the index could be looked at very quickly, and, based on what is seen there, a decision could be made that it's time to, you know, do the interim analysis. Again, I didn't anticipate that it was every single year that you're going to be doing that.

DR. BUCKEL: Genny.

DR. NESSLAGE: Sorry I'm talking so much, but, if it can be simulated, the trigger option, which we talked about before, I think that would be fabulous, but, to get back to the original, as I understand it, impetus for doing this whole study, and I'm looking at Erik, is that we can replace updates and benchmarks and whatnot with more of these interim assessments, and so, if folks are thinking that, a minimum, we wouldn't want to go longer than three years for some of our species, or five years, then we should have a run where the interim analysis is scheduled every three years, period, if it's not the five or the ten-year, right, and so I don't know how you would -- Maybe you want to change it from ten to -- What would the numbers be? You have to figure out what would make sense to make it a three-year interval, to make sure you're getting a three-year in there, at minimum, for the interim analysis, and not annual. I don't think any of us are supporting an annual one.

DR. BUCKEL: Thank you. Excellent comments and good advice for the analysts for the next iteration of this. With the triggers, one complication is this issue of the SERFS information being a year lag, and that's the combination video-trap, but, for some species, the video-trap doesn't differ that much from the trap, and so you could have -- Could SERFS provide a list of those species where the trap doesn't different from the trap-video and where you could get more instantaneous -- That year that the trap data comes online quicker than the video data.

DR. BUBLEY: Right, and that's what we've seen in a lot of assessments that we've had recently, when we've been combining, is the vast majority of them are tracking fairly well with each other. There are a couple that have some slight deviations, but, for the most part, they do track well. I know Nikolai had asked us some questions about how fast we get these out, and so the trap index -- Most of the time, in the spring, and definitely by the summer, council meeting, everything is already put together on our end, and we can produce the indices of abundance for the entire suite of species that we're looking at, but, typically, even by the time we go through the QA/QC of the data and have it in hand, by March or April, we typically have those analyses run.

They're not put together in the nice, formatted report, but we have them on-hand, and so it wouldn't be the nine to twelve months that they were talking about earlier, and it would be more along the lines of six months, I think, prior to getting trap information at least, and, as we discussed earlier, if you're looking at something along the lines of length frequencies, that would be even faster than that.

DR. BUCKEL: Great. Thanks, Wally. All right. I don't see any other hands up here, and no hands online, and we're seven minutes into our lunchbreak, and so I think now is a good time to break for lunch, and we'll be back here at -- Is everybody okay with 1:30? We'll get back here at 1:30 for the Snapper Grouper MSE Model Presentation. Thanks, everyone.

(Whereupon, a recess was taken.)

DR. BUCKEL: Welcome back, everyone. We are going to Attachment 4a, and we're going to receive a presentation on the Snapper Grouper Management Strategy Evaluation Model. Dr. Adrian Hordyk, from Blue Matter Science, is online, but, before he gets started, Chip Collier is going to do an introduction, and so go ahead, Chip.

SNAPPER GROUPER MSE MODEL

DR. COLLIER: Just a reminder about what we're doing here and the MSE, and we had talked about a holistic approach for the snapper grouper fishery, and this is going to be like -- The first half is looking at red snapper and setting the ABC and addressing some of the issues there, and this is the second half, is really trying to address some of the issues in the fishery, and so we've been working with Blue Matter Science, in order to develop the MSE, and Jie is going to be the liaison for complex analyses like this, and it's good to have SSC members engaged in the process, and we're going to try to keep you guys involved in it, as much as possible, so nothing comes in at the end and is a complete shock.

With that, I want to just hand it over to Adrian. We had a great presentation from him last week at the Snapper Grouper AP, with the stakeholders, and so they gave a lot of good feedback to Blue Matter and Adrian and Tom, and so now it's to the science group, and we look forward to hearing some of your comments, and so let me make you the presenter, Adrian.

DR. HORDYK: Thanks, Chip. Good afternoon, everyone. I'm Adrian Hordyk from Blue Matter Science here in Vancouver, Canada. I believe my colleagues, Quang Huynh and Tom Carruthers, are also on the call. Tom and I were down in Charleston last week, and, as Chip said, we gave a similar panel to the advisory panel meeting there, and so apologies to anyone who was at that meeting also, because a lot of the content in this presentation is quite similar to what was presented last week.

I've got four sections to my talk, and they're all fairly brief, and, first, I'm just going to start with contrasting stock assessment approaches, that perhaps many of you are most familiar with, with management strategy evaluations, which at least for some people may be a new concept, and then I'm going to talk a little bit more about management strategy evaluation, give a brief overview, and then I want to go through the MSE process and give a brief outline of what that process could look like, what we're proposing for the snapper grouper fishery, and then I'll wrap up just talking a little bit about the software framework that we will be using to do the MSE, and so I will start with contrasting stock assessment with management strategy evaluation.

With stock assessment, the key question really is what is the current or historical state of the fish stock, and the sort of sub-questions to this are how many fish are in the water, and that's usually measured in terms of biomass, to try and get at how many fish are in the water, and is the stock overexploited? To do that, the assessment needs to estimate both how many fish are in the water and also some sort of reference point to evaluate whether the stock is in a good state or whether it's overexploited, and then those two pieces of information are used to determine if the management regulations need to be changed at all.

The output of an assessment process is estimates of the key population parameters, and so the scale, the absolute abundance of the population, but also the productivity, how the population is likely to respond to different fishing pressure, the current state of the stock, relative to the reference points, and so a statement about the stock status, and then advice to managers. Usually, that's done in terms of short-term projections of the population state, subject to different harvest policies, and so then the managers can choose -- From the information, they can choose a management policy to implement into the fishery to try and get the outcome that they're after.

A management strategy evaluation approach is going to differ in focus. The question here is -- The key question is what is the management policy, sometimes called a management procedure,

or a management strategy, and what management policy is most appropriate for this fishery, and so this is getting at questions like what process should be used to convert the fishery data into management advice, and is this process robust to uncertainty, and under what conditions is this process likely to fail?

The output of a management strategy evaluation focuses on -- It produces things like a reproducible and transparent process for selecting a management plan, and then a management plan is an agreed process that describes how the fishery goes from data to management advice. Then a key part of the analysis in MSE is to identify the conditions where that management plan is likely to require revision or it's likely to fail.

Now I will talk a little bit more about management strategy evaluation in general, and I know probably many people in this group are familiar with MSE, and I just saw that presentation that you had before lunch that spoke about management strategy evaluation as well, and so some of this might be familiar, but I think it would be useful just to go over it again, just to provide the context and to make sure that everyone is on the same page.

In most fisheries, management decision-making could benefit from two things. One is a more coherent strategy, and so really getting at why decisions are being made in the way that they are, and, secondly, an increased transparency and accountability, and so how are these decisions made? When you consider the options, there is good reasons why it's been difficult to achieve this, in many, or probably all, fishery contexts.

This figure shows the main elements of a fishery system. On the top, we have fishing activities, and then, on the right, data is collected here, in port samplings, collected from the fishery, and, on the bottom, the data is analyzed, and a management recommendation is made, through a stock assessment process, for example, and then, on the left, the management action is implemented and enforced into the fishery, and then this feeds back into the fishery system and impacts it in the future.

One way to evaluate different approaches to this management system is to conduct an experiment, and so, for example, changes could be made to how the fishing activities operate on the water, changes in, for example, regulations for the types of gear that can be used, or the area where the fishery is allowed to operate, or changes could be made to the way that data are collected, or the way that they're analyzed, and then the fishery could be monitored to see if these changes have led to the desired effects. However, there is two problems with this approach.

First of all, it's potentially quite risky. Implementing new management actions can be risky, because there is no guarantee that that will lead to the desired outcomes, and this can make it challenging to try and implement -- To put new ideas somewhere in the fishery process, and so it can lead to inertia, or resistance, to try new ideas, because the outcomes are unknown.

A related problem to this is that there are no replicates. A key part of scientific experimentation is to have replication. However, we only have one fishery, and so, if we make a change to the management system, if somewhere in this system we make changes, and it leads to a good outcome, how do we know if that outcome was due to that actual management action or if it was just luck, and the reverse is also true. If we make a change to the management system, and it leads

to a bad outcome, was it a bad idea, or was it just bad luck, because, when you only have one goal, it's really difficult to know which.

What do people do when they're faced with these sorts of high-risk situations? Well, they turn to simulation, and simulation is where the system is reproduced in a model that can be controlled and replicated, and simulation models can be physical, for example a wind tunnel for testing vehicles and aircraft, or war games, where nations engage in mock warfare to test out different strategies, but, most often, simulation models are built in a computer.

For example, here on the left, we have a trainee helicopter pilot in a simulator, and the operators of this simulator can test the trainee pilot's ability to handle the aircraft under a wide range of different conditions, for example looking at different crosswinds, storms, low visibility, all sorts of different conditions that the pilot can be subject to. They can also test the pilot's ability to handle stressful conditions. What if something goes wrong? Will the pilot respond appropriately?

On the right is an F1 driver in a simulator. It's expensive, and potentially risky, to put a new driver in a real car on a real track, but, in a simulator, the driver's abilities can be tested under a wide range of controllable conditions, and so, in both these cases, the emphasis is on both the pilot and on the driver, the person in the seat. The focus isn't about predicting the weather conditions that the pilot will be flying in, or predicting the conditions of the racetrack. The focus is on testing the pilot and the driver's ability to handle the vehicle under a range of conditions that they are likely to face.

The pilots who perform poorly in a simulator, and that aren't able to achieve the desired outcome, and so, for example, safely landing a helicopter, under a wide range of conditions that they are likely to meet, they will never be allowed to pilot a real helicopter, and so, using the simulation approach, they can weed out potentially poor drivers, or poor helicopter pilots, and just keep a focus on identifying and selecting people who are able to control these vehicles under the wide range of conditions that they are likely to meet in reality.

Management strategy evaluation is the same approach in the context of fisheries, and so this is a schematic of the fisheries systems that we looked at earlier. In MSE, this system is reproduced in a computer model. The fishery, the stuff that goes on in the fishery, in the gray box there, gets reproduced in a computer model, which we call an operating model, and then the data that's collected from that fishery is generated through an observation model, and that takes the simulated fishery dynamics in the operating model and applies an observation model, which is a filter to generate data, simulated data, that looks similar, has the same sorts of characteristics, as the real data that we're getting from the fishery.

The population, assessment, and management rules, we call a management procedure, and then, finally, the enforcement is captured in an implementation model, and this is where the management procedure, the management advice that comes out of the management procedure, is implemented back into the operating model, and it impacts the fishery dynamics in the future. Sometimes management procedures are called harvest strategies, or management strategies, and we tend to use the words "management procedure", and I will talk a little bit more about them in a few minutes.

We also have some abbreviations, and operating models are often referred to as OMs, and management procedures as MPs, and so, if you hear me say OM and MP, I am referring to operating models and management procedures.

What does that look like? Well, here's an example, and imagine that we had an assessment that was conducted in 2020, and we have an operating model that was estimated from that assessment, was generated from that assessment, and the operating model contains all the fishery dynamics that were estimated, predicted, from that stock assessment, and then the computer model goes through this loop and generates -- Uses the observation models that generate data and applies a management procedure, in, this case, MP Number 1 is an index-based management procedure that generates management advice from an index. That gets implemented into the fishery, and then it's going to update the fishery dynamics in the future.

From that operating model, we can take the biomass and the catch, for example, or any other of the dynamics that are going on in the operating model, and we can interrogate them and report them, as the simulation progresses, and so, for example, this is the first year.

The model is projected forward for one year, and it's applied the management procedure, and now it has projected the model forward to 2021, and you can see the plot, and the biomass has stayed pretty stable, and the catches have gone down a little bit, and then the process repeats again for the second year. It updates the projections, the biomass and catch, and again for the third year and so on. It keeps going around and around for every year, and it's updating the population dynamics based on the rule that was generated -- Or used to generate the management advice.

A key part of management strategy evaluation is to test different management procedures, and so, for example, we can repeat this entire process using the MP Number 2 here in the green, and this could be a management procedure that uses a different index, for example, a different index of abundance, and perhaps also uses a mean length data, and so now we have a projection of the biomass and the catch under exactly the same conditions, the same system, but the only thing that's different is the management procedure that was used the generate the management advice.

Again, a third management procedure, and, here, this is two different indices, for example, and a different process to generate management advice, and we can see -- Once we've got the projections for these three different management procedures, we can evaluate which one of those is most likely to lead to the outcomes that we are after and which one of these management approaches is likely to lead to poor outcomes, and we would never implement it, in reality.

The second part of management strategy evaluation, other than multiple management procedures that are evaluated, is different operating models, and so this is like testing different conditions of the helicopter pilot or the racecar driver are under, and so, for example, here, we can have a second operating model that is very similar to the first one, but it has lower discard mortality, and perhaps that's a key uncertainty in this fishery, and so we want to make sure that management procedures still achieve the same desired outcomes if conditions in this operating model were true, and so this process is repeated for as many operating models as we have that span the uncertainties in the fisheries system, and I will give some examples of those shortly for the snapper grouper fishery.

This process is called closed-loop simulation, because it goes around in a loop that applies a management procedure, and it generates management advice, which gets implemented into the

fishery, and then it closes the loop by updating the fishery dynamics in the future, and so this way of using closed-loop simulation is a method that you can use to test the expected performance of a management procedure under a wide range of conditions, if that was likely -- If it was implemented in a fishery.

How can this process, MSE process, look for the snapper grouper fishery? Well, like in a stock assessment, a management strategy evaluation process starts with the fishery data, but then, unlike an assessment, where the fishery data is analyzed, and an attempt is made to build a single model that is the best model that describes the fishery dynamics, an MSE would build multiple operating models, and each one of these operating models -- They may be generated by an assessment, and they can be generated in other ways, but each one of these operating models captures and spans the uncertainties in the fisheries system, and so the focus here is no longer about which one of the conditions is most likely to be true, but about are these -- Do these operating models capture -- Do they span the uncertainties that the fisheries system is likely to face?

In the analogy of the helicopter pilot, each of these operating models would be different environmental conditions, and it might be night, nighttime, or there might be crosswinds, or there might be a storm, and each one of these is a different set of conditions that we don't know which one of them is actually going to happen in reality, but we want to evaluate and test our management procedures under each of these conditions, and so that's the third component of management policies, or management procedures, and, like the operating models, these are generated in consultation with the stakeholders, who propose what we often refer to as candidate management procedures, and so a list of potential approaches that could be used for managing the fishery.

Once we have these two pieces of information, the operating models and the management procedures, we conduct the closed-loop evaluation, where we test each of these management procedures in each of these operating models, and the result of this process is to quantify and compare the performance of these management procedures.

Then, from those results, the stakeholder group can select the management procedure that has the best performance, that is most likely to lead to the desired outcomes, and is most robust to the uncertainties that the fisheries systems is likely to face, and then adopt that management procedure for managing fisheries, and so a key part of management strategy evaluation is that this is a stakeholder-driven process. The operating models, and the management procedures, as well as the interpretation and the tradeoffs that are examined in the results, are all a stakeholder-driven process.

I will go through this briefly, these four key parts of a management strategy evaluation process, in the context of the snapper grouper fishery, and so we'll start with operating models. Like I mentioned earlier, an operating model is a plausible description of the properties of a fisheries system, and, in general, it captures two things. One is the stock, the biology of the stock, and the other aspect is the exploitation pattern of the fishing activities that exploit that stock, and so, for example, here, we have an operating model for the red snapper fish stock component of the operating model, and it captures things like the biology, the growth, the maturity of the animal, as well as things like the spatial distribution and movement.

Then the exploitation component captures and describes the characteristics of the fishing fleets, and so there could be several different fishing fleets that have different gear selectivity, gear types,

different patterns in fishing effort, perhaps different seasonal patterns or overall fishing effort, and perhaps different spatial distribution or preferential targeting.

When we have multiple species, it gets a little bit more complicating. We can do a second operating model, with the same sort of information for the second stock, and here we have gag grouper, for example, for the biology of that animal and the fishing fleets that target that stock, but there is other things to consider when you evaluate these things together, and so, for example, when you look at the interaction from these stocks, consider the spatial overlap, whether there is preferential targeting of one species over another, and, really, the goal here is to get a question of how management regulations for one stock will affect the other.

A key part of the MSE is to capture uncertainties, and so these uncertainties can be uncertainties in both the stock characteristics and in the fleet characteristics, and so, for example, there may be uncertainty in the biological parameters, and there may not be agreement on the parameters, the most appropriate parameters, to use to describe the biology of one, or both, of these fish stocks, and the uncertainty in the spatial distribution and movement, the abundance, discard mortality, or anything related to the animals. There could be uncertainty as well in the fleet characteristics, and the selectivity pattern may not be well estimated. The fishing effort in some of the fleets may not be well described, and the spatial distribution of the stocks may be subject to uncertainty, or the fleets. Sorry. They may be subject to uncertainty.

These uncertainties are captured in multiple operating models, alternative operating models. For example, we could generate Operating Model Number 2, which is very similar to Number 1, except for it has different assumptions about the abundance, and perhaps a different model was used to generate the condition in the operating model that resulted in different estimates in the stock abundance.

A third operating model may have uncertainties in spatial distribution and so on, and, of course, these operating models don't always just have to have a difference in one aspect either, and it can have multiple uncertainties that are captured in different operating models, and the goal is to generate operating models that encompass the full range of hypotheses that are being proposed by the stakeholder group, and so this is a way of getting everybody's hypotheses of a fishery dynamics captured in a model that could be used to evaluate the performance of management procedures.

What does the process like look to build an operating model? Well, for example, here, we put Operating Model Number 1 from the most recent stock assessments for the red snapper and the gag grouper, and so we can import these stock assessments directly into the MSE software, and then, when we simulate the fishery, it will generate the fishery dynamics exactly as predicted, or estimated, by those stock assessments.

For example, in the top, we have the biomass trend for the red snapper and the gag grouper, and on the bottom is the landings and the discards, the overall landings and discards, as predicted by those two stock assessments, and they are captured together in a single operating model. Operating Model Number 2 is generated by a different process, and that would lead to a different description of the historical dynamics of the fishery.

Some questions to consider, when we build these operating models, is, first of all, with multispecies fisheries, like the snapper grouper fishery, we need to consider which stocks to

include. We're starting with these two stocks, the red snapper and the gag grouper, but there may be others that need to be considered as well, and particularly if management regulations for one or both of these stocks are likely to impact the exploitation of the other stocks.

We need to think about what information is available. For these two species, we have the assessments, and that's one way to start doing operating models very quickly, but, for other species, they may not have such readily available assessments, and we may need to consider generating operating models directly from data, for example. Then, like I mentioned earlier, the consideration of what are the interactions between the stocks, and the spatial overlap of these stocks, and are they caught separately in different areas? Spatial distribution for fleets, and are the fleets overlapped, or are they discrete, and then what are the key uncertainties that we use to generate the alternative operating models?

We had quite a bit of discussion about this last week, at the advisory panel meeting, and this will be a key part of the first part of the MSE process, is generating these operating models and considering these questions related to the uncertainties in the system.

The second step is to build the management procedures and describe the management policies. A management procedure is just a process for going from data to a management decision, and so, for example, the yellow box here shows a management procedure. The data goes in the top, and a management recommendation comes out the bottom, and the inside is the rules, the management rules that describe how the data are converted to management advice, and that could be static, or it could just be, for example, to set a size limit or have a spatial closure or a seasonal closure, or it could be adaptive, where the rules adjust the management decision, the management action, like change a size limit, perhaps, or change an effort limit, in response to a signal in the data that's being collected and observed.

How is this different to the traditional approach? Well, there's three ways that a management procedure is different from a traditional approach of an assessment that generates management advice. First of all, a management procedure is hard-coded, and that means it's reproducible, and so you have different people, and you will always get the same result. If the same data is going in the top, you will always have the same management recommendation coming out the bottom.

It's agreed upon, and so a management procedure, once it's been developed and adopted, it's agreed upon, and there is no haggling anymore. The data goes into the management procedure, and the rules are applied to that data, and a management advice is returned by the management procedure, which gets, at least in principle, or that's the idea, is adopted back into the fishery. It's already been pre-agreed that these are the rules that are going to be followed.

The third part, that is possibly most important, is that a management procedure is simulation tested. It means we have some confidence that the approach that's going to be adopted and implemented into the fishery is likely to achieve the objectives, to achieve the management goals for the fishery.

With a multispecies fishery that has multiple sectors that target the fish stocks, a management procedure can be a little more complicated, and it might be described better as a management plan, and so, for example, this could describe all the data that's being monitored for both the commercial and recreational data streams, and it could be catch rates or size composition, for example, and then the rules could generate individual rules for different stocks within that fishery, and also,

perhaps, different fleets within them, and so there may be a set of rules that describe how the management advice for the commercial fleets would be updated, either by stock or overall, and the same for the recreational sector. Then the management advice is just implemented at some set interval.

These management controls could be any combination of spatial closures, seasonal closures, size limits, bag limits, effort limits, and/or catch limits, and, like I mentioned earlier, all these things could either be static, and you could set a size limit that is just fixed and doesn't change, or that could be adaptive, where some of these management controls would be updated every management cycle based on the signal in the data, and that can be -- Management procedures could have a mix of those things as well.

After we've developed the operating models, a stakeholder group gets together and develops a list of candidate management procedures, and each of these describe the data that will be used in the rules, and we'll process that data into management advice, and these can be as simple or as complicated as necessary, and so the questions to consider when we're developing candidate management procedures is what data can be used to inform management?

What are the feasible management options, and so what management options can actually be feasibly implemented in the fishery, and so, for example, that might be by gear type or by stock. Then another thing to consider is how often will the management advice be updated, and what's the management interval, or the update cycle, and how often will these rules be subject to be changed? Sometimes there is hard limits that are outside of the MSE process that fix much of these things, and so it's important to know these things before we start the analysis.

Once we have these two pieces of information, we are ready to do the closed-loop evaluation, and so here's an example of doing the closed-loop simulation testing using an operating model. Here, Operating Model Number 1, as I showed earlier, was just generated directly from these two stock assessments, and so we have the historical fishery dynamics, as predicted by those assessments, and the MSE, the first part of the MSE, is to simulate that fishery, and so, here, it just reproduces exactly the fishery dynamics that were generated and predicted in those assessments.

We need management policies, management procedures, for these two stocks, and so, for example, it may be a size limit for one stock, and it may be an effort control, or a spatial closure, for the other stock, and, in this example, we have a five-year management cycle, and so these management procedures will update the rules every five years. Once we simulate the fishery, we can take the data from the fishery and apply the management procedures that would generate the management rules for these two fisheries, or these two species, and then implement those management regulations into the operating model.

This will update the operating model in the projections, as the model goes forward, and the final step is to close the loop that updates the dynamics, and then the model is predicted forward in time, and so you can see here, in the plot on the bottom, the population has been projected for five years into the future, after it has applied the management procedure once, at the beginning, where the vertical dashed-gray line is.

Then we simulate data, in this case 2025, and the model simulates data from the updated operating model, and it applies the management procedures again, and it applies the management

regulations, and it updates the model again and projects it forward, and again and again. This continues for a set period of time.

Because there is uncertainty in the future projections, we do multiple simulations, and so this is done to capture things like different environmental conditions, and probably the most significant part of this is recruitment variability in the population, and so there is natural variability in the population, and that's unrelated to the fishery dynamics, and we do multiple simulations to try and capture that uncertainty, and so, in the image, that would be the second bold line that shows the projected stock dynamics under identical management rules, but under different environmental conditions, and, again, a third time, and a fourth, and so on. We do lots and lots of simulations, until we have enough to have a stable distribution in projections, and that is shown here in the solid line as the median, and the shading is showing the percentiles.

This is a way -- Once we have done enough simulations, we can statistically describe the performance of these management procedures, and this process is then repeated for a second management procedure, and there will be a different set of rules to these fisheries, and perhaps it uses different data, or perhaps it uses different rules to adjust the management regulations in response to that data, and so on we do for all the management procedures that have been proposed, all the candidate management procedures.

At the end of this, we'll have results that look something like this. Here, we're showing four management procedures, and the population has got the same historical trend, but the projections going forward are different, and, in each of these cases, the conditions, the environmental conditions as it were, in the simulations are identical, but the only difference between them is the management rules that are described and captured in those management procedures, and so the difference in the projection biomass that you're seeing here is simply only due to those management rules in those management procedures.

The question then is how do we rank these management procedures? How do we determine which have good performance and which have bad performance? To do that, we need to know what we care about. How do we define good management outcomes, and how do we define bad management outcomes?

In MSE, this is done through performance metrics, and performance metrics are quantitative measures of management outcomes to be achieved, or perhaps to be avoided, and these are most often determined by stakeholders, although some of them are required by law, for example to ensure sustainability of a resource, and performance metrics may differ amongst stakeholders, who value perhaps different things in the fishery, and different stakeholder groups may have different objectives, and the results of the MSE can be used to navigate the tradeoffs amongst those different performance metrics amongst the candidate management procedures, with the goal to try to find a management procedure that satisfies, that best satisfies, the entire stakeholder group, or keeps the most people the most happy.

Here is a simple example of how we would use performance metrics to choose amongst management procedures. Suppose we had just three performance metrics, and we wanted to have a sustainability metric that says we have to have at least a 50 percent probability that the stock is above B target, and so, here, I am showing the projected biomass for Management Procedure

Number 1 and Management Procedure Number 2, and the dashed-horizontal line is our B target for the two stocks, the red snapper and the gag grouper.

The second performance metric might be to maximize overall catch, and so we can see, in respect to the first performance metric, MP Number 1-- Under the conditions of MP Number 1, both stocks fail to have 50 percent, or at least 50 percent, probability that the stock is above the respective B targets, whereas, in Management Procedure Number 3, both stocks satisfy Performance Metric Number 1, and, for our second goal of maximizing overall catch, we can do a similar plot of the projected catch, and, here, it's just for the projected period, from 2020 to 2040, and the results here show that Management Procedure Number 1 has both a lower probability of the stock reaching the target level, well below 50 percent for both stocks, and a lower average yield, and so Management Procedure Number 3 satisfies the first performance metric, and it has at least 50 percent probability that the stock is above B target, and it has a higher average long-term yield for both stocks.

In this simple example, the conclusion would be quite obvious, and MP Number 3 is a better option. We would reject MP Number 1 as too risky, and it doesn't achieve the catches that we would like, and MP Number 3 would be kept for further consideration.

A summary overview of what the MSE process looks like, there is generally four phases to an MSE process. The first phase, where we are now, is to develop performance metrics, describe the objectives, what we're trying to achieve in the fishery, develop the operating model structure, the stocks to include, the links that will be modeled, for example, and the data that's going to be used to generate those operating models, and then capture and describe the key system uncertainties that will be captured in those operating models.

Phase Number 2, which is our next step, is to take the information from the structure, the data and the system uncertainties, and generate a range of different operation models. The third phase is often a process where a large number of operating models are put into different categories, and, often, we have a reference set of smaller group of operating models that we call our reference set that span the key uncertainties in the fisheries, and perhaps other operating models that we often refer to as robustness tests, and these may be conditions that are potentially possible, but may not be supported by empirical data, and so these are conditions that we want to test, stress test, the management procedures under, but they may be regarded as less likely to occur, in reality.

There's a process there of selecting and grouping the operating models into different categories. Phase 3 occurs at the same time as the development of these candidate management procedures, the list of rules that will be used and evaluated to generate management advice from the fishery. Phase 4 is the closed loop simulation testing, which we've talked about in quite a bit of detail already, and the key part here is the performance metrics are used to evaluate the performance of these management procedures. It's important that these performance metrics get described early on in the process, and they come in, and are used here at the end, to evaluate the performance of the different management approaches.

Then Phase 5 is really the end of the process, where an MP is adopted and implemented in the fishery, and there is another process that needs to go on, which is often referred to exceptional circumstances, and this is where the fishery is monitored to make sure that the management procedure that has been selected and adopted is performing the way that we expect it to perform.

If, for example, the conditions in the fishery change in an unexpected way, or in a way that wasn't captured in those operating models at the beginning of the process, then the management procedure is no longer operating under the conditions that they simulation tested under, and so exceptional circumstances will identify those conditions and trigger a reevaluation of the management procedure, to see if it's see suitable for these new conditions that we're faced with or if there is an alternative approach that may be better suited.

The final section is just a brief overview of the MSE framework that we'll be using to do this analysis. We're using some software that we've developed called openMSE, and openMSE is an umbrella R package for building operating models, analyzing fishery data, and conducting MSE.

Under the hood, openMSE consists of three separate packages, MSEtool, which is the core package that has all the machinery for building operating models and running the management strategy evaluation, and then two other packages, the DLMtool, which is the collection of data-limited management procedures, and SAMtool, stock assessment methods and data-intensive management procedures. When we load openMSE, all of those three packages are loaded and all available to use in the MSE.

A few details about the operating model in the openMSE package, and it's an age-structured spatial operating model, and it's been built with R, but, under the hood, it's been coded in C++ and TMB, and we also use parallel processing, and that means it can run quite fast. It's open source, and the code is all available on GitHub, and so anyone is able to dive under the hood and look at the code, any part of it, and it includes about a hundred or so management procedures, many data-limited ones.

Early on this process, we developed DLMtool to try to code as many data-limited approaches as we can find, and that's been since extended in SAMtool, with data-moderate and more data-rich stock assessment approaches, but, more importantly, it's extensible, and that means it's really easy to develop custom management procedures and import them into the framework, and so, for example, in this case, in this fishery, when we're looking at multiple species, we're likely to develop management procedures that are develop rules for multiple species, and perhaps multiple fleets, and so we have to develop custom MPs.

There is an option, which we'll be using in this case, for multiple stocks and multiple fleets, and so, like I demonstrated earlier, they can all be modeled together. It includes, by default, two spatial areas, but it can include an unlimited number of spatial areas, provided we can describe the distribution, the spatial distribution, and the movement, which can include movement by age, migration, things like that, and then it has an option for a bio-economic model.

The model framework is described on the website, openmse.com, and it has a lot of documentation for all the different components of the software, and there's also a paper that we published, I think in 2019 or so, and that was described -- At that time, it was called the DLMtool, the Data-Limited Methods Toolkit, and a peer-reviewed paper describes the equations and the assumptions behind the model, and, even though that was called DLMtool at the time, it's the same machinery that's under the hood here in openMSE.

For this particular project, we have a GitHub repository, and, currently, it's private, but you can have access to that by either contacting us or the management council, and we can give you access

to that, and it has all the code that will -- It will have all the code that's been used to conduct the management strategy evaluation for this project, and linked to that repository is a splash page, or a home page, for the project. At the moment -- There's a link there for it at the bottom.

At the moment, it doesn't have a lot of information on there, but the idea is that we would build up this homepage with a description of the MSE process, and so a living document, what we usually refer to as a trial specifications document that describes how the operating models are built, the assumptions for each of those operating models, the management procedures that are being proposed, and a record of all the decisions that have been made by the group, and so this document, and this homepage, will be updated as the project goes on, so anyone can see where we are with the project and what decisions have been made at any point in time, and, at the end of the project, this document will describe the entire MSE process and will be reproducible. Together with the code in the repository, it will be reproducible for anyone to access and interrogate, and so that brings me to the end of my presentation, and so thank you very much for your attention, and I'm happy to take any questions.

DR. BUCKEL: Thank you very much for that excellent presentation. We will take questions now for Dr. Hordyk. Jennifer.

DR. SWEENEY-TOOKES: Thank you. Before we dig into the models, which I know we will do, I just wanted to say thank you for a very interesting presentation. I really appreciated your very clear description of that model, and I wanted to reinforce that having this reproducible and transparent, as you were saying, a transparent process, from human subjects, from a social science perspective, is an excellent step.

I do want to reinforce and really echo something that you mentioned, and that's that stakeholders are not a unified population in this region, and so you do mention that as being potentially problematic, that different stakeholder groups might have different objectives, which is what you said, and I wanted to emphasize that, that we might still have a lot of negotiating that has to take place.

DR. BUCKEL: Thanks, Jennifer. Anne.

MS. LANGE: I guess I'm always the skeptic, and I'm just curious, in a very succinct way, how this differs from how the councils and the science committee, the scientists, work now. There is getting the assessments done, and the major concern that we have, usually, with getting the assessments done, and done correctly, is needing more data, needing more samples, needing more fishery independent data, more economic data, and I'm not sure that the systems that we have now -- The stock assessment scientists and economists do all the types of things, I think, that need to be done, and our biggest issue is not getting the data.

The council does its job, and it has all the advisory panels that are able to provide it, and I guess I'm looking for the linkage of why this system, that kind of covers everything, and it sounds as though you throw everything in, and you push a button, and it comes back out, as opposed to the process the way it works now, and I understand that things get bogged down, both in the science and also in interacting with the stakeholders, but I have always felt that the biggest need we have is more socioeconomic and stock assessment personnel and more data.

I'm not sure if reinventing the wheel, the overall project -- I mean, I'm just not sure how this interacts with the process that we have now, which, again, could always be improved, but mostly that's done by getting more staff and more vessel time and more data. Anyway, I'm just curious.

DR. HORDYK: I have a couple of comments in response to that. First, I think it's important to remember that a stock assessment process, and I'm not sure exactly the process that goes on in your part of the world, but the stock assessment process focuses on the question of what's the state of the stock. People need an answer of what the stock status is, and so there's a lot of effort that goes into trying to answer that question, and this process, this MSE process, is not going to resolve that problem, or not necessarily, that issue, because it's a very difficult question to answer, like you said, and, generally, to be accurate, with any confidence, it requires a lot of data and a lot of expertise.

What about if the focus is just on how do we manage the fishery to make sure we're getting the management outcomes that we desire? For example, you may have a situation, a situation like, for example, a recreational fishery where you have very limited data, in terms of the total effort that's going into the fishery, and it's hard to monitor, and it's very difficult to enforce a catch limit, and it's very difficult to enforce all the different regulations, but you may able to, for example, set a size limit, or a spatial closure, or something like that, a very simple management measure, and, using management strategy evaluation, we could test, and then demonstrate, that that approach, for example a size limit above the size at maturity with no discard, or very low discard, mortality below it, can be very, very effective in ensuring that the stock -- That the management objectives of ensuring sustainability, for example, will be met.

Even if you have no ability to conduct an assessment for a stock, and no way of answering the question of what is the stock status, you can still have confidence that the management objectives, the management goals, can be achieved using a simple and feasible management approach, and so I'm not sure -- I think there's still -- It doesn't answer your question of how this is going to impact the current process of the stock assessment cycle, as it were, and answering that question, but I think, if you see it through the focus of trying to answer the question of what management actions can we take to be able to have some confidence that it's going to lead to the outcomes that we're after, a stock assessment doesn't address that question at all, and that's what MSE is designed to address.

DR. BUCKEL: Thanks for that explanation. Are there other questions? Scott Crosson is online. Go ahead, Scott.

DR. CROSSON: Thank you, again. Echoing what others said, it was a very informative presentation, and I guess my question is -- As other people have stated, this is a multispecies fishery, where the assessment science seems to be pointing that most of these fisheries need to reduce discarding, predominantly from the recreational sector, and that would probably require a reduction in effort, and so I would like to hear more about how you're going to engage with stakeholder groups who are potentially hostile to even just that starting principle of, you know, having to try and somehow reduce the effort of a lot of these fisheries, to get them out from being underwater, the way they are right now, with overfishing going on, and how they're all linked together. Is there -- You've already met with the advisory panel, I guess last week, and could you tell us a little bit more about that process?

DR. HORDYK: In terms of how sort of the engagement process might work, that might be a question that the council might be better placed to answer. From our perspective, so far, our goal is to just try and get the lay of the land, and like that's what we did last week, to understand the complexities and the sort of issues that are facing the fishery and the system dynamics, the uncertainties in the operating models, and I think that you raised, Scott, like the high discard mortality, or the fact that there's a large amount of discards in the fishery, and we potentially need to reduce effort, and that's something that was flagged last week.

Our goal would be to try and present results showing different management approaches, and so one might be reducing discards for one mechanism or another, or maybe reducing fishing effort, or adjusting fishing effort, and there may be methods that we can develop with size limits, or slot limits, for example, and so our goal would be to try to just demonstrate the likely expected performance of each of these approaches, and that's something that needs to be -- At least then we have it on paper, as it were, or on a screen, that the different components in the fishery could look at and have that discussion.

I think you're right that this MSE process doesn't make that -- Jennifer raised it earlier, and like the conflict, as it were, between the stakeholder groups, and this doesn't resolve any of that, but what it does is make it transparent, so you can clearly see what the issues are, and some things, which some people are perhaps really concerned about, may turn out not to be so much of an issue, and other things are much more important, and so, if we can at least identify those things, what those things are, what the importance of those things are, we can help facilitate a discussion to try and navigate our way through that, but you're right that it doesn't resolve that issue of how decisions need to be made, of trying to get people to accept that, but hopefully it makes the process more transparent and more concrete, because we can see what we're working with, rather than sort of ideas, when used with words, that are very hard for others to understand and examine.

DR. BUCKEL: Thanks for that response. Are there other questions from the SSC members present or online? Amy.

DR. SCHUELLER: I was just hoping you could speak to the timeline of this project, and like are you in the very initial stages, and, I mean, the key question on Slide 5 is a bit nebulous, and are you -- Like when in the process are you expecting to more -- I'm not sure what word I'm looking for, but define sort of what the main goals of this work are, more pointedly, and I'm sorry if I missed it in this slide, but thanks.

DR. HORDYK: We are in the very early stages of this project, and last week was our first meeting with the advisory panel, and the project officially only started up a month or two before that, and so we've been -- Although I've shown, like in this slide, and various places in this presentation, a linear progress, really, it is a bit more of an iterative process, and so we are really in Phase 1 now, and we're just trying to capture the fishery dynamics in an operating model, or some operating models that describe -- Once we've understood those uncertainties, to capture them in an operating model and start to demonstrate some of these management approaches, but then, often, what happens is, once groups see those results, they start to see like both operating models that describe different system uncertainties and the performance of different management procedures, and that sort of instigates discussion about other uncertainties, or other possible management procedures, and what about if we tried this, or what about if we tried that, and so it's an iterative process that

go back and develop more operating models, or develop more, or different, management procedures.

It's a two-year -- We've got a two-year project with the council to do this work, and the goal is, at least at the end of this, is to have the framework for moving from operating models to management procedures that are demonstrating like the performance of those, so the groups can understand how the process works and see and start to examine the tradeoffs amongst those different management approaches.

The goal, of course, always is to get a management procedure adopted, during Phase 5, although that's often out of the control of the actual project, but the goal of this is to at least have a table of results, as it were, that can show the performance, the likely performance, with respect to performance metrics and management outcomes, management objectives, that the group cares about and that the groups can look at and start to have that discussion about the tradeoffs and how you would pick amongst those management options, and so that's the goal that we're aiming for at the end of this two-year process.

DR. BUCKEL: Thank you. Other questions? I had one. The interaction with the advisory panel, was that to -- I think it was your words, but to get the lay of the land, but I was curious if the management procedures that you will look at -- Are those going to be determined based on input from stakeholders on the frontend? One of the slides seemed to suggest that there would be the input -- Looking at the output them to determine, you know, the management procedures, but I guess it's what -- How will the different management procedures that will be put in on the frontend be determined, if that's going to come from a list of likely procedures that you've used before or tailored from stakeholder input?

DR. HORDYK: The goal is to develop both the operating models and the management procedures from the stakeholder input, but, last week, like I said, was our first meeting with the group, and we gave a presentation quite similar to this one. For many people, it's a new concept, a new approach, and so we are soliciting questions, not with the aim of getting an answer to them, but just to get people thinking about them, and we were busy taking notes during the discussion, and so we have, also, a small technical group, that Chip might be able to talk more about, that sort of meets in between these meetings and sort of makes some of those preliminary decisions.

That gets then proposed to the stakeholder groups for further revision, and so, for us, we need to chat about exactly what the next steps will be, but, based on this meeting and the last meeting, our goal was to develop some operating models. We have the first one developed from the assessments, but we heard about, last week, some uncertainties, and we need to chat with the technical group a bit more about trying to capture what those main uncertainties are, and so to develop a couple of sort of strawmen, or first-go, operating models that span the key uncertainties, as we understood them, and we'll do something similar with the management approaches.

We've heard a lot of talk about reducing discard mortality and size limits and seasonal closures and things like that, and so, with the technical group, we'll develop a list of sort of preliminary candidate approaches, management approaches, and then our goal will be, in the next meeting, for the stakeholders to present those results and get sort of a strawman version of the process, so that we can then have another discussion, based on the knowledge that we gained from this first meeting and the things that we think about in the meantime.

When they see some results, then we can go back and say, okay, now people might have a better idea of how to propose management approaches, and our goal is to -- Anything that people can propose, the stakeholder groups can propose, such as uncertainties in the system or management procedures, it's our goal, or job, is to go away and turn them into -- Develop them into code and input them into the system, and so it's an iterative process, and that's the idea, is to work that way. We'll present something, and the group will discuss and refine it, and we'll go back and do the analysis and repeat it again.

DR. BUCKEL: Thank you. Other questions from the group here or online? All right. Then we will move into our action items. Thank you very much, again, for an excellent presentation, and, again, echoing the others, it was very information and helpful in understanding how this process is going to move forward over the next couple of years, and we look forward to working with your group. Marcel.

DR. REICHERT: Public comment.

DR. BUCKEL: Do we have any public comment? Thanks, Marcel. It doesn't look like we have any public comment, and so we'll move on into our action items for this item, and Judd is putting those up on the screen, so that we can address them now. We had three questions. The first is what are the most important uncertainties in the fisheries system? The second is what are the main data sources that can be used to evaluate the state of the fishery, and what are the primary concerns with the data sources? I'm sure the folks at Blue Matter would be fine if we provided other input, if you had other suggestions, of like management procedures, for example, that we just talked about. Anne.

MS. LANGE: Well, I guess, this first one here, what are the most important uncertainties in the fisheries system, every assessment we have had presented to us, and all the work that we do, we always wind up with research recommendations, and I think it was at our last full meeting where we asked that all of those research recommendations get pulled together and looked at, to see what has and what hasn't been done, what has been addressed and what hasn't been addressed.

All of those issues are still there, and George was just saying, and how does this address all those issues that we still have? How does this -- Even if they pull all of the assessment information and everything into one massive unit, or one management strategy evaluation option, how is that going to address some of the core issues that we've been asking for decades, that, again, the Science Center and everybody want to get at, but there isn't the opportunity, there isn't the staff, there isn't the funding to do it?

Those are still issues that need to be addressed, and while I'm not -- I don't have anything negative about this particular project itself, and what I'm concerned about is it diluting the ability to get to the answers that we have been asking, year after year, and that, because of funding and other things, have not been able to be answered, and I guess I'm just not sure that there's anything that this is generating that's going to address those core issues. I mean, it's basically redoing the stuff that our assessment people do, and, again, I'm sorry, and I just -- I'm just afraid that working on this type of thing will dilute getting at some of the core questions that we've been asking year after year, stock over stock, fishery over fishery.

DR. BUCKEL: I am going to take a stab at answering it, but folks that do MSE are here in the room, and they can follow-up, but I think the idea is we're trying to identify management procedures that will result in the outcomes that we're looking for, right, not overfished and not overfishing, given the uncertainties that we have in our system, that they're not going to improve over the near-term, that we're going to have this lack of fishery indices of abundance, no recruitment indices, whatever the other limitations are. Given the limitations that you just mentioned, what management procedures would get us the best outcomes and deal with some of the issues, like the discard mortality, for example, and so folks can chime-in and add to that, but does that help, Anne?

MS. LANGE: Well, yes, but, again, it's still using the same -- It still has the same holes in it that the assessments have, that everything that we try to do to provide management advice -- All those holes are still there, and using modeling, again, is great, but I'm not sure how much you can improve the model, especially when you're adding so much extra to it, and it's not just a single species, or a small conglomerate, and it's everything, and, to me, that just complicates things, and, again, the data holes are still there, and not just data, but understanding, some of the things we still don't have an understanding of, like distribution, or changes in distribution, and I understand that the modeling is trying to address some of that, but I'm not sure -- It just seems like it makes it more complicated.

DR. BUCKEL: Thanks, Anne, and so, Tom Carruthers, to that point. Go ahead, Tom.

DR. CARRUTHERS: We have heard of one example of an issue to do with the current assessment framework, to do with getting a handle on spatial distribution, maybe changes in spatial distribution, and so, in your current assessment framework, you can't overcome that, presumably, because you don't have the expertise in the data to describe a plausible scenario that could go through an assessment for that particular uncertainty, and is that correct?

If that is correct, then that is exactly the kind of situation that MSE was designed to solve, which is that there is an uncertain interpretation of the data, and those data may have holes in them and produce scenarios that could be equally likely, but you have no idea which is the best representation. If you can show that your management procedure is robust to that, and that it essentially doesn't matter, that enables you to prioritize your research for assessment and other things on those things which do have an impact on your management performance.

The idea here is to stop worrying about all the things we don't know and to start to focus on the things we don't know that matter, and the only way to do that is first to characterize those things and see which ones of those things are influential or not, and MSE provides you a way of doing that, and it actually helps answer the question of what's the next thing we should be worrying about in our assessment, for example.

DR. BUCKEL: Thank you, Tom. Fred Serchuk, go ahead.

DR. SERCHUK: Thank you, Chair. Just to follow-up a little bit on what Anne said, I think one of the biggest challenges is the effect of changing environmental conditions of all of the resources in the area, changing environmental conditions that we haven't seen, because of changes in the environment, particularly water temperatures, and changes in circulation patterns, and these affect the resources in a multitude of ways.

They can affect growth, and they can affect recruitment, and they can affect spatial patterns, and they can affect prey and predator relationships, and we really, in my mind, have very little hindsight, because I think we're approaching some environmental conditions that we haven't seen before, at least not the magnitude of changes, because of changes both, as I said, in the temperature regime and circulation patterns.

One might say, okay, and all we can do is go out and try to measure is growth affected, or is maturity affected, or is predator-prey relationships affected, but my feeling is that we're going into no-man's land in relationship to the types of environmental changes that are going on, that we can list them, but we really don't have very good information about the impacts throughout the system, and I think that, more than anything else, worries me, not only for this exercise, but for all the data collection that we do, and, you know, I just raise that, and maybe it's unsolvable problem, and maybe we -- I don't know how well we can model this, but I think we're going into a situation where we have no background, and we have no basis, for trying to understand the magnitude and directionality of the impacts on populations, in terms of their behavior, in terms of their population dynamics, and in terms of their distributions. I am sorry to be sort of not very optimistic about it, but, you know, we're seeing things in the environment that we never expected. Thank you.

DR. BUCKEL: Thanks, Fred. Tom Carruthers, go ahead.

DR. CARRUTHERS: Thanks for that, Fred. I think you are describing a very common concern in Canadian fisheries that we have with changes in ocean conditions over recent years. The bottom line here is that we may actually have a very bad ability to predict future changes in an exact way, to do with things like maturity, growth, and distribution. However, we can show rules that are robust to things.

I believe Adrian will have used the example of a pilot, and our job is try and scope out not the truth, not a forecast that anybody could necessarily believe in, but a set of conditions under which we could feel that a management approach was sufficiently robust and responsive to survive and provide us with good performance under those circumstances. In many different MSEs that we've worked on, it only a very small subset of the dynamics that change in the future that affect the ranking, or how you would choose a management procedure, and so we can actually discover which dynamics we have to care about.

Maybe range, changes in distribution, aren't a concern, because our index-linked management procedure just detects changes in abundance and fishes accordingly, but maybe it is sensitive to changes to somatic growth, and maybe it is sensitive to changes in maturity, and, right now, we don't know of those things, but, producing an MSE and including some scenarios for how climate and oceanographic conditions could change dynamics, we can work out which things we need to monitor most closely, because they will have the largest performance impacts on certain management procedures, and so I see this as a first step to basically being theoretically consistent with what we recommend. We don't know the truth, but we could say, theoretically, this is the most robust and best performing option available to us.

DR. BUCKEL: Thanks, Tom. Genny.

DR. NESSLAGE: Thanks. I am super excited about this project, and I'm glad you all are onboard. This is going to be great. I see this not as a stock assessment tool, and I see this, obviously, as a management tool, a tool for managers to explore what might happen if they pursue different policies, right, and so I guess, when we were asked what are the most important uncertainties in the fisheries system, I think one of the biggest struggles you might have is trying to identify how the anglers will respond to any of these management policies, and so I'm wondering if you could speak to that a little bit.

DR. BUCKEL: Go ahead, Tom.

DR. CARRUTHERS: Sadly, my audio was jumping in and out, and so I missed the question, but maybe, Adrian, you could answer it?

DR. BUCKEL: Go ahead, Adrian.

DR. HORDYK: Thanks. I just realized that I don't have a hand-raise option, and so I didn't want to butt-in, but I think that's an important part of the MSE. Like we've talked about, there is lots of different moving parts. We talk about uncertainty in the operating models and different approaches, but, obviously, the part you're talking about, Genny, is the response of the anglers to the management policies, like implementation.

It's one thing to set a management rule, or regulation, and perhaps an adaptive one that changes in response to data, but how is that going to be implemented, and is it going to be enforced on the water, and that could differ amongst different parts of the fishing fleet, for example, and so that's another key uncertainty, and so, if that's something we need to discuss, and try and map out scenarios for that, and our goal is to try to find a management approach that is robust to that uncertainty, and so, if you have something that can't be -- That is unlikely to be followed, or well-enforced in the fishery, that's important to know.

We might be able to -- For example, you can find that a management procedure works well under all conditions, except for it has to be enforced, and that at least helps you prioritize that enforcement, or communication perhaps, of trying to focus the energy on getting those particular anglers or whatever to follow the management regulations, and that would be a critical part of the success of the whole thing, and so, yes, I agree. It's important, and hopefully -- The idea of the analysis is to try to identify those conditions, so we can respond appropriately.

DR. BUCKEL: Go ahead, Genny.

DR. NESSLAGE: Just quickly, to follow-up, thank you, and we have a great Socioeconomic Panel here, as part of our process, and several of the members are on our SSC, and I was wondering if part of the plan for the project is to work with both that panel and stakeholders, to try and get at some of those uncertainties in implementation, because that will be critical, I think, and a good resource to tap into our folks, and I'm staring at them across the table.

DR. HORDYK: If I could just jump in, I think that would be great. That would be fantastic, to engage with you guys on this.

DR. BUCKEL: Great input. Chris and then Amy.

DR. DUMAS: I would just like to say that -- Thank you very much for the presentation, and I enjoyed it, and I think this is like a very good framework and environment for conducting simulation modeling for South Atlantic fisheries, and I think it lays everything out in a very logical way, and it makes sense, but it's not clear to me yet how this is an advance over the excellent simulation modeling that's been done in the past by our Southeast Fisheries Science Center scientists and that's been presented to the SSC in the past.

They have done excellent simulation modeling work, and maybe this is just a more general overall framework to conduct simulation modeling, and I'm all for that, and I think that's a good thing, but could anyone give me any additional, I guess, functionality that this framework brings to simulation modeling that we didn't already have in the past? There may be some aspects that I'm just not seeing. If it's just a general framework, that's fine. That's fine, and it doesn't really add any more functionality, and that's fine. That's not a negative thing, but I'm just curious if there is some additional functionality that I'm just not seeing. Thank you.

DR. BUCKEL: Thanks for that question, Chris. Chip Collier is going to address that.

DR. COLLIER: In the past, when we were looking at simulations, it was mainly simulations, or sensitivities, for stock assessments and running through that. This is looking at kind of the next phase, going into the policy and saying, all right, given these sets of conditions for these species, what management procedures will work to keep a sustainable stock, and so that's the biggest difference, and another aspect of this is it's looking at multiple species at once and not just a single species, and so it's trying to do a couple of different things.

Then they've also been exploring maybe putting a spatial component in there as well, and so looking at a bunch of different factors, and we're not exactly certain what-all is going to be included in it, but, right now, we're developing the framework based on what the stakeholders are guiding us to put in there, as well as we want to get input from the scientists as well.

DR. DUMAS: Thank you, Chip. That makes the incremental contribution of this effort much clearer to me. Thanks.

DR. BUCKEL: Amy.

DR. SCHUELLER: The question that was posed to us is what are the most important uncertainties in the fisheries system, and I immediately wrote down four things, and so I want to make sure they're in the notes, and the first was what happens under different management procedures, which is exactly what Genny brought up, and my thought was, if we have a change in season, or a change in space, what does the effort reallocation look like, and do we even know, and I think that's a critical uncertainty, and so I will talk about the other three.

The first one is discards, and I think that we don't have a good handle on discards in general, and it's changing through time, with the different fleets, and so that's going to impact our ability to get good estimates of fishing mortality. The second one that I had on the list was recruitment, and we talk about recruitment all the time, and we're uncertain about recruitment. It appears to be changing for some stocks, but not others, and what that's driven by I don't know, and people are working on it, and so that was my third one, I guess.

Then the other one was interactions between species. Since this is a multispecies MSE, I'm just -- I'm not sure what that really means exactly yet, and like how are the species going to interact within this is unclear to me, and I think they are interacting because it's a multispecies fishery, and so there would be some like maybe species switching among anglers or something, but are we going into the level of like -- They're not eating each other, right, or are they? I don't know exactly what this model is going to include, but there is just a litany of questions related to the interactions between whichever species are included in this MSE, and so those are my top four, I guess.

DR. BUCKEL: Thanks, Amy. Those are certainly at the tops of many of our lists, I'm sure, and so does anybody else want to -- While we're on that question, did that jog anybody's thoughts? Does anybody want to add to Amy's list? Chris.

DR. DUMAS: Data-limited species, and has that been mentioned in the list so far, the species that we have that, unfortunately, we have very little data? Thanks.

DR. BUCKEL: Good point, Chris. Thanks. We've been talking about the handful of species that we do assessments on, but we have many species here that are data-limited that we do not do the age-structured assessments on. Amy.

DR. SCHUELLER: Do we have a defined list of species, or is that something they're going to work on as they go through the process, and then -- I mean, the data-limited comment is a really good one, because, especially, some of those species are sort of rare catches in the multispecies fishery, and there will be impacts on them, and so are we just -- Are we ignoring them? What are we doing? It's a good question.

DR. BUCKEL: Chip, do you want to speak to that point, and then we'll go to Nikolai?

DR. COLLIER: The actual list of species is not finalized yet. We're going to try to get some input from the stakeholders, but I think you guys have a good point, is, you know, should we be considering one of these data-limited species in there. If you look at most of the landings right now, with the exception of gray snapper, the species that are assessed account for most of the landings for the snapper grouper complex, and so we feel like, if we bring those species along, some others might follow, as long as shifting of effort, or shifting of species, doesn't occur, but, you know, angler behavior is something that is hard to predict, but they haven't in the forty or fifty years that Magnuson has been managing this fishery, and it has never really popped up as a significant species, and there might be blips in MRIP here and there, but it's not necessarily a sustained high level of landings for some of these species, and then we really don't have an index of abundance as well, and so that's going to be a bit more challenging.

DR. BUCKEL: Thank you, Chip. Amy.

DR. SCHUELLER: So can I ask a question back to you? What if one of these management procedures causes greater catch in one of those species that then puts it over its ACL or something? How are we going to know that, if we don't include them, or at least like a representative them? Does that make sense? Do you understand what I'm asking, because, I mean, we wouldn't necessarily have to say, okay, we're going to pick this particular one, and we could sort of have a representative data-limited-type species that, under different management procedures, different

things happened, and then we could throw out the ones where, oh, that results in those types of species being over their ACL, and that's going to be an issue. I guess maybe I'm just making a statement like I think that probably something needs to be thought about with respect to that.

DR. COLLIER: So, just to follow-up with that, yes, and this is why we're coming to the scientists and getting ideas like this, is, yes, potentially look at something like that, and, as you were saying that, it was making me think, you know, it might vary among areas, right, and south Florida has a very different complex of species than the fisheries up off of Charleston, and so it might need to vary by area as well which species is included in there, and so thanks.

DR. BUCKEL: I believe we had Nikolai next. Go ahead, Nikolai.

DR. KLIBANSKY: Thanks. I was thinking, with regard to the multispecies aspect of the MSE simulation, that, you know, one thing that seemed like it may be possible, and would be really valuable, is, you know, we're constantly having all these discussions now, and have today, about discarding, and so, even if, in the multispecies model, we don't really know so much how the fish are interacting, the fish populations are interacting themselves, and we do have a lot of data on how, you know, a particular fleet catches multiple species at a given time, and so there would be a fair amount of empirical information, I think, to have the different operating models, which include the biology, but also the fleets, you know, and the interaction could occur there, and it could be pretty interesting to look at, you know, how do you avoid discarding --

How do you decrease discarding in Species 1, if you still have fishing for Species 2 through 5, or something like that, and, you know, we have a lot of trip-level information, and so we can, I think, pretty realistically characterize, you know, how much discarding is happening among fleets, to sort of explore different ways of kind of, you know, controlling -- Trying to manage in light of that dead discarding, and so I could sort of see the multispecies approach being really helpful, even if you just use that information and kind of, you know, ignored the species interactions on the biology side of things.

DR. BUCKEL: Thanks, Nikolai. Chris.

DR. DUMAS: Thanks, Nikolai, and I was about the same thing, and we could call that, you know, looking at incorporating co-occurrence of catch, and cooccurrence of discards, across species, and I think that's one example of what Amy was talking about with interactions with species, and that's one example of how that can occur, and cooccurrences can differ by fleets, and they can differ spatially, and differ across time of year.

That was my first comment, and my second comment is, thinking about the time step for this model, and I guess we've been using an annual timestep, but thinking about incorporating the recreational data, and we might want to use a wave timestep, a two-month timestep, possibly, but thinking about what would be the best timestep to use in this model would be an interesting thing to think about, and the best timestep could be different for different species, or different situations, and I think that's interesting.

Then my third comment is some features, some options, that would be interesting to see in the management options of the model, and one would be, you know, sort of Bayesian updating and how that would be possible, and how we could include that as part of a management strategy, and

the second, in sort of a list of three, would be inverse sampling, especially for rare species, and then the third would be sort of VAR methods and sort of time series modeling and to what extent we could accommodate that. Some of these features, you may already have these as options, and so I'm not sure, but I think these would be interesting to look at when we're thinking about different management procedures and ways to use the data. Thanks.

DR. BUCKEL: Okay. Adrian, please go ahead.

DR. HORDYK: I was just going to comment on that, and that was really helpful, all those comments, I thought, but just to comment on the management procedures, and so, just as a sort of general description of how it works, is we have a sort of standard data object that's generated from the operating model that, in this case, will be the data from each of the stocks and fleets that are in the operating model, and then that data is basically passed to just --

You can just generate a standard R function that takes that data object and does anything you like in there, and so, as long as you can imagine a way of processing that data using R libraries, and R packages, any of those things can be done internally inside the MP, just using normal R code, and it takes that standardized data object, and you can do whatever you like with it, and so it just returns a standard management recommendation object, which, again, can be by stock and fleet, and that just gets returned with those different management options that I listed earlier, size limits and so on. To answer that question, any of those things can be done on the inside. If somebody has an idea for a management procedure, or a way to convert data into management advice, if they can code it in R, it can be incorporated into a management procedure.

DR. BUCKEL: Thanks, Adrian. Are there other questions from SSC members? I think we've addressed the first and third action item. The second one -- Or we can check on all of them, but I think, for the first one, we've got some good points there. The third is what are the primary concerns with the data sources, and so some of those that you've got there below, Judd, are to go in different -- To address different questions, it looks like, and those aren't all to address that Question 3, correct?

DR. CURTIS: That's correct. This is just the initial notes, and so those can get broken up between those other questions and bullet points, but, if there's anything else that you want to add directly to the primary concerns with data sources, that would be helpful.

DR. BUCKEL: Is there anything below that? That's the end there? Okay. Genny.

DR. NESSLAGE: I have a question about the question. I think these folks already have the assessments in-hand, and I'm sure the Center will give them all the data that's already used in the assessments, and so I'm wondering if the really important question is, is there anything that's not in the assessments that can help inform the development of this model, because what we -- That huge list that we just gave them above is going to require more data than what is in the assessments, to go well, and to give us any sort of non-nonsensical answers, or at least well-informed answers, and so I guess I would look to the people from the region, who are wonderful data providers, to see at what level like -- What additional information that doesn't go into the assessments, or that might be available, but that can't be incorporated into our current BAM, for instance, might be useful for informing this MSE tool.

DR. BUCKEL: That will directly address the Question 2. Marcel.

DR. REICHERT: Thank you. To that point, I think spatial distribution of some of the data, that we are currently not really looking at in our stock assessments -- If these management strategy evaluations are going to look at that, then that's one of the data that we probably need, and, for some species, we have that. For other species, we do not, and it's not just on the fishery-independent side, but also on the fishery-dependent side, and then the -- What amount of detail is necessary is important, to see if the data is available.

DR. BUCKEL: Did you get that second one, Judd? Marcel, could you repeat your second one for Judd?

DR. REICHERT: The second -- Well, spatial for both fishery-independent and fishery-dependent data, and then the level of detail that is needed. I mean, what is your grid needed for potential spatial analyses, because we, collectively, may or may not have that information available.

DR. BUCKEL: Thanks, Marcel. Chris, did I see your hand?

DR. DUMAS: On the socioeconomic side, I'm not sure if this is currently incorporated, but, to help determine fishing effort and its distribution, spatial distribution, but, more importantly, it's distribution I guess over time, would be the unemployment rate and fuel prices, to make sure those are incorporated.

DR. BUCKEL: Marcel.

DR. REICHERT: This is a question for you, Chris, or others, and would fluctuations in market price be something that would be -- Because especially if you're looking at what time of the year the product is landed, and that may have an effect on socioeconomic aspects.

DR. DUMAS: Yes, of course.

DR. BUCKEL: Jennifer.

DR. SWEENEY-TOOKES: I just wanted to echo what Chris said, but then also adding, you know, a key component of this whole plan is that stakeholder participation is critical, and, yet, when I look at the summary, it looks like stakeholder input and feedback is primarily obtained from the APs, and that's a really limited group, and so I would just hope that there would be maybe openness to other socioeconomic data, other stakeholder input, and other venues as well.

DR. BUCKEL: Chris.

DR. DUMAS: To follow-up on that, like we were talking about earlier, if we had a database to capture and track the input from stakeholders, and someone mentioned I think the fishery performance reports as one source of that information, historical information, but, also, having that in some electronically-accessible form.

You know, just sort of brainstorming, it could be interesting, from a citizen science perspective, to have a web-based survey where the captains could go to the web-based survey once a month or

something, and I don't know, once a year, and say do you think catch is going to go up or down next year, yes or no, or similar types of questions, and what do you think recruitment is going to do next year, if it's going to be higher or lower, and you could put ranges on that, quantitative brackets, instead of just qualitative, but it would be interesting to get what are their predictions on different biological and, you know, economic and fishery measures, and then we could track those data over time, and, if they're also -- If they're helpful in making predictions, or projections, in combination with our other data series, well, then we could incorporate them.

DR. BUCKEL: Thank you, Chris. Chip, I'm not sure if you want to comment, and is there a plan for the MSE team to get input from stakeholders outside of the APs?

DR. COLLIER: This is one of the benefits of Reg Amendment 35 going ahead of the MSE. We're getting a lot of comments right now, overall, and so we can compare what we're hearing from the general public on some of the issues in the snapper grouper fishery and potentially address those and try to get those incorporated, but we probably can't do a survey, Chris. We would have to go through PRA in order to do that.

DR. BUCKEL: Jennifer.

DR. SWEENEY-TOOKES: This is great, and then, also, in the interest of transparency, making sure that that's clearly identified when this MSE is shared out, and, if it's transparent, then let's be really transparent about all the different ways that stakeholder input is being incorporated.

DR. BUCKEL: Great. Thank you. All right. I think that was an excellent setting us up, Genny, for addressing Question 2. Thank you. I do have -- I was thinking about Question 3, what are the primary concerns with the data sources, and one thought that I had, and others can weigh-in, is just how catchability has changed over time in this fishery, with electronics, with just -- I always think that things have gotten to the point where they can't get any more efficient, and the boats get faster, and so the time that hooks are in the water are longer, and with GPS position motors, and it's just -- Catchability just keeps increasing, and so I guess that's a concern with the data sources. If you're assuming constant catchability, that is incorrect, in this fishery, for these bottom -- For the snapper grouper fishery. I just wanted to add that, in terms of a concern. Any other comments from members who are present or online? Are folks happy with where we are with these action items? Marcel.

DR. REICHERT: I am kind of thinking about your last comment, and, I mean, do we know that it keeps increasing? Is that our assumption? In other words, perhaps changing or something, changing catchability or something like that.

DR. BUCKEL: We could say the potential that catchability continues to increase over time.

DR. REICHERT: It's not that I don't believe you, but, I mean, in terms of do we have information that that is -- Anyway, it's just a minor wording issue.

DR. BUCKEL: I think that it has not been quantified, and so you're absolutely right that that is anecdotal, but, yes, the potential that catchability continues to increase. There was a workshop at some point, I think before I was on the SSC, a catchability workshop right, and I don't know if

anybody here was involved with that. There was a before me. Erik, is that changing catchability -- Erik Williams is going to approach the table and remind us.

DR. WILLIAMS: Bring the old-timer to the table. Yes, we did -- If you go far enough back, we actually were formerly incorporating changes in catchability into our fishery-dependent CPUE indices, because we did -- There were a couple of studies that were done that sort of compared fishery-independent indices to fishery-dependent, to try and capture what that catchability change over time was, and there was the belief that it's driven by GPS, the onset of GPS, and then advances in boating technology of various forms and so on and so forth, but that was a while ago. Since we're recently shifted more to an emphasis on fishery-independent indices, we kind of shelved that stuff a little bit.

DR. BUCKEL: So I brought this up as a concern with the data sources, but, Erik, would you say that maybe, because we're not relying on fishery-dependent indices of abundance, that that's less of an issue, or is it still something that we need to be thoughtful of? I guess if you could --

DR. WILLIAMS: I mean, that's a good question. I think, from a stock assessment standpoint, you know, fishery-independent data is our better way to go for that, but I think, you know, using catch rates, and understanding catchability in the fishery, can be important for other things, and management considerations as well.

DR. BUCKEL: Thanks, Erik. Okay. Seeing no hands up, we're going to take our midafternoon break for fifteen minutes, and we will come back to the table at 3:35.

DR. CURTIS: Thank you, Adrian and Tom, for your presentation and for answering questions. You are released.

DR. BUCKEL: Yes. Thank you very much, Adrian and Tom.

DR. HORDYK: Thanks, all.

(Whereupon, a recess was taken.)

DR. BUCKEL: All right. Welcome back, everyone. We are moving on to Agenda Item Number 5, the Southeast Fisheries Science Center MSE Strategic Plan, and I will point you to Attachment 5a in the documents, and we have a presentation from Dr. Cassidy Peterson and Dr. John Walter, and Cassidy is here, and are you ready to go?

DR. PETERSON: Yes.

DR. BUCKEL: All right. Take it away.

SOUTHEAST FISHERIES SCIENCE CENTER MSE STRATEGIC PLAN

DR. PETERSON: All right. Thank you, and so I am the Management Strategy Evaluation Specialist for the Southeast Fisheries Science Center, and I appreciate you all giving me the time

to talk about sort of our strategic vision for how MSE might be of the greatest use within the Southeast Region.

Just to beat a dead horse, a little background strategy on management strategy evaluation and so this is the way that we sort of stress test, or torture test, different management procedures before we implement them in the real world, and a management procedure is essentially the thermostat of fisheries management, and so, essentially, we sort of set the temperature of the fishery, and, typically, that temperature is something like maintaining the stock at the biomass that supports maximum sustainable yield, and then we have a process where we sort of take the temperature, or collect data about the status of the stock, and we have an estimating model, which does not necessarily have to be a full population dynamics model, but it's how we sort of assess the status, or trajectory, of the stock.

We compare that to the desired state, and that sort of information gets fed into a predefined decision rule, and we call this the catch control rule, and this is where management advice is adaptively proposed, based on the measured status of the stock, and so if the stock temperature, essentially, is too high or low, management advice will adjust accordingly, and then that management advice will then get implemented back into the fishery, to hopefully maintain the stock at the desired temperature, and so all the process of generating data bout the model, the estimating model, the control rule, and the implementation model are all components of the management procedure itself.

The steps, according to best practices of management strategy evaluation, start with identifying management objectives, and this is how we are defining whether the management procedure performs well or performs poorly. Oftentimes, these already exist in fishery management plans or the like, but, where they do not exist, or where there's sort of competing stakeholder interests, these are ideally identified with stakeholder input.

These management objectives are then converted into performance metrics that we calculate from all of the operating models, to determine whether the management procedure performed well or not, and Number 2 is identify relevant uncertainties over which the management procedure should be robust, and so, again, if we're uncertain about what the natural mortality is, for example, we can build three different operating models, one with a low, medium, and high natural mortality level. We can run the MSE forward, over the next several decades, and determine whether this management procedure is robust to the true natural mortality.

If the management procedure performs well in each case, then we can probably infer that it is a -- It will probably perform well, regardless of the true natural mortality, even though we're uncertain of what it is, and this not only is useful for uncertainties that we have in the historical or current stock, but also in the future, and so this includes things like looking at non-stationarity or climate-induced impacts on the stock.

Number 3 is developing the operating models and conditioning them on available data, and this ensures that the projections are consistent with the type of data that we already have available to us. We identify management procedures that are responsive to the stock dynamics, and this is the full feedback loop that has been talked about in the previous presentations, and the management procedures, again, comprise each of the four different components highlighted in green in this figure, and then, lastly, we run the simulation exercise, summarize the results, and present them to stakeholders and to managers.

Because of how complete this process is, we can ask a lot of different questions with this approach, and so not only can we look at impacts of future and current dynamics, like climate impacts or ecosystem considerations or fishery dynamics, like socioeconomic implications or technical interactions with multiple fisheries, but we can look at different components of each of the different steps as well, and so we can look at the sampling design and how that might impact management procedure performance, and we can look at the complexity, or the parameterization of the estimation model and catch control rules, and we can also look at different types of implementation error as well.

The main purpose of an MSE is to develop and sort of torture test a management procedure, but it comes with a lot of really great ancillary benefits as well, and so we're forced to identify the management objectives of the system. Typically, this is through communication with stakeholders, and so it fosters increased transparency for stakeholders in the management process.

A key output from MSE is understanding the tradeoffs inherent in managing the natural resource, and so it really clearly outlines those tradeoffs, and it helps us to highlight future research priorities and prioritize future research, because, as Tom mentioned in the previous presentation, we can really highlight which uncertainties have the biggest impact on management performance, and those are probably the key uncertainties that we need to focus on, moving forward.

It will clearly identify management approaches that will not work for the given system. Most fishery management decisions are made with a short time horizon, and the management procedure, or the management strategy evaluation, allows us to look at long-term views as well, and, lastly, this is such a complicated process to undertake that, no matter what, we will come away with a better understanding of the stock and the management system.

I don't know exactly the date, but, within the past few years, each Fisheries Science Center was allocated the resources to hire an MSE specialist, and so, within the past three years or so, all of the positions have been filled for each of the Science Centers, and, because this is a new position, the first task that I sort of undertook, as the Southeast Management Strategy Evaluation Specialist, was to take stock of where MSE might be of the most use, or most valuable, within this region and centralize that into an MSE strategic plan for the Southeast Fisheries Science Center, and so that's kind of what I'm talking about today.

I will also note that MSEs are really resource-intensive processes. They require a lot of time, a lot of expertise, a lot of competing resources, and so the capacity that one individual has to sort of crank out MSEs is very limited, and so, instead of being the sole analyst doing MSEs in the Southeast Center, or in the Southeast Region, my goal is to sort of catalyze and coordinate these activities and make sure that they align with our strategic goals.

Part of the my role is to be a part of the National MSE Working Group, and so, just briefly, I will introduce that they are the MSE specialists at each of the Science Centers, along with some NMFS senior scientists, and we all participate in a National MSE Working Group, and we're tasked with kind of developing MSE best practices, coordinating and collaborating across the regions, tracking and monitoring regional MSE activities, and, also, serving as sort of a group thinktank, where we can share resources and problem solve, and it's been really useful.

One example of a collaboration that we've done was a manuscript that's in preparation entitled "When Should We Conduct a Management Strategy Evaluation", and this is being led by John Walter, and, in this publication, or in this manuscript, we sort of clarify, or categorize, different MSE activities, ranging from a full stakeholder MSE all the way through a desk MSE and categorizing activities that maybe don't require a full MSE.

Full stakeholder MSEs are the most resource expensive, but they require full iterative stakeholder involvement, and these are really intended for when management objectives are unknown or when the MSE is intended to be used to change some sort of management action. On the other side of the spectrum, desk MSEs can be used for general research questions, and there is no stakeholder input, or they can be used to look at management procedures where management objectives are already known, or already identified, like in a fishery management plan.

There is an intermediate level, where there is some interaction with stakeholders, but not the full iterative involvement, and then, lastly, again, there are some questions where MSE could be useful, but maybe they could be answered in simpler and less resource-expensive approaches, and so, keeping this sort of spectrum in mind, we developed the Southeast Strategic Plan for MSEs, really focusing on where we should prioritize a lot of our resources and a lot of our stakeholder involvement.

I will introduce some of the three sort of flagship MSEs that we've identified and we've sort of embarked upon thus far, and we're really focusing on high-profile, potentially regime-changing applications of management strategy evaluation that really could improve the way that management of these fisheries is conducted, and so the three species are outlined here: dolphinfish, Kemp's ridley sea turtle, and Gulf of Mexico shrimp. I will talk about each one in turn.

First, the dolphinfish in the South Atlantic. Dolphinfish are highly migratory, and so, because they have an international distribution, that means that there is an international component to the fishery and an international component to the data availability. We don't have enough data to run a full stock assessment on dolphinfish just yet, and we have a limited capacity to manage the entire stock. Right now, management is a static catch limit that's based on the third-highest catches observed between 1994 and 2007, and that can be problematic, because dolphin availability is largely fluctuating.

Dolphin are short-lived, and they are largely -- Their productivity is largely environmentally driven, and so static catch limits don't allow us to fully take advantage of the annual fluctuations that we see in availability every year, and so we're proposing to manage using what's called an empirical management procedure.

One of the more broad goals of the strategic plan is to explore data-limited catch control rules, and an example of that is empirical management procedures, and so traditional management procedures, like we think of them, are model based, and this is like the traditional stock assessment process, where we have a population dynamics model that we use to generate stock status information, and then that is fed into the catch control rule, to provide management advice when data is limited, or sometimes where a full stock assessment model might be inappropriate, empirical management procedures can be used in these management procedures.

There is no population dynamics model, and so we're using some other indicator of stock abundance, like an index of abundance, and we adjust management advice based on the behavior of that indicator, and it can look at simple as something like an increase in index of abundance might correspond to an increase in allowable catch in the next year, and these procedures can be more complex, of course, but they are definitely more simple than a full population dynamics model when we're looking at this for dolphinfish, and this is also the same sort of management procedure that we're looking at for Atlantic bluefin tuna as well.

We've already embarked on the first set of stakeholder workshops for dolphinfish. Earlier in October, we went to south Florida, and, next week, we'll be in southern New England, and then, in January, we're going to go to the Mid-Atlantic to conduct these stakeholder workshops. Here, we're looking to identify conceptual management objectives for the fishery, identify uncertainties that we should incorporate into the operating model reference grid, identify participants who would like to be involved iteratively throughout the remainder of the MSE process, and fully introduce the concept of management procedures and management strategy evaluation to the stakeholder participants.

As far as the quantitative analyses, this is going to be led by Matt Damiano and Jie Cao at NC State University, and it's going to be a spatial and seasonal operating model, and we're looking to build an empirical management procedure, and so, right now, this team is exploring indices, for their predictive ability, that we can use moving forward, and, ultimately, this will be a collaboration with the South Atlantic Fishery Management Council and Wes Merten at Beyond Our Shores Foundation.

A comparative example is Gulf of Mexico shrimp, and so, again, this is an annual crop with a short lifespan and highly environmentally-driven productivity. Currently, Gulf of Mexico shrimp are assessed with a full statistical catch-at-age Stock Synthesis model with a monthly time step, and this might be a little overkill for this stock, especially when we consider that the delay between data collection, assessment, and management implementation is longer than the lifespan of the stock, or of the shrimp, and so, again, we're proposing to use an empirical management procedure based on the concept of empirical dynamic modeling.

Empirical dynamic modeling is a really cool numerical modeling approach. It's useful for forecasting time series in a non-linear dynamical system, and the concept is that you can take a time series of a well-behaving system and model that time series as a function of its lag, and, in well-behaving non-linear dynamical systems, you can get really good predictive ability, using these approaches, and so Steve Munch and his post-doc, Cheng-Han, at the University of Southern California, have identified that EDM works really well and has a really good predictive ability for Gulf of Mexico shrimp, and we're now thinking that that could be a really useful predictive index to use as the basis of an empirical management procedure, and so we're looking forward to moving forward with that.

The third is Kemp's ridley sea turtle in the Gulf of Mexico, and, ironically enough, management strategy evaluation was kind of pioneered for protected resources, with the International Whaling Commission. It hasn't been used a bunch in protected resource management since, and so, obviously, the correct answer to protected resource management, in a vacuum, is just to not allow any mortality, don't allow any bycatch, but, in the real world, these protected resources are subject to technical interaction with other fisheries, and so we're interested in looking at how to -- We're

looking at developing sort of conservation strategies, which are protected resources vernacular for management procedures, for Kemp's ridley sea turtles, and hopefully doing some stakeholder involvement and using this as a blueprint for how to inform management strategies moving forward.

This will be a project that's led by Susie Piacenza at Oregon State University and with collaboration from SERO, and this is going to be a spatially-explicit individual-based model, and that's going to be the operating model, and it's going to focus on bycatch mitigation approaches and potentially looking at the impact of additional data collection regimes, like in-water surveys and close-kin-mark-recapture.

These are some of our flagship MSEs that we're really excited about, but the MSE strategic plan also outlines some additional goals, and so, going beyond sort of our flagships, an additional goal is capacity development, and so I already mentioned that MSEs are really resource intensive processes, and so a way to expand our reach with MSEs is to pursue collaborations, both internally within the Science Center, across divisions and branches, but also externally, and so that includes the council, and that includes university partners, regional fishery management organizations, and across Science Centers as well.

I don't have to go into too much detail about this example, and this is coming from Nikolai's interim approaches exploration, but one goal is to look at ways that we can improve our assessment turnover, and so a couple of ways is looking at interim approaches, and another is assessment frequency, and so this is a figure coming from Nikolai's work that showed that the interim assessment approach certainly could be valid, and additional research is warranted, and so we're going to move forward with that.

Another such example is where we can reduce assessment frequency, and so this was an application to the sandbar shark, where we looked at the impact of stock assessment frequency every one, five, ten, or fifteen years, like we can see on the figure on the X-axis, and each plot shows some performance metrics for the stock, and, as you can see, the impact of increasing stock assessment frequency, or reducing stock assessment frequency, is pretty minimal across these performance metrics, and so, for slow-growing species, like sharks, that have a relatively direct stock-recruitment relationship, that aren't particularly economically valuable, they might be good candidates for reduced assessment frequency.

Another goal is to think more broadly about ecosystem impacts, and so, in addition to the South Atlantic Council's MSE, here's an application, again led by Tom Carruthers and Blue Matter Science, for Atlantic bluefin tuna, through ICCAT. This is a multiarea, two-stock operating model, and so it's a really complicated modeling exercise, and there is mixing between the two stocks, and so this is a plot that shows the tradeoffs between east average catch over the first thirty years, and so this is average catch in the eastern stock on the Y-axis, and biomass ratio after thirty projected years in the west, and each point is comprised of letters and numbers, and that is different parameterizations of four different candidate management procedures, and the bars are 90 percent confidence bounds.

We can see that, if we have higher catches in the east, there's going to be a tradeoff with the western stock, and there's going to be less biomass after the first thirty years, and so considering these sort of ecosystem impacts is one of the goals of the strategic plan as well.

Another example of looking at sort of the ecosystem factors comes from some stakeholder participatory workshops that are led by Mandy Karnauskas and Matt McPherson at the Center. They conducted some dolphin wahoo participatory workshops in 2020, and this is to get an idea -- All of the stakeholder participants sort of gave us a conceptual map of what impacted abundance and availability of dolphin and wahoo in their region, and that gave us input on how they perceive the fishery.

These were converted into sort of conceptual maps, and this gave us some really great information on socioeconomics, fisher behavior, local ecological knowledge that Mandy and Matt were able to follow-up on and validate a lot of it, and so this was a really useful exercise.

Another goal is to look at how management procedures will perform in the face of non-stationarity and climate change, and here's an example of a desk MSE that was built using the openMSE software built by Blue Matter Science, and this was a desk MSE, and these plots all show spawning stock biomass ratio trajectories, and they are the median behavior for each different management procedure.

Each line represents a different management procedure, and the lines are color-coded, and so all of the black lines are model-based management procedures, and the blue lines are empirical management procedures, and each different plot shows a different operating model scenario, and so the first, the top-left, is the base case scenario, and so everything performs relatively well, and then, as we move to the right, we have scenarios where there is a regime shift, in the form of age-zero natural mortality, high and low, and we have a scenario with episodic natural mortality events. Then there is a high and low shift in recruitment deviations and then a non-stationary recruitment deviation scenario, and then, at the bottom, the bottom-right, is a reference -- A bias in the reference point calculations, and there was a couple more that we left out, but these are the ones that I want to highlight here.

We ran this for three species in the South Atlantic, and these are just results for vermilion snapper, and the one take-home is that we can see, when we have a regime shift, that all of the black and gray lines tend to shift, and they don't ever make their way back to a spawning stock biomass ratio of one, but we can see that some of the blue lines, or the empirical management procedures, have some more flexibility and that they are able to kind of push their way back towards the desired spawning stock biomass ratio of one, and so our take-home from these preliminary analyses suggests that empirical management procedures may be better able to adapt to a non-stationary environment than traditional model-based management procedures, and so this is something we definitely want to follow-up on.

Another example of empirical management procedure performance, in the face of climate change, comes from the Atlantic bluefin tuna MSE. Here, we're looking at median catch trajectories and median spawning stock biomass trajectories for the eastern stock that is simulated in this example. We have the median trajectories of the impact of zero catch, with four different candidate management procedures, and the left two plots show a scenario where projected recruitment is constant in the east, and the left scenarios, or the left-two plots, show a scenario where projected recruitment will decline in the east.

Right now, we're kind of in a -- There's a Superman effect of recruitment in the eastern stock, which is why we see an increase in catch and an increase in biomass in the next few years, but we can see that, when recruitment is projected to be constant, that it kind of quickly levels off in both the catch and the spawning stock biomass ratio, but, where we see recruitment declines, we can see that these empirical management procedures are flexible enough to really ramp down on the allowable catch to allow the stock to recover and maintain a relatively healthy spawning stock biomass ratio.

Another goal is to focus on recreationally-dominated fisheries, and so this is a problem that's maybe more important in the Southeast than some of the other regions, and here's an example that I am highlighting, and please direct all the questions on this to Jie, because this is his work, but it's a really interesting management strategy evaluation tool that is looking at tradeoffs in management objectives between recreationally and commercially-driven fisheries, and this was an application that had intermediate stakeholder input, and so they conducted phone interviews to get management objectives, and they looked at how MSY and F-based management procedures would impact the stock.

Another goal is to look at the survey enterprise and sort of prioritize data availability, quality, and efficiency in our data collection regimes. However, this is a case where maybe the full feedback loop for MSE isn't necessary, and that's demonstrated by this figure, which was taken from a publication by Katie Siegfried and colleagues, and it found that the way to improve stock assessments was by increasing age comp data within the commercial sector, but this, again, was not a full feedback loop MSE, and this was just a straightforward simulation analysis, and so this is a priority, but, again, keeping that spectrum of MSE stakeholder input in mind, this might be lower on the list.

Another consideration is building MSE tools and learning all of the great MSE tools that are already in existence, and so, of course, we've talked a lot about openMSE that was built and is developed and maintained by Blue Matter Science, and I also want to highlight SS MSE, which was the result of a cross-collaboration between the Southeast Fisheries Science Center and the Northwest Fisheries Science Center, and this converts a Stock Synthesis assessment model into the operating model for an MSE.

A whole bunch of other goals that I have put into miscellaneous, but, more appropriately, these are a lot of the desk MSE questions that we might have in mind, and so things like running desk MSEs to improve the stock assessment process, or to improve our understanding of different management approaches, generally, and a lot of desk MSEs are conducted using species of sort of generic life history, with maybe a fast-growing, a medium-growing, and a slow-growing life history strategy and looking at how generic management procedures can be developed and how they might perform to each of these types of questions are still high priority, and we include them here.

Then there are some broader conceptual questions that might be a little bit harder to define, and one such example is shown by this plot here. This was another MSE applied to sandbar shark, and we have the performance of a bunch -- Of twenty-four different control rules along the bottom, and we're looking at three different performance metrics here, and we can see that there's three bars of different colors, and that's because the sandbar shark is exploited by Mexico, as well as the United States, and so, obviously, the capacity that the United States has to manage the stock is

limited, and so we looked at three different implementation scenarios, one where all of the removals from the stock were managed, or regulated, by the harvest control rule, or the catch control rule, one where we assume that unregulated catches are continuing in the future at a low constant value, and one, which is the red bar, where we assume that the harvest rate of unregulated catches is constant, and so, as the stock biomass recovers, the amount of unregulated catches will increase as well.

One take-home that I want to get is we can see that these last two catch control rules -- There is no red bar for U.S. cumulative commercial catch, and so, in a hundred projected years, there is no commercial catch, and these are the most conservative of the catch control rules, and we can see that, when we assume the high rate of unregulated fishing, that does not reduce our probability of overfishing at all, and it does not improve our probability of recovery, and that is because, if we assume a constant harvest rate of unregulated catches, that rate might be too high to ever allow the stock to recover, and so this is a really important consideration to think about when managing internationally-exploited species.

That also lends us to working in collaboration with regional fishery management organizations, like ICCAT. In addition to the bluefin tuna MSE, we're also collaborating on northern swordfish and tropical tuna MSEs that are ongoing right now, and so I think that's it, and I'm happy to answer questions, and please reach out to me with ideas that you have for MSEs in the region.

DR. BUCKEL: Thank you very much, Cassidy. That was an excellent presentation, and I look forward to working with you. Are there questions from SSC members here or online for Cassidy? Genny.

DR. NESSLAGE: So many questions today. I am also very excited about all this, and I'm glad that you're onboard as well, and this is actually a marine mammal question. I wasn't -- I was going to ask you this offline, but I want to do it on the record for a reason, because I see now that you were talking about sea turtles, and I'm a member of the Atlantic Scientific Review Group, which the scientific review groups are like SSCs for the Marine Mammal Protection Act, and the group was presented with the idea of using MSEs to identify data priorities, kind of like what you were talking about, how to improve efficiency of data collection for coming up with stock assessments for the marine mammals, basically from Maine all the way through the Gulf of Mexico and down into the Caribbean, by Andre Pont and his group.

It fell on completely deaf ears, not only amongst the committee members, but also amongst the NOAA staff, and they were -- They looked -- Everyone just kind of looked kind of glazed, or eyes glazed over, and so I was wondering if you had any plans to interact with, educate, collaborate, with your NOAA Fisheries folks who are on the protected species side of the shop, and particularly the marine mammal side.

In the South Atlantic, there's a number of programs that could benefit, and stock assessments that could benefit, from MSEs, and I am wondering as well -- I guess the reason I'm bringing it up here, and on the record, is because we don't have any control -- The SSC has no control, or authority, or any sort of task for marine mammals, but it impacts our fisheries in the region, should protected species interact with -- Or fisheries interact with those projected species, and so I think it's important for our stakeholders, and so I was wondering if you had any plans to reach out to the marine mammal side of the shop. That was a long-winded question.

DR. PETERSON: But it was a good one, and so thank you for asking it. Yes, and so we are being very strategic, and treading very carefully, because this could be a very contentious area, and so we are working with the marine mammal and turtle division within the Center, and it's mostly sea turtle people, because, of course, we're focusing on turtles for right now, and we're collaborating with the Southeast Regional Office, and we are -- The reason that I can't share the MSE strategic plan more broadly is because we do have a blurb about the Kemp's ridley MSE, and we need to vet it appropriately through OPR first, and so we're definitely trying to be mindful about our way forward, and we are trying to socialize this concept with all the protected resources folks.

DR. DUMAS: Thanks, Cassidy. I think that was a great presentation, and I'm going to steal a lot of these slides for my fishery management class, when I try to attempt to explain MSE to them, and so this is fantastic. I just had a -- One question is, on the slide with Atlantic bluefin, should the tradeoffs -- There was a tradeoff slide. That one right there, and so, looking at those confidence intervals, they really overlap, and so is this really telling us anything? In these kinds of situations, when those confidence intervals overlap so much, can we really say that those -- I guess are there different colors for different MPs, and so can we say those are really different? Like what are your thoughts on that?

DR. PETERSON: It's a really good observation, and so I am part of the bluefin tuna MSE communications group, and I am violating our rule here by showing you results across three different recruitment scenarios, and so we are making -- Again, these are results presented across the full operating model grid, the reference grid, which is comprised of forty-eight different operating models, and each one makes really different assumptions about the current and future dynamics of the stock.

Part of the reason that these uncertainty bounds are so big is because like we cover -- In this slide, we're looking at different recruitment regimes, and so we can see how differently the catch and the biomass trajectories look, and, again, these are median trajectories, and so they're a lot more variable with respect to two of the different recruitment scenarios, and so part of the reason that the confidence bounds are really big is because we are, again, compiling results across that whole suite of operating models, but it's still interesting to note that there is --

If you follow the confidence bounds, they follow similar trends, and so there are different ways, beyond just looking at the median performance metric. There are different ways that we've been tabulating the results and looking at them, to look at different risk metrics and stock status and things like that. I would say that they are so broad, right now, because, again, we're not projecting future scenarios, and we're torture testing across a variety of different plausible futures, and that is reflected here.

DR. DUMAS: Thanks. Yes, that makes a lot of sense. Two other points, and one would be, in one slide, you were assessing different assessment frequencies, and I think that would also be -- Another useful application of that would be to look at the MRIP assessment frequencies by wave, and one-month versus two-month sort of assessment frequencies, and that could be another -- If you haven't looked at that yet, that could be useful.

Then, also, using this to not only compare different MPs, different management programs, but also to look at comparing different estimating models for a given operating model and a given MP, and

how do the different estimating models compare, those types of -- That question comes up a lot in various forms in our SSC discussions, and so I think this has great potential to help us look at that also, and so thank you.

DR. PETERSON: To quickly follow-up on your second point, one of the sort of key items that's listed in the strategic plan is looking at, quote, right-weighting estimating models, or stock assessment models, and we just haven't made any progress on that item yet, but it's definitely included, and so thank you for your recommendation.

DR. BUCKEL: Marcel.

DR. REICHERT: I am sorry if this goes a little bit into the weeds, and let me know if that's the case, but, on Slide 11, and that's the dolphin, you mentioned the indicator-based management, and can you tell us a little bit about what indicators are being considered there?

DR. PETERSON: This is another question that Jie might have a good answer to as well, and we're still working on identifying the best predictive indices to use for this. One example is using pelagic logbook data that's been run through a VAST model, and that's one of the ideas that we have, that we might move forward, but this team is looking at a whole suite of different -- A suite of different indices, including things like fishery -- What is it when you -- I am blanking on the word right now. Like when you have a competition. Fishing tournament data in Puerto Rico. Thank you very much, but, yes, there's a whole suite of different indices that we're looking at. Some ideas have come up, including environmental indices, looking at, you know, temperature, and indicators like that as well, but we don't have any defined, as of right now.

DR. REICHERT: Thank you, and the second question I had was that refers to Slide 23, and you may have mentioned that, but, the traditional model, that was based on the stock assessments, and like that's a traditional stock assessment model, and, in your modeling, those stock assessments were performed every so many years, or just one and then the rest was based on the projections coming out of that stock assessment?

DR. PETERSON: Good question, and so this work built off of all of Nikolai's really great work looking at interim assessments, and so, if memory serves, they were all statistical catch-at-age models with data management implementation lags, and the solid black line I think is an annual stock assessment, and the different colors of black and gray are statistical catch-at-age models with a five or ten-year lag.

DR. REICHERT: Thank you for the clarification.

DR. BUCKEL: Jennifer.

DR. SWEENEY-TOOKES: Thank you. Back on Slide 7, I got really excited, and you said that we were going to talk about these different models, and the full stakeholder MSE versus the intermediate versus the desk, and I may have missed it, but I know that you mentioned the workshop that was done, and you mentioned that that was full stakeholder, and you mentioned phone interviews with stakeholders for intermediate, but could you define like how those are being decided? What are the definitions, and what's the criteria for being full versus intermediate?

DR. PETERSON: I think that's a good question, and I wouldn't say that I have the correct answer, but I would say a full stakeholder MSE involves sort of an open forum, where any interested stakeholder can come and voice their opinions at the frontend, and then maybe a smaller group is iteratively involved throughout the process, and so, as results come forward, they work on refining the management objectives, from sort of conceptual management objectives to operational management objectives, and so we're able to put kind of a number to it, and they are providing input on the type of management procedure that's being proposed and what directions they want to see the management procedure move forward. They are typically involved from the very beginning, before any analyst, you know, opens up R, all the way through to the end of the process.

An intermediate MSE might be something where there is stakeholder engagement at the frontend, and it might be a small group that is providing input, once or a couple of times throughout the process, and anything less than that full, and everyone is allowed to comment, and then an iterative engagement, and so anything ranging from that to nothing I would say is intermediate.

DR. SWEENEY-TOOKES: Thank you, and that will be consistently explained and identified and held to throughout this whole process, right? Stakeholder engagement is one of those really squishy things, and really expensive, and so it's sort of one of the first things to be dropped off.

DR. PETERSON: Yes, and hopefully this manuscript will be submitted. We're ready to submit any day now, and so hopefully it will get published, and it will be able to provide guidance to future analysts and managers, moving forward.

DR. BUCKEL: Genny.

DR. NESSLAGE: Not so much a question, but a comment. A year or two ago, our ABC Category 4 Control Rule Working Group had recommended exploring some sort of empirical harvest strategy for our data-limited group of stocks, and so I'm super excited to see the dolphin work come out, because that's kind of exactly what we were hoping for, and hopefully that sort of approach can be expanded to some of our other data-limited species, because it is desperately needed, and we've been recommending and asking for that for a while, and I don't know if our data-limited workgroup will ever get off the ground, but we would love to hear more about that project when we do.

DR. BUCKEL: Other comments for Cassidy, or questions? Anyone online, Chip? All right. Last chance. I do want to ask for public comment. Dewey, go ahead with your question.

MR. HEMILRIGHT: Thank you. Can you go back to page 6? I believe that's what it is, and, basically, my question is, with the newness of MSE, and the species you've chosen here, mahi, Kemp's ridley, and shrimp, do you think, in the future, you will choose some species that are predominantly cooccurring species, or stocks, like snapper grouper stocks, to look at this, because until something in the MSE world is done, for folks to understand exactly what the outcome of what we see on the water, people will still be kind of, well, suspect, a little bit, but it's --

I think you used the words "torture testing" a lot in your presentation, and just some of this is torture testing my head, when I look over it, but just, hopefully, in the future, there is some prime examples of, when you're doing MSE, something that is more of a stationary species that is caught

by both -- In the South Atlantic realm, versus something that's like highly migratory, the mahi, and the Kemp's ridley and the shrimp, but thank you for that.

DR. BUCKEL: Thanks, Dewey. Any other public comment? Other SSC members? Fred Serchuk, go ahead.

DR. SERCHUK: Just a reminder that, the other day, I sent out a news release, or a news article, in relationship to a public hearing that was held on mahi-mahi, and you may have seen some of the different views that were expressed there, and I hope you read it. Thank you.

DR. BUCKEL: Yes, and thank you, Fred, for sending that and for all the other items that you send. We appreciate it. Okay. Cassidy, thanks again. We much appreciate it, and we have a little bit of time before we end at 5:00, and so we're going to have Kathleen come up and give us the SEDAR report, and that will save us time on day-three. Thanks, Kathleen, for going early. This is Item 14, I believe, or 11. Sorry. This was slated for Thursday morning, first thing, and it's Attachment 11a and Attachment 11b.

SEDAR: GOLDEN TILEFISH, BLUELINE TILEFISH, SADL SURVEY

MS. HOWINGTON: Okay, and so we're going to go ahead and start off with the more complicated thing that I need to bring to you all's attention, or, first off, hi. My name is Kathleen Howington, and I'm the SEDAR Coordinator. Hi, everyone.

We're going to be looking at tilefish, which is scheduled to have an operational assessment in 2024, with potentially two to three webinars starting early in the year, and we're hoping that this one is going to be the first half of the year, and the first thing that I want to review with you guys is the terms of reference, and so, to give you a little bit of a background here, you all approved the statements of work. That came to me in May, and I then turned them into a term of reference. I don't make any edits, and I don't make any changes. It's exactly what you guys give me, and I turn it into a term of reference.

I then send it to the Science Center, specifically Erik Williams. Erik Williams then gives me, you know, a little bit of feedback, or maybe some wording, and, typically, it's pretty minor, and I come to you guys with a term of reference that gets looked at, as well as, as I have told you multiple times, I have my notes on here that are always, you know, here are the suggestions, or little tiny tweaks.

This time, Erik came back with a pretty substantial change in the terms of reference, I think trying to improve our efficiency, and so I didn't feel comfortable making those decisions all on my own, and so you now have Option 1, which is the generic terms of reference that I, you know, just build from your statement of work, and you have Option 2, which is the terms of reference that Erik Williams responded after I asked him for his feedback.

I would love it if we could go through and review some of the changes and edits and then discuss what the final wording you guys want in these terms of reference to be. I know that Erik Williams is here, and I have asked him, if you have any questions about any of the changes that he made,

and he is here to be able to kind of give some feedback on his perspective and what he's planning on doing.

With that, I'm actually going to change the view so that we can see both. We want to be able to see both. I do have, for the people who are in-person, hard-copy printouts, if anybody just wants to have hard-copy printouts to put next to each other, and I will come to you, if you need it, as soon as I'm finished arranging these. All right.

Does anybody need hard-copy printouts to compare the two? If you're online, you can zoom-in and out by using your scroll mouse button, and then, if you don't have a scroll on your mouse, you can actually, I think, hit Control-minus or plus, and that should be able to go in or out as well. Unfortunately, for the people who are watching, we are going to have to put Option 1 on the left screen, which you cannot see, and I apologize for that. Like I said, Option 1, that's your normal, generic TOR, and Option 2 is feedback from the Science Center, and I guess feel free to discuss. Marcel.

DR. REICHERT: You and I emailed back a forth a little bit about it, and my first confusion with Option 1 is the 2024, and so data provided may include preliminary data or partial 2024 data, and my question was should that be 2023? In other words, what happens with the 2023 data, or is this a typo?

MS. HOWINGTON: That is not a typo. That is, since it's starting in 2024, the last time we wrote that term of reference -- To remind you all, this is when we were doing blueline tilefish, and we were doing this via email, and it was whatever the year that the assessment is going to start, and so, that way, we can get as much data as humanly possible.

Now, tilefish is, right now, scheduled to start in early 2024, and so we probably wouldn't even get any data from that year, but that is why it's written the way it is, is the statement of work said 2022, and then partial preliminary data, as much as humanly possible, since it starts in 2024, and 2024 is on there, and I actually have that -- Again, my messy notes over here, and it says we need to ask this.

DR. REICHERT: I understand that, but I'm wondering, and so there's no 2023 data, and I understand that for the projections, but it also said could be used in the stock assessment models.

MS. HOWINGTON: Through 2024 is what we need to say. Sorry. Now I understand where you're coming from. Yes. Data providers may decide to include preliminary or partial data through 2024.

DR. REICHERT: Thank you. That explains -- Okay. Thank you.

MS. HOWINGTON: All right, and so let's just go ahead and compare TOR Number 1 with TOR Number 1 and see what you guys like or dislike about the two. I believe that what Erik did is he actually split 1 and 2 up, or 1 up into 1 and 2, and so let's just look at the first-half of TOR Number 1 in Option 1 and TOR Number in Option 2.

DR. BUCKEL: Amy.

DR. SCHUELLER: I am not sure the correction that was made really helps me, and so, I mean, are you saying that the terminal year for the assessment is expected to be 2022, but there may be 2023 and 2024 data available?

MS. HOWINGTON: I believe that was the purpose of trying to reword this term of reference, to try and include as much data as humanly possible, while still giving data providers a goal of get 2022 data in. If you potentially can get us 2023 data, or 2024 data, we would also appreciate that.

DR. SCHUELLER: Well, I will just put on the table that I read both of these two options, and I immediately felt like Option 2 like sat better with me in general. I will just say that.

MS. HOWINGTON: Okay, and so we have an opinion for -- Is that the entirety of Option 2, the whole terms of reference? All right. Does anyone have a different preference, if they prefer Option 1? Okay, and so, personally, for me --

DR. REICHERT: Well, just a clarifying question, and so does that mean -- Does that change the timing of the stock assessment? This basically means the terminal year would be 2023, with whatever data is available through 2023, but at least you would have the data through 2022, and, if that's the case, my question would be -- I know it's probably impossible to answer, but what does that do to the uncertainty, ultimately, in terms of having partial data, and I'm not sure if there is an answer to that question or if anyone would be willing to address that.

MS. HOWINGTON: I think it depends on what data is submitted that is partial, or preliminary. What we're doing right now, with 76, is everyone submitted as much data as they had possible, and they just indicated that this is only a partial year, or this only goes through here, and this year is complete, and so, by doing that, then the analyst is able to look and say, okay, and so this is only the first two months of one year, or this is only from this one dataset, and so they're able to actually look at that, and then the analyst is the one that determines that, okay, maybe we shouldn't use this partial data, or, no, this partial data could potentially inform our projections, or this partial data is not going to be used.

DR. SCHUELLER: I mean, I see different reactions to these by data providers, and so Option 1 would be that you would have data providers provide you everything they have through 2022, and likely you won't get anything else, because they're moving on to some other species, and you're not going to get anything additional, and that's my concern with Option 1.

Option 2, they might do everything in their power to get you everything through 2023, because it says that, but I think it might also cause a lot of stress on folks, and a lot of machinations upfront about how that's not going to possible, and so I assume there will be a lot of discussion upfront about whether or not that's possible, and so I think there's issues with both, and it's sort of which one do you prefer. The reason I picked Option 2, and I had no idea who submitted what. I just read them both and thought, well, two sounds a bit clearer to me, is because I just think it's more straightforward to give one year, without this sort of, you know, predication here, I guess, and I don't know.

MS. HOWINGTON: I think you all's thought, when you were writing the blueline tilefish, was let's make a terminal year and then get as much as we can, but, if there's going to lead to confusion -- The other thing, and Erik understands, and I am right there with him, but I understand that, also,

the tilefish is probably going to start in the beginning of 2024, and so there's a chance that a lot of data providers can't complete their data by then, and so, again, this is you all's decision, and that's just where I'm coming from mentally, knowing of the schedule.

DR. BUCKEL: Chris.

DR. DUMAS: It appears to me that another difference between Option 1 and Option 2 is Option 1 mentions some specific issues to look into in Item Numbers 4 through 7, and Option 2 does not mention those specific issues, but just perhaps incorporates it in more general terms, and did the SSC want those specific issues and items, 4 through 7, specifically to be looked into, or is the assumption that those issues are included within the more general terminology in Option 2?

MS. HOWINGTON: The statement of work did list Items 4 through 7 specifically. Now, one of the suggestions that I was going to make is Number 5 and 6 are also repeated in the topical working group, and so I was actually going to suggest removing those anyway, but then 4 and 7 then are not moved over to Option 2. I think it would be understood that -- I guess, if the Science Center has the ability to do those things, they can, but they did not get copied over into Option 2 for the terms of reference.

DR. DUMAS: Just a follow-up, and there may be good reasons why these specific items are not included in Option 2, and maybe they're more advanced, or more methods, or more appropriate data to use instead of looking at specific items, but do we know why, why those specific items were not included in Option 2?

MS. HOWINGTON: I believe that Erik Williams was trying to come up with a general terms of reference that allowed the assessment more flexibility, instead of giving specific goals and things for them to meet in an assessment that might not be as high of a priority or as efficient, to make the assessment complete.

DR. WILLIAMS: Yes, and the thinking is we often set a terminal data on these assessments, and we set it before the fine schedule of when, within a year, an assessment occurs, and that creates a problem if -- So let's say we put, in the terms of reference, that we want data through 2023, but we're looking at the schedule, and we're trying to put it at the frontend of 2024. Well, because of that TOR that specifically says you must have 2023 data, that automatically bumps that assessment to the latter half of the year, or even further, and so the point here is to actually allow flexibility to allow whatever data is available at that time -- I mean, I think data providers, hopefully, are doing their due diligent work and looking at the schedule and knowing what species are coming up and processing their data as quickly as they can for that particular species.

The terminal year of an assessment is much like the decision of the starting year in an assessment, and you don't always have the complete dataset. You have incomplete datasets all the time when you're deciding the starting year, and the same thing can happen on the backend, and probably should happen on the backend. We should have a decision of what terminal year to run the model through, based on the data that is available, and I would add, on top of that, if, say you are conservative in the way that you choose that terminal year, so that you want to make sure that you have a complete dataset for that final year, there may be some other data sources that have the next year's data.

Well, guess what? That is going to be important for our projection analyses then, and we can use it then, because we have it in-hand, and so this is all an attempt to sort of make these things a little more generic, allow more flexibility in the way we're ingesting the data and using it in the model, as best we can. That's where I'm coming from.

DR. BUCKEL: Genny.

DR. NESSLAGE: But I think Chris's question was specifically to 4 and 7 in Option 1, which, correct me if I'm wrong, and my memory doesn't serve me properly, Erik, but I believe 4 and 7 were addressed during the last update, and so I think it makes sense that you pulled them out.

DR. WILLIAMS: Yes, and I think they were, and, again, when we start talking about specific data sources, or even specific methods, that may have been used in the last assessment, and that's the other reason to go with a generic set of -- A more generic set of TORs, is it allows us the flexibility to incorporate the latest-and-greatest methods or techniques or whatever. We ran across this issue with tilefish, in particular, when the Dirichlet multinomial likelihood became sort of the likelihood of choice for composition data, and we went with it in the assessment, and we ended up getting sued because we didn't specify it in the terms of reference, and that was just kind of silly, frankly.

DR. BUCKEL: Genny.

DR. NESSLAGE: I agree with Erik completely, but just remember the reason these were more specific than they needed to be was because this was that transition set of TORs and statements of work, where we were seeing them before -- Right before we got the update, and so we were like, well, we're not sure what's going to happen in the update, but, if it doesn't happen in the update, then we should do this during the next assessment, and so it was really stupid in the timing, and poor Kathleen got stuck in the middle of it, and so I think this is great, and I love what Erik has done with it, and I support Option 2.

MS. HOWINGTON: We can mix them together, if you want, but it seems that everyone is liking Erik's Option 2.

DR. BUCKEL: Marcel.

DR. REICHERT: Well, some of the things that I was going to say were just mentioned, thinking back on the previous tilefish assessment. Also, I am thinking back to our previous SSC meeting for yellowtail and Spanish, where a lot of details in the terms of reference get us to, well, this wasn't explored in the assessment, but it was also not part of the terms of reference, and so I would also support a little more flexibility and more generic terminology in the terms of reference, to give the assessment team some flexibility in terms of what to explore and what not to explore, to get us out of that conundrum of, well, you know, it wasn't done because it wasn't part of the terms of reference, and so I like Option Number 2, because I think that gives the assessment team a little more flexibility, and, as a former data provider, I completely agree with Erik, in terms of the timing and providing the data that are, at that point, available, and I think we've seen, in previous stock assessments, that then, during the process, maybe additional data become available that then can be incorporated in later model runs.

DR. BUCKEL: Thanks, Marcel. Fred Serchuk.

DR. SERCHUK: Thank you, Chair. I have two minds concerning these drafts. One is I think, for an operational assessment, because it is an operational assessment and not a benchmark assessment, there ought to be sort of a standard format, okay, and Option 1 was trying to do that. Erik is right that, by being more specific about many of the things here, there is a greater likelihood that they will be accomplished, rather than having some rather general things about consider updated information and so on and so forth. I like the generality of Option 1, and it's easier to read, particularly for those people that are looking at -- That are not familiar with the nuances of the assessment.

On the other hand, I understand why Erik has done what he's done here, and I'm still a bit concerned about how much can change in an operational assessment from the benchmark, and I know this is a problem that we often have, and I don't know where we cross the line, and I think, often, if some of the specificity there in Option 2 is related to issues that would change sort of the operational model, either by tweaking frameworks, you know, I think that might violate, in my mind, what an operational assessment is. Again, I think Option 1 would be better read by managers, and Option 2 would actually be better read by the people that actually have to do the work, but I want to make sure that we stay within the confines of what we think an operational assessment should be doing. Thank you.

MS. HOWINGTON: Fred, just to clarify, the one that is one page, that is the more generic one, that has less specificity, is Option 2. The one that is more specific, that is a page-and-a-half, is Option 1.

DR. BUCKEL: All right. Any other comments? It sounds like Option 2 is the SSC's preference.

MS. HOWINGTON: Okay, and so now we get to do, I guess -- I'm sorry. You are the chair.

DR. BUCKEL: Yes, and we have twelve minutes.

MS. HOWINGTON: Let's finish up these terms of reference.

DR. BUCKEL: Okay. I thought you were moving on to something else. Go ahead.

MS. HOWINGTON: Okay, and so, for tilefish, we're going with Option 2, and so then I do have a few -- Normally, I always bring suggestions, based on the previous terms of reference, just to remind you, and do you want to add in a term of reference about the SSC catch level projections workgroup, or do you feel like Erik Williams has that down, or the Science Center knows to try and incorporate that, because that was specific in your blueline tilefish terms of reference, but it's not listed here. Erik, do you think you can incorporate the SSC without it being in the terms of reference? Okay.

The other thing that you talked about during the last SSC meeting was about -- This is just notes, but including abundance and catch time series to inform projection timeframes, autocorrelation, and partial autocorrelation functions, and so does anyone have anything that they want to give me to tell me why I wrote that down, and do we need to make it a term of reference?

DR. BUCKEL: Chris.

DR. DUMAS: I think I remember discussing that issue in the just general time series issues to be considered, but I think, if we're going with the more -- With Option 2, the more general discussion, then those things are included within that, and so I think they're covered. Thank you.

DR. BUCKEL: Thanks, Chris. Amy.

DR. SCHUELLER: I was just going to say that I feel like Number 2 allows for the use of the document that we put together for recruitment projections, and it allows for that topic you just brought up, which is related to the recruitment projections, and so I think that we've covered that.

MS. HOWINGTON: Okay. Those are all the little notes and suggestions that I had, and so then the other thing that I am going to ask, and, again, this is about just tilefish, is I'm going to request participants, and I'm going to request that the SSC give us feedback on when these webinars occur, and so, like I said, it's going to be two to three, and one is going to be a scoping, and one is going to be a decision-making, and one is going to be a backup emergency, and so when should they occur during the assessment process, early on when we're getting data, midway, at the end? What do you all think? This is how topical working groups work, is we have minimal webinars, but then they can be either all at the end of the assessment, after all of the data has already been submitted, or at the beginning, or spread out. Does anyone have an opinion?

DR. BUCKEL: Amy and then Genny.

DR. SCHUELLER: Well, I think a need a -- I'm not sure exactly what you're asking. Are you asking when the topical working groups should meet? Okay, and so that leads me to a question, and there's like five topic areas in here, and is this topical working group addressing all five of those items?

MS. HOWINGTON: Yes. This topical working group is a life history topical working group addressing all five of these items.

DR. BUCKEL: Genny.

DR. NESSLAGE: If I can help address Amy's face, I think some of these -- Which those of you on the webinar can't see, and it's very quizzical, and I think a number of these will be quick reviews, based on our discussion in the last assessment. Item (i), the incorporation of the new data though, I think will be the real meat of it, and so I think some of these were -- 2, 3, 4, and 5 will be good discussions, and perhaps even have a separate webinar for those and then a separate webinar, and I am pointing at these guys, for the new survey data, because that is probably the most likely to be incorporated, or considered, in the assessment, if I were to gauge -- Based off the discussions we had during the last assessment, but I would look at anybody else, George or whoever else was -- I am trying to think who else was on that group. Erik, you were in the room, and if Nikolai is still on.

MS. HOWINGTON: Well, Erik, are you going to talk about SADL?

DR. BUCKEL: Erik.

DR. WILLIAMS: I think this -- That bullet (i) is specific to life history information that might come out of the SADL survey, and there is an independent effort to have the SADL reviewed, and, actually, we're still working out how exactly we're going to review it, but it's going to come to the SSC, one way or another, before these assessments start, and so you'll get to see that as an independent survey review, so to speak, if that helps.

DR. BUCKEL: Thanks, Erik.

MS. HOWINGTON: Okay, and so it sounds like, to me, that you all would prefer having scoping very early on in the process, since you said it's going to be a little bit more of a data lift, and then, somewhere in the middle, before like -- You know, two months before the report gets released, being able to review some of this data with another webinar a little bit later, and I will, of course, draft -- No? All early? Okay. I can do that.

All we have is a generic schedule of the beginning of 2024, two to three webinars, and we're hoping to have this finished by mid-2024, and so what I'm asking is, if scoping is in January, and the report is coming out in July, when would the webinars be most useful, the beginning, middle, or the end?

DR. BUCKEL: Genny.

DR. NESSLAGE: If these are life history, I would think they need to be early, before they start running models, and, honestly, just to add on for Items 2 through 5, these would -- I don't see these being incorporated -- Even if we thought all of these were wonderful, and we had great information, that would be for a benchmark, and I am looking to Erik. The incorporation of those things is not going to happen during an operational assessment, and so it would be for research recommendation purposes for the future, but (i) could be life history data, new life history data, that could be incorporated into the operational, and so that would need to come ASAP, early, in my opinion, but --

MS. HOWINGTON: I am getting arguing head nods.

DR. WILLIAMS: Genny, were you saying that incorporating the new survey would be -- That it shouldn't be done in an operational? I am confused what Genny was saying.

DR. BUCKEL: Genny, go ahead.

DR. NESSLAGE: I am saying Number 1 should -- If it's vetted, and people think it's ready for primetime, it should be incorporated in the operational. I think 2 through 5 would be something that would need a benchmark major revision of the model to incorporate. If you're going to incorporate hermaphrodism, or new stock definitions, or range shifts, I think then we're talking major non-operational assessment, and so Number 1 is the one that I would personally think you would want upfront, so you could incorporate that new information in the operational, or are you thinking that none of this would go in an operational?

DR. WILLIAMS: No, and I am thinking the opposite, that all of it would go in the operational, depending on what comes out of those. I mean, hermaphrodism we incorporate regularly as just a

new way to compute SSB, whether it's males only, females and males, et cetera, and that's not a model -- That's not that complicated to force it to a research track.

MS. HOWINGTON: Okay, and so, again, webinars, more at the beginning, because it's life history information, and a topical working group that's going to address all of these, and who wants to be a part of that topical working group, would be the next question, because now we've got terms of reference, schedule, and now participants. Who in the SSC would like to specifically have discussions on this topic, all five? I've got Marcel.

DR. BUCKEL: Wally. Where is Church when you need him?

MS. HOWINGTON: I typically have two to three members, and so Marcel and Wally is good, and we're going with Option 2 for the terms. Okay, and so that is all I needed for tilefish. You are not finished with SEDAR yet. Sorry. Blueline tilefish is still coming up in my generic little overview, but that's all I needed for tilefish.

DR. BUCKEL: How much time do you think?

MS. HOWINGTON: It's going to take no time at all.

DR. BUCKEL: All right. Let's do blueline.

MS. HOWINGTON: Okay, and so, in 2024, we're going to start the year off with golden tilefish, and we just talked about that. We are then going to move to blueline tilefish in the latter half of 2024, and this is, again, going to be two to three webinars. You all have already approved the terms of reference, and we are not reviewing those. You've already done it, and we involved the Mid-Atlantic, and we got their approval as well, and so, right now, I am just going to inform you of the generic schedule, again the latter half of 2024, and we're hoping to have scoping earlier, maybe in February or March, and so, that way, we have a lot of time to gather data and then have webinars later, in August or September, that kind of thing.

What I need from you all is, again, when should these webinars occur, and who wants to be a part of it, and so I'm going to pull up the terms of reference, which you should have somewhere on here, and, again, you all have already approved these, and so no reviewing.

This right here is the topical working group that we are looking at. Now, the SADL is also here. Because that's going to have that external review, I'm going to see how that goes, and then I will follow-up with all of you, if that needs to be a topical working group or if that just needs to be moved to just a generic term of reference, but this review and recommend catch and landing streams for north of Cape Hatteras.

To give you some more information, the previous assessment, SEDAR 50, looked completely north of Cape Hatteras, and it was a DLM Tool that Mike Schmidtke actually was working on, wherever he is, and he might have run away, and then, when you guys reviewed Assessment 50, you all then truncated it to what they call the sliver, and I didn't know it was called that until last week, but the sliver between Cape Hatteras and North Carolina/Virginia.

The first question I have is, and this is really going to be for Nikolai and for Erik Williams, is I want to double-check that we're doing for the entire region north, and we're using that DLM Tool the whole way up, yes or no? Yes. All right. I am seeing a yes. Can you loudly say yes, on the record?

DR. WILLIAMS: Yes.

MS. HOWINGTON: Okay, and we're doing commercial and recreational for this, all catch landing and data streams? All right. So, then with that in mind, again, the same questions. Who wants to participate in this topical working group, and do you all think that this should occur closer to scoping, closer to when the report is ended, or where do you think it should fall?

DR. BUCKEL: Are folks in favor of having them similar to golden, for the same reasoning that Genny provided, having the -- Well, let me finish my thought, but just having those webinars earlier, to frontload it? Scott Crosson.

DR. CROSSON: I'm sorry. That was an accident.

DR. BUCKEL: Are you sure you aren't volunteering, Scott, because, I mean, you did raise your hand.

DR. CROSSON: I will be on the topical working group. I'm just not masochistic enough to do that again with blueline.

DR. BUCKEL: What was that, Scott, that you would like to be a member of the topical working group?

DR. CROSSON: I didn't say that I would like to, but I am willing to, yes.

DR. BUCKEL: Thank you, Scott. Kathleen needs one more.

MS. HOWINGTON: Yes, at least one more. I like to have two to three. That way, in case somebody has a scheduling issue, I still have one person there.

DR. BUCKEL: You've got George. Thank you, George.

DR. SEDBERRY: You've got me.

MS. HOWINGTON: That's all I had for the stuff that's happening in 2024. The only other things that I had on my list were talking about the SADL, which I believe is going to be Judd, and then giving you all the generic SEDAR update, which, honestly, can wait until Thursday, if you want, or we can do it today, and it's your call.

DR. BUCKEL: Do folks have the energy for Kathleen to finish things off now? All right. Let's go for it.

DR. CURTIS: Let me jump in, and we'll do the SADL workgroup first, briefly. We just talked about, in the blueline --

DR. BUCKEL: Before we leave golden and blueline, we'll take public comment. Anyone, Chip? Okay. Thanks, Chip. Okay. Go ahead, Judd, with the SADL survey.

DR. CURTIS: Okay, and so, as discussed, the SADL survey, which you guys got a briefing in April, and that has appeared in several terms of reference, and so the idea is that we can have a more general review of that new survey, as opposed to having to review it every single of term of reference that it ended up in, and so the idea here is that we're going to be in the process of developing that term of reference for the SADL survey, and we just need to get a workgroup together, four or five SSC members, that will then review those terms of reference, once they are developed, and so, ideally, we would like to get maybe two people that are intimately involved with the SADL survey and then maybe two members that are a little more not involved, to serve as kind of objective reviewers, and so I will open up the floor, Jeff, if there's any volunteers.

DR. REICHERT: Well, I've got a question, and so this is just to review the terms of reference and not to review the survey?

DR. CURTIS: That's correct. This will be just to review the terms of reference. The entire survey will come to the entire SSC.

DR. REICHERT: Okay. Thank you. I am happy to be part of that.

DR. BUCKEL: George, do you have a comment, or are you volunteering?

DR. SEDBERRY: No, and you can SADL me up, and I'm not sure whether I'm intimately involved with that or not. I was at one time.

DR. BUCKEL: All right. We have George and Marcel. Wally, thank you. That's three, and Judd is looking for four to five.

SSC MEMBER: What is it again?

DR. BUCKEL: The South Atlantic Deepwater Longline survey.

SSC MEMBER: I know, but what is the -- What are you looking for the workgroup to do, to just evaluate the TORs?

DR. BUCKEL: Correct.

SSC MEMBER: I don't know what that is, but I will help.

DR. BUCKEL: All right. That was --

DR. CURTIS: All right. Thank you, all. We've got four members, and so we can check that one off. We're all set there.

DR. BUCKEL: Thanks, everyone. Okay. Kathleen.

MS. HOWINGTON: All right, and so this my little generic here's what is going on in SEDAR. For those of you who don't know the spiel, my first things first is that we have actually upgraded the SEDAR website, and it has a teensy bit of a facelift, and it looks pretty similar, but it's on a completely different platform, and so it's actually completely different for me.

The first thing I want to show you is this. Right now, we have an active recent documents and upcoming events box, and so, if you know that you have a webinar coming up, and you can't remember where it is, or you know it's within like the next week or so, this upcoming events is going to be the next five events. You click on it, and you'll get the registration link, and you're good to go.

Recent documents is, whenever we're posting stuff, if you send me working papers, and I say it's been posted, that's going to be coming up on here. Now, it's only the most recent five, and so, if you send me ten, and you only see five documents, that's why, and so those are two little fun spiels.

Then here is our map that actually got uploaded today, and so this is from the SEDAR 2022 Steering Committee outcome, and this is what's going on in SEDAR. To give you an update, the scamp OA, and this is 68, and this is the follow-up from the research track, that is still scheduled to complete in November, and I believe you all are scheduled to review it in January, via webinar, correct, and so that is currently on time. Spanish mackerel, we've already completed, and black sea bass is a webinar-only assessment, and that is Fred, Chris, and Alexei, and that is going to be completed in March of next year, and so you will be seeing it in April.

Gray triggerfish, SEDAR 82, is a research track that is currently ongoing, and we had the data workshop in September, and we have our last post-workshop webinar actually this Friday, for anyone who wants to, you know, just continue the SEDAR train, and then, after that, we're going to be going into assessments, with a review workshop next September and the report released in December.

Red grouper operational assessment is scheduled to begin in November of this year, and it's going to end in December of next year, and that is all in-house for the Science Center, and there is no topical working groups. You all have approved the terms of reference, and so you don't have to do anything for that, which is great.

Tilefish and blueline tilefish, we've requested participants, and I've given you what I know of the schedules, and so there you go, and then the red snapper research track is currently scheduled to begin at the end of 2024, with scoping, and so hopefully that's going to be able to incorporate the red snapper estimation, and the planning team has already met, but we're going to meet again come next February, and that planning team involves Jeff, Chip, Judd, Erik, and Kyle, and so almost the entire planning team is actually in this room right now.

Then the other potential assessment that you all might be interested in is mutton snapper, and that is Scott, Amy, Alexei, George, and Jie, and that's going to be starting in April of 2023 and ending in August of 2024, and that does have data and review workshops that are in-person. Otherwise, it's webinars, and then the last one that I wanted to bring to you all's attention is, in 2024, there is a red drum review workshop, and, right now, that is currently scheduled for August of 2024, and so I'll keep you all in the loop, if anything happens with that, and that is an ASMFC assessment,

and so that's not going to be coming through you all, but I know sometimes you all are interested, and so I like to keep you informed.

I believe -- The red snapper research track, like I said, the planning team is going to be meeting up in February, and so you all are going to be getting an email sometime in March, asking for potential participants. If you can think of anyone, including yourselves, if you want to, you know, go ahead and just announce yourself interested, but anyone at all that you think would be interested in being a participant, please let me know. I will also be sending out the generic, hey, who is interested in blueline tilefish and tilefish in November and December of this year, and so, anyone that is outside of the SSC, if you think they would be good, let me know, so I can put them on a potential participants list for the council to review. With that, I mean, is that enough information? Do you all want more?

DR. BUCKEL: That's plenty for me. Thank you, Kathleen. Any questions for Kathleen on the upcoming SEDAR events? All right. Well, thanks, everyone, for a good first day, and we'll see you back in here at 8:30 tomorrow to tackle Spanish mackerel. Enjoy your evening.

(Whereupon, the meeting recessed on October 25, 2022.)

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OCTOBER 26, 2022

WEDNESDAY MORNING SESSION

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The Scientific and Statistical Committee of the South Atlantic Fishery Management Council reconvened at the Town and Country Inn in Charleston, South Carolina on October 26, 2022, and was called to order by Dr. Jeff Buckel.

SPANISH MACKEREL REVISED OPERATIONAL ASSESSMENT REVIEW

DR. BUCKEL: All right. Good morning, everyone. Welcome back to the South Atlantic Fishery Management Council's October 2022 SSC meeting. Thanks for a very productive day yesterday. We got everything on the agenda accomplished, plus one other item from Thursday, and so we're ahead of schedule, and so thanks, everyone, for that.

This morning, we're going to hear from Dr. Erik Williams, and this is the Spanish mackerel revised operational assessment. If you recall, we had a meeting in August, where we received the stock assessment report from Erik, and we had multiple concerns. I presented those to the council in September, and NOAA Fisheries informed us that there were issues with the MRIP data that they wanted to go back and revisit, and then, with those new, revised MRIP data, there would be a rerun of the assessment, and that's what Erik is going to present us today for us to comment on. Any questions on that? Marcel.

DR. REICHERT: Just for the record, we had a workgroup that we formed at the last SSC meeting, and I just wanted to mention that the guidance that the SSC and the council provided was sufficient, and so that workgroup never met and provided guidance to the Science Center, and so I just, for the record, wanted to make sure that I mentioned that, that we did not provide input, because we deemed it was not necessary.

DR. BUCKEL: Thanks, Marcel, and I meant to bring that up. We did have a workgroup planned, and Judd and I were waiting on the council feedback, and then we were going to get that group to meet, and then, when we got -- The feedback that we got was, hey, we've got some incorrect numbers, and so then, again, we didn't want to get the group together until we saw the updated assessment with the new numbers, and so, after you see this, we may still convene that group, and so thanks, Marcel. All right, Erik. Take it away.

DR. WILLIAMS: All right. Thank you, Jeff. I heard a lot of rhetoric there just get exchanged that probably needs correction. First, there was not a data error. It was the actual 2020 MRIP estimates that we had at the time. What happened is MRIP looked back into it and found some issues with the number, and they made corrections, and it is corrected to the full database now.

Secondly, this is not an update assessment, in the sense that we actually -- I just reran the model with this latest data, and I don't know that if it satisfies what the SSC needs in order to then go forward and set ABCs based on this assessment, but that's what I'm hoping you guys will discuss, is what, if anything, does need to be done next, so that we can sort of be done with this assessment, so to speak, either set ABCs with it or -- I'm not presupposing that that's what you guys should be doing, or, if you do think there's more worked required, then we might need to circle back and make a more complete list of what needs to be done, and when and how it would be done would have to be decided later by the Science Center, based on what you guys feel needs to be done. Anyway, what I'm going to present today is very short, and it's just a quick update with the new MRIP numbers.

What I did here, and this is hot off the press, so to speak, and I just got the new MRIP estimates last Monday, and then it took a little while to sort of rerun the estimation models, to get the full corrected values that feed into the assessment. The main changes that MRIP made, and this is straight from their email, is, in 2020, Wave 5, in east Florida shore mode, they made a couple of changes there, and then, in 2021, in Wave 2, east Florida shore mode, they made a couple of changes there, and so I got that new data and reran the model just last week, and, of course, due to time constraints, I was unable to rerun all the MCBE projection analyses, or even generate a new report, and so that's why this is going to be very abbreviated, but hopefully it contains enough for you guys to make some decisions based on the output here.

In this slide is the time series of the general recreational removals, landings and discards, and so, if you recall, in Spanish mackerel, we've lumped all the recreational into a general recreational fleet, and so that includes everything, including headboat, and what is shown to the right are the landings and discards, and it includes the 2021 data point, just as a reference point, and that data point was not actually used in the model, and you will recall the model actually had a terminal year of 2020, but I show the 2021 in this figure, just so you can see for comparison.

You can see there is almost hardly any difference in the discards, and the main difference is right up here, in 2020, and you see a slight decrease in the new numbers, compared to the old. I did

have to, just as a quick note -- We didn't update headboat, and so I just added in a three-year average of headboat, just as a quick calculation, and that didn't take much time.

This is the results of the model run, and this is probably the most pertinent output from the model, is stock status, and so F over FMSY and SSB over SSB MSY, and, again, you see very little effect from this change in the 2020 MRIP data, and the most noticeable is right up here, in 2020, a decrease in the F, which is sort of what you would expect with a decrease in landings.

Recruitment, slight changes there, and there's a slight decrease in sort of the last six years' worth of recruitment, and that's because you've reduced landings, and the productivity of the stock goes down slightly, and, finally, a table of sort of pertinent reference points, so you can see the difference, and I had to take these out several decimal places just to even show the difference for some of these, because the change was so small, and so that's that. Now what do we do with Spanish mackerel?

DR. BUCKEL: Okay. Thanks, Erik, and we'll get onto questions. I have one question, and I used the word "error", and you said that was incorrect, and so if you could tell me what I should use in the future, if NOAA Fisheries says -- You said there was a correction made, and so I just want to know what language, and should I say the words "red flags", or what do we call that?

DR. WILLIAMS: Well, it was an update, and that's all. I mean, data is updated all the time, and it doesn't make the old data in error all the time, and it was the best available at the time, and so I would just call it an update.

DR. BUCKEL: All right. Okay. Are there questions for Erik, or just overall comments of where we were during our August meeting, and I sent out our August report, as well as the slides that I presented to the council, so you could remind yourselves of where we were with Spanish mackerel and the issues we had with the SEDAR 78 assessment, and you can see that, with the updated MRIP data, things haven't changed a whole lot.

I guess, in the future, Erik -- At the council, it sounded like there was going to be some -- It sounded like there would be some major changes in the landings, and maybe they didn't know, and they just had the red flags, but I guess, if you get data, in the future, and you see that there is hardly any change, I think you could bring -- For me personally, and we can get input from the other SSC members, you didn't have to take the time to rerun the model, right, because we could see, based on the landings, that there wasn't going to be a dramatic change, but I know that was your charge, but just to save your time in the future, when it hardly changed the MRIP landings stream, and so we would know that it's not going to be a major change to the assessment results, but that's just my thought.

DR. WILLIAMS: To that point, this is something that has happened repeatedly, with MRIP data in particular, is people have gotten adept at going into the -- At the level of the sampling that's going on with the survey, and they're looking at the samples, the actual intercepts, and they are internally flagging them themselves, because they see things like, oh, somebody reported twelve Spanish mackerel in a two-hour fishing trip, and they think, oh, that can't really be happening, or something along those lines, and they are making judgment calls that they shouldn't be, and, frankly, that's the issue.

I think a lot of people thought that there were some issues with that data, but then, when MRIP went back and looked at it, they only made some minor changes, and so I think that's the issue. It was those flags were created by people who shouldn't have been flagging the data, frankly, because they didn't have the survey knowledge to know whether those data points were outliers or not, and that happens frequently with the MRIP data.

DR. BUCKEL: All right. Thanks. We have Fred Serchuk. Go ahead, Fred.

DR. SERCHUK: Thank you, Eric. I have one question about the most recent data points that you have in the time series of stock indicators. Did you say you put the 2021 point in, but it wasn't included in the assessment, and was I correct in that?

DR. WILLIAMS: Yes, Fred, and I just included it on that plot as a reference, just so you could see what the 2021 value looks like relative to the 2020.

DR. SERCHUK: Is it also correct, when you were looking at the next figure, where you have the base model and the status indicators, and does the 2021 point, even though it hasn't been included, suggest that there is overfishing occurring, because F is now greater than FMSY?

DR. WILLIAMS: I am not going to predict, because I have learned enough lessons to know that sometimes -- We have to look at what the recruitment is doing at the same time and all that sort of stuff.

DR. SERCHUK: Okay, but what is the most recent data point on the top graph? Is it 2021 or 2020?

DR. WILLIAMS: 2020.

DR. SERCHUK: Sorry. Okay. I misunderstood that.

DR. WILLIAMS: Yes, and the stock assessment only goes through 2020.

DR. SERCHUK: Okay. Thank you.

DR. BUCKEL: Other questions for Erik or overall comments on Spanish? Go ahead, Fred.

DR. SCHARF: Did the MRIP folks provide any explanation for the changes here on the east Florida shelf in both of those years? You know, I understand that, in the full scheme of the total annual landings, it ended up only changing the 2020 landings a little bit, but, you know, this increase from 2,000 to 222,000 in the state territorial sea, and so you have a -- It increases by two orders of magnitude, and then the inland seas goes down by almost two-thirds, and then, the next year, the state territorial sea drops by -- From two-and-a-half million to 1.2 million, and so it cuts in half, and so -- I mean, to me, those are pretty extreme changes that they're estimating from their survey data, and it doesn't give me a tremendous amount of confidence that, you know -- So we asked them to take a second look, and they came back and came up with these numbers. I don't mean to be facetious, and I'm just wondering, and did they have a straight face when they gave you these numbers?

DR. WILLIAMS: Good question, Fred, and so this is part of the dilemma of people not fully understanding the MRIP survey and at what level you should be looking at it. When you drill down into it, of course, you're going to start to see increased noise, because you're decreasing your sample size and your strata. I mean, when we're using it at the coastwide level, that's pretty -- That's a pretty well combined bunch of strata that then that central tendency should be fairly robust.

Now, I don't know the exact details. The way it was explained to me, and this is just -- I am going by recollections and discussions with Richard Cody, is they do have a flagging system, and so they look at their intercepts, and they flag them if -- I don't know what their criteria are for determining if they're potentially outliers or not, but they flag them, and then they go back and look at the flags, and then they make a determination on whether to do something with them.

They are still in the midst of working out some better processes for dealing with that and dealing with outliers and smoothing and all that sort of stuff there. As you can imagine, the pandemic hit them hard too, because they had to deal with missing sampling and a whole bunch of other things, and so they're still trying to develop that system, a better system, of sort of flagging and dealing with outliers. Anyway, my point is they looked at those flagged outliers, and they decided to basically change one or two of those, and that was it.

DR. BUCKEL: Erik, one of the -- Go ahead, Chris.

DR. DUMAS: Thank you. Did they give any PSE estimates with the new numbers when they sent those?

DR. WILLIAMS: I didn't get them, but I know they provide them with that, and so I just didn't look at it.

DR. BUCKEL: Erik, one of the concerns that we brought to the council was, in recent years, that the shore-based mode rec has higher landings than the private boat rec, which didn't make a whole lot of sense to members of the SSC or other stakeholders, and that was another one that we asked to be looked into, and did we get any feedback from Richard Cody on that?

DR. WILLIAMS: Basically, what the Center did was say, Richard, please look at this, and he wasn't in on the whole council conversation on this topic, and, yes, he went back, and they did what they did, and these were the numbers they came back with.

DR. BUCKEL: Any other comments from SSC members? Judd and Chip can correct me if I'm wrong, but I think we need to -- Since I don't see any SSC hands, or any hands online, we'll take public comment before I go into my next comment, and so any public comment? Go ahead, Thomas.

MR. NEWMAN: Can I ask a question before I give my comment?

DR. BUCKEL: Sure.

MR. NEWMAN: I am looking at the shore-based MRIP landings, just for east Florida by wave, and over 75 percent of these waves have a PSE over 50, and I guess my question is to Erik, and

it's like why did they only correct Wave 5 in 2020, and, like I said, some of these waves are over a hundred for the PSE value.

DR. WILLIAMS: Thomas, that's -- I honestly can't speak for, you know, the methods, that detailed methods, that MRIP uses to determine when they're going to make changes and when they're not, and I agree with you that those high PSEs are a concern, and that's another thing that I know that MRIP is wrestling with, is determining potential cutoffs of when the data should or should not be used, and, when I say should not be used, really what that means is we have to come up with ways to aggregate the data, possibly across multiple years then, instead of just a single-year estimate, to get the PSE below a point that is then reasonable, and that number that is reasonable has yet to be decided or figured out, and so that's kind of where they are.

MR. NEWMAN: Thank you for the answer. It's just very frustrating to see just really one segment of the fishing community potentially causing a harvest reduction for everyone else, and, with these PSE values like this, we've got to get away from using some of this data. I sent in public comment, and I gave public comment at the last SSC review, and I need to reiterate that I'm also on the Cobia Mackerel AP, and our discussion at the AP a couple of weeks ago too was that this assessment is not good for anybody, and it's going to cause a lot of undue regulatory discards if we look at a quota reduction for the commercial fisheries.

I think everybody was in pretty good agreement that this needs to go to a research track assessment, and we need to look at it more broadly and figure out what we're going to do with these MRIP numbers that have such high PSEs and not let them take over the stock assessment, because, right now, that's what we're doing, in my opinion, and I really appreciate everybody's time in putting all this together, and I know it sucks having to redo it again, but I think that's the best route, and I really don't want to wait another three or four years to have a stock assessment, but I think we're down to our only option, and I appreciate everybody being here, and I think that's my public comment, unless you have questions for me.

DR. BUCKEL: Thanks, Thomas. Does anyone have any questions for Thomas? No hands here, Thomas. Thank you very much for your input. Dewey, you're up next.

MR. HEMILRIGHT: I was just curious as to when -- You know, I continue to hear this drumbeat of the MRIP is working on something on these smoothing aspects of fixing these astronomical PSEs, or outliers, but yet I continue, probably for five or six years, hearing nothing about when it's going to be fixed, and, until something of substance, of actually fixing something, and something is put in place to address these, we're going to continue, and especially the SSC, continue to be at a level of not where it needs to be to be able to make decisions on stuff, and this is crucial, this stock assessment, with the fishermen, and we cannot have a reduction, when something is based on such speculative information.

I know I'm probably preaching to the choir, because I've heard many of you all ask about these different things and when MRIP is going to be looked at and the outliers, but, yet, continually, nothing ever gets done, or I am have not seen where it's been used, the smoothing aspect of it, and that's going back from me and some of my recollection back to SEDAR 32 for blueline tilefish, but, until then, I just think that something needs to be done, and we shouldn't be using MRIP data, even according to websites and NOAA, if it's over 50 percent PSE, and so, hopefully in the future, in the very near close future, something can be done that would help when the SSC has to look at

this stuff and has to make a decision, and, not only that, the stock assessment folks, when stock assessments are going on, because it's just simply not fair for continuation of having to use this stuff that says it's not to be used for management purposes. Thank you.

DR. BUCKEL: Thank you, Dewey. Chris Dumas.

DR. DUMAS: Hi, Dewey. I just wanted to reply to your comments, and I think they're very insightful comments. I was a member of a committee that was pulled together by the National Academy of Sciences to review the methods that MRIP uses to analyze their data, and that report came out last year, and it's called "Data and Management Strategies for Recreational Fisheries with Annual Catch Limits". It's on the National Academy of Sciences website, and you can download it for free, and I can send you the link to it.

In that report, two of the things we looked at, in particular, were methods for identifying outliers and how, potentially, methods to deal with that, and that information is in Chapter 4, and it's also in some of the appendices, and my understanding is MRIP is looking at this report and seeing whether they could use some of these methods that we suggested in the report, or something else, to help deal with that issue.

One of the things we specifically looked into was, when you've got an outlier, how do you know whether that outlier is telling you that something is actually changing in the biology of the fishery or is an outlier, just sort of a random blip up or down, in a fishery that is really not changing, and so we looked at statistical methods that are available to help make that determination of what is the outlier really telling you, and how do you determine whether a data point is an outlier, and, if it is, what is it telling you, and so we reviewed those methods and made some recommendations, kind of outlined the methods that are available that MRIP could potentially use, going forward.

The MRIP data program is -- You know, it's an excellent data collection program, but, you know, relative to other data collection programs worldwide, but they do have limited funds, and limited personnel, and, with respect to the Spanish mackerel and the issue we're talking about right now, that 2020 data point in particular, because COVID was going on, they had a lot of issues with being able to get their surveyors in the field, because of quarantine restrictions and those types of things, and so they had a really hard time getting their sample.

My personal opinion on that 2020 data point is that there's a lot more uncertainty involved with that than we would usually have with MRIP data points, and so I just give you that for your consideration, and, if you would like the link to that report, I would be glad to forward it to you. Thank you.

MR. HEMILRIGHT: May I give a response back, please?

DR. BUCKEL: Yes, Dewey. Go ahead.

MR. HEMILRIGHT: I would appreciate that report, and, even though they're working on it, and you all have just done, I guess, recently, the National Academy of Science review with them, and this stuff has been ongoing, and I can give you instances from seven years ago of outliers, where six blueline tilefish gave 33,000 discards, where two mako sharks gave a hundred metric tons of fish, and where MRIP stuff increased the U.S. catch of mako sharks from four-hundred-and-some

metric tons to eight-hundred-and-some metric tons, in one particular year, and so, while I understand and appreciate it, and I want to learn, and I'm going to read the report, there is some things that we need a hurry-up catch on, before we're doing this stuff, that shouldn't -- That needs to be figured out before it takes years to figure out how to address outliers, but I certainly appreciate it, and I look forward to reading the National Academy of Science and the work that you all did, and I appreciate it. Thank you.

DR. BUCKEL: Thank you, Dewey. Next up, we have Tim Griner. Go ahead, Tim.

MR. GRINER: Thank you. I was just a little confused, and maybe Erik can help me with this, but so did MRIP go back and look at this shore mode versus private rec, and are they standing by the assertion that the shore mode has greater landings than the private recreational sector, or the private boat mode? Thank you.

DR. WILLIAMS: Tim, I guess they're standing by it, because my impression is they went back and looked at the 2020, and I think they looked at even -- Well, you saw that they made correction to 2021 as well, and I think they've looked at Spanish mackerel in general, and I think they made all the corrections they intend to make at that point, which was just what you see here, and so I guess, in a sense, they're standing by their estimate at this point.

MR. GRINER: Thank you, Erik.

DR. BUCKEL: Any other public comments? All right. Chip and Judd don't see any other hands raised. Thanks to those in the public that provided comments on this. Any SSC members want to comment, after hearing those public comments? Fred Serchuk, go ahead.

DR. SERCHUK: Thank you, Chair. We are responsible, as an SSC, for ensuring that we provide the best scientific information available, and I am concerned now that, although the MRIP people have done what they did, there are so many issues relative to the PSEs, and the uncertainty in the estimates, that I am not quite sure, personally, that the use of that data is the best scientific information available. It may be valuable to us, but we realize, quite frankly, as a point estimate, the numbers are just not taking into consideration some of the points that have been raised by people that are very familiar with the fishery, and I think we need to have some discussion of that and whether we can actually -- Even though it's given to us, whether that 2020 point is really one that we need to include. Thank you.

I mean, we have our own integrity here, Chair, because we have to certify that the information used in the assessment is the best, but it isn't really the best, because it doesn't take into account, in my view, the sampling problems and the large PSEs. Had we been given the task to look at it, we would have done it quite differently, I'm sure. Thank you.

DR. BUCKEL: Thank you, Fred. All right. If there is no other SSC member comments, we'll move into our action items, if Judd can bring those up. Go ahead, Amy.

DR. SCHUELLER: I am a little unsure what we're supposed to be making decisions about, and I'm a little unsure about what even happened, and so Marcel stated that the group didn't meet because they thought that this was going to address our concerns. No? Okay, and so can we get

clarification on why the Spanish mackerel subgroup we put together didn't meet, and then I have another comment about the MRIP data, but I will wait for that first.

DR. CURTIS: Thanks, Amy, and so we formed the subgroup, coming out of the review, in the August meeting, and they were initially going to be tasked with reviewing some of the issues that the entire SSC had coming out of that meeting.

Because we were waiting for the council meeting to occur before we convened that group, at that council meeting, the Science Center indicated that they could review the MRIP numbers and then provide them for this SSC meeting, and so we held off on convening the subgroup, to see what the results of that -- The readjustment of these MRIP values are. Given that nothing else has changed in the assessment, based on the SSC's review from August, as Marcel mentioned, that subgroup is still ready, and we'll probably convene that, or it's an option to convene that, based on the SSC's discussion coming out of this meeting.

DR. SCHUELLER: Then I also have a comment on the MRIP data. I will just make the statement that we're always unhappy with the MRIP data. Everyone is unhappy with the MRIP data, but we don't have anything else. We're not magically going to create anything else, and I look at Slide 3, and I understand that people were concerned about the 2020 data point being higher, and the 2021 datapoint on that slide is also higher, and I am not particularly surprised about that, because, during the pandemic, there was a lot more outdoor activity occurring, and there was a lot of reports about increased fishing, increased camping, increased hiking.

If any of you bought tents, or tried to buy tents, or any camping gear, all of the costs of that stuff went astronomical, because the supply was limited, and the demand was huge, and so I'm not exactly -- I don't know, and I don't feel the same way everybody else feels about those two points. It's not surprising, to me, that they're higher numbers, and I guess my other comment is there's this whole crew of people working on the MRIP data, and they have these special workshops, and there is progress being made, over time, and I think the SSC is slightly foolish to think that somehow we're going to make some big determination and change what's going on there in some magically different way, and so I -- I guess I'm a little bit -- I don't know what it is that we're going to be doing.

I mean, we have to be pretty realistic here about this, and, now, if there's other issues with the assessment, that's fine, and we need to discuss those, and attend to those, but I don't know why we're spending this much time on this particular time series, because I don't think we're going to fix it. We can assess the uncertainty, and, if that's what we're going to do, that's fine, but I think that we need to be very, very, very clear about what we can actually accomplish.

DR. BUCKEL: Thanks, Amy. Marcel.

DR. REICHERT: To Amy's point, I kind of agree with you, and do we have, or does anyone have, any information on similar patterns in other species, in terms of the uptick in recreational catches, because that would, I think, strengthen the notion that, you know, these are probably not outliers, because it happens in other fisheries too, because of the increase in recreational and other activities during COVID, and I'm not sure if anyone has that information, similar patterns in other species.

DR. BUCKEL: Chris.

DR. DUMAS: I think a way to look at that would be to look at, you know, the state-level estimates, or the region-level estimates, for what's going on with a particular species, because those would have lower PSEs from larger sample sizes, because are these the Florida estimates that we're looking at here?

DR. SCHUELLER: It's coastwide.

DR. DUMAS: These are coastwide estimates? Okay. Then we could look at the -- I agree that we could look at the estimates for other species then. Sorry, and I thought these were the Florida-alone estimates. Okay. Thank you, and so we could look at other species, but I have not done that yet.

DR. BUCKEL: Erik.

DR. WILLIAMS: I have been looking at the MRIP data far closer than I ever intended in my career lately, in part driven by red snapper, but, in looking at that, I have seen patterns of increased effort, particularly in the South Atlantic, for many species, and, if you look at just effort from the survey, it doesn't bear out, and you have to keep in mind that that effort that they're estimating is like total recreational effort, and, when you drill down into sort of focusing on the effort for a given mode, or a given species, you can see some of these increases, and I've seen it for some of the other species, and that's just anecdotal, and take it for it is then.

DR. BUCKEL: Just to -- Related to that conversation, you know, I agree that it's not surprising that we see an increase in landings, or in effort, given the COVID situation, like you talked about, Amy, but this issue of the shore-based landings being higher than private, and that started -- I think it was four or five years back, and that's the one that has me perplexed, is what I would guess, and it would be nice to get the explanation of, well, this is why you see so many shore-based, and we didn't get that, and that's what I would like to see, and is that real, or maybe that's where there is a -- It just doesn't match what you see, at least the reality of what I see on the water. Thanks, Amy, and go ahead.

DR. SCHUELLER: I was just going to say that's good, and so that's a very specific statement and question that we need to like document and then get addressed, but, I mean, it's just -- We need those kinds of statements and not sort of these more holistic statements of just everything is garbage, because that's not true either.

DR. BUCKEL: That is in our August report, and so I feel like we've kind of come back to we've got the issues in our August report, and those are still -- There is issues with the -- There were some issues with life history, as well as with this MRIP data, and there were a few others that were in there, and so that is -- Judd, I'm not sure if we want to -- What the pleasure of the group is, and we can tackle these action items that Judd has up now, or, if folks want to put up the August report, or the slides that I presented to the council meeting, as a review, or did folks have the time to review the issues that we had back in August, and do you feel comfortable? Those are fresh in your brains, and we can tackle these?

Let me rephase it. We can either put up the SSC report from August, or the slides that were presented to the September council meeting, to get a review of the issues we had with SEDAR 78, or we can just take a stab at hitting these action items now. Fred.

DR. SCHARF: I think that the second bullet, related to, you know, some of the issues in the assessment that are in the notes from our last meeting, and the presentation that you gave to the council, outlines some of the issues related to the assessment, given that it was constrained, as an operational assessment.

You know, there were -- I am guessing that we could lay those out again here, in terms of, you know, all of the usual suspects, you know, natural mortality, steepness, selectivity, but there was certainly evidence, in that assessment, where the likelihood profiles for steepness and natural mortality pointed towards some different numbers that would change stock status quite a bit, and so I guess -- You know, if we recommended that we move to a research track assessment for this particular stock, based on those issues, I am just wondering how we separate that from the MRIP issues, because, if we -- While I think those issues in the assessment, related to natural mortality and steepness, could be impactful, in terms of stock status, I think that these MRIP numbers are still going to override any of those changes, and so, if we're not comfortable with the MRIP numbers, based on -- You know, to me, the MRIP numbers, there is two issues.

There is the shore-based mode, private boat mode, which we asked for, right, and we asked them to look at that, and they didn't, and so they haven't provided any explanation, and so, clearly, beginning in 2020, there was an increase in shore-based effort. You know, that's not disputed. People were going outside fishing, and a lot more people were fishing from shore, and they didn't all buy boats, but they were outside fishing.

The question is it seems like what has happened here with Spanish is that maybe there's a few -- I would like to see the intercept data that supports the landings coming from shore-based mode for this species, because it doesn't align with what generally happens, or at least what we think about what's happening on the water, and then there's the other issue with the changes that they just sent us, right, which, although it didn't seem like it changed the overall number very much, when they looked carefully at these waves on the east Florida shelf, the amount of change that occurred, in what they sent back to the Center to rerun the model, with no explanation as to what was driving those, concerns me as well.

It doesn't give me a lot of confidence in the estimates that they have if they can have changes that are two orders of magnitude with no explanation, but I feel like those two things are separate, right, the research track assessment dealing with some of the inherent issues that we have with most assessments and being able to evaluate, you know, changes in natural mortality or steepness or selectivity as part of a research track assessment is different than these MRIP numbers, and I don't know if we would go down the path of a research track assessment if we don't get these addressed first. Sorry.

DR. BUCKEL: Erik, to that point?

DR. WILLIAMS: It's not exactly to that point, although I would love to comment to that point, but I won't. I just wanted to note that you guys have set a sort of false dichotomy here of a rerun with requested changes on your part and research track, and there's a lot in between you could do

as well, and so don't think it has to be a research track, and, in fact, I would say it doesn't need to be a research track, and I think there is an operational that we do with a lot more changes, and maybe even some topical working groups, or something like that, to address specific issues, and so I just wanted to make sure you don't fall into that trap of it's one or the other.

DR. BUCKEL: Thanks, Erik. There was some language elsewhere that made it sound like it was going to be one or the other, and so we appreciate having that flexibility and the time of your staff to work on the rerun of the operational assessment. Does anyone need to see some of our language from the August report?

DR. CURTIS: Jeff, we can queue that up, if you want to go through the old report, and I think that would be a good refresher.

DR. BUCKEL: Yes, and why don't you maybe put that on the left-hand screen, and we can have the action items on the -- If that's possible, Judd. Thanks. I don't know if we want to go through every slide on this, and I was hoping that folks had taken a look at this before, but I guess we can try to hit the highlights. The general comments that I provided were some of the ones that we had led with in the report, and so age comps, the issues with the age comps, and so few age comps for commercial cast net and commercial handline.

There is substantial regional difference in how the fishery is prosecuted, where there were large data gaps in the assessment, and we just covered the data issue with MRIP and then the model inputs, and Fred covered the natural mortality, steepness, and selectivity, and those were -- We felt those needed to be explored more thoroughly, as Fred mentioned, given the likelihood profile results, and those were -- The likelihood profile results were used in SEDAR 78 to change the selectivity, but they were not used for -- The natural mortality and steepness were left as SEDAR 78, and, again, to the next point that was just a lack of flexibility for the analyst, given that it was an operational.

Then we -- There was very little -- There were no data in that lower-left-hand part of the stock-recruit curve, shown on the lower left there, and so no data to help estimate steepness, and high uncertainty, as indicated by the likelihood profiles, and so, again, as the analyst mentioned, this is not unusual to Spanish, but just, you know, pointing that out.

We have covered this already, this how the 2020 estimate of catch is -- It's not influencing the current stock status, because there is a three-year average, but, you know, if, moving forward, we see what the 2021 estimate looks like, and so, if all things stay the same, then a new three-year average, with 2021, would likely begin to affect stock status, but, for now, ending with a terminal year of 2020, it's not -- It's not affecting the current stock status, with the 2020 terminal year, but what it is impacting are the projections, and so, as we've mentioned, and so that's leading to a reduction in catch in future years.

What we see with the stock size is it's going down, while observed landings are increasing, and so that could be real, or the increased landings could be a result of increased population size, right, and so there is questions there, and that -- One of the issues, or anecdotal information, is the public input that we're getting about the perception of catch per unit effort that's out there, or the population size that's out there, and then that third bullet there talks about the issue with the MRIP shore that we've already talked about this morning.

Again, the constraints of the OA and our perceived lack of data were a concern, and there was a further question related to BSIA, and there was a concern that projections are not sufficiently robust, given that 2020 -- The uncertainty that we've discussed for 2020, and removals and -- We've already hit that last bullet point, that the assessment model is estimating a decrease in spawning stock size as a result of the increase in catch, and this is driving the need for future catch reductions in the projections. However, other sources of evidence suggests the stock size could be increasing. Here are some more bullets related to that perception.

The geographic distribution, there is some evidence that there's some northward shift. Again, the shore mode issue, in that third bullet, and then the changes in the fishery that have taken place with the -- The example there is the changes in the user -- The different parts of the commercial sector, but the OA is based on the 2012 benchmark that is now over a decade old.

This is hitting on the natural mortality again and how that is impacted by the growth and that these increases in recreational landings could be, as mentioned, the increases in recreational effort due to COVID, but also could be related to increases in stock size or some combination of both, and some evidence of the larger stock size is that, over the last several years, commercial fishers have been meeting quotas earlier in the year, and so that could be increased stock size, or it could be increased effort, or maybe one think that I don't have on here is earlier -- You know, if they're coming up earlier, that the migrations happen earlier, that could impact that as well, but the perception, from public input, was that these quotas are being met earlier because they're catching a lot of fish, which suggests -- Or that the catch per unit effort is higher, suggesting that stock size is higher.

Fred mentioned the uncertainty in steepness and natural mortality, and so I just highlighted to the council that the likelihood profiling suggests that natural mortality could be much higher, or it could be higher, and so it looked like the likelihood profile was pointing to something around 0.7, if I recall, and, in the sensitivity analysis, in that lower left, the base is the middle line, and going to an M of -- Which is 0.37, and if you go to -- I think it's -- Sorry. The base is 0.35, and then you go to 0.42, and so that slight increase in M gives you -- It shows you how the ratio of SSB to SSB MSY, how sensitive it is to just that -- It's not even going above 0.5, right, and it's just to 0.42, and so it changes how close we are to the ratio, the ratio of one.

These are some of the other assessment uncertainties, and we've hit on some of those. The lack of a fishery-independent index is one that hasn't been mentioned, and we talked about some of the fits to the commercial and the recreational data, the last two bullets, some issues there, and so this is -- We've talked about MRIP sampling already, and that just gets into some of the details, and so we can move on from that, and this is -- This slide is specific to the assessment projections, and it lists the concerns that we had, the commercial age sampling, MRIP, the fits to the rec data, uncertainty in steepness, and so a lot of this is just repetitive of some earlier slides.

We have hit on these points in our discussion this morning, and the working group that had this part of the action item -- They filled out the ABC dimension tiers, and then these are research recommendations, and then we had a -- At the end of the August meeting, we summarized a consensus statement here, and so I will highlight those. The assessment model is appropriate, but inputs need to be more thoroughly investigated. Some were concerned with certain aspects of the data quality that should be more thoroughly investigated before setting catch levels. The OA TORs

constrained the modeling approach, and there could be alternative data inputs that would benefit future assessments.

That stock status classification, and we talked about the uncertainty in that terminal year data already, and how that uncertainty gave us little confidence in the projections, and so we're back to now the technical subgroup to look into the issues we raised in August and then provide that to the -- The plan was to have that group meet, and then we would discuss that and then provide that to the Southeast Fisheries Science Center, as Erik has mentioned that they're willing to do a rerun of the operational assessment with changes that we recommend, and so that's our charge today, right, if folks feel strongly that it should go to a research track assessment or if we can provide input to Erik's shop to rerun the operational assessment, and I will be happy to answer any questions related to these slides. Go ahead, Chris.

DR. DUMAS: I have a couple of questions for Erik, and they're just general questions about the assessment model, assessment modeling, and my questions relate to several questions that we were asked, as the SSC, to answer regarding this assessment that we, I guess, didn't have time to get into last time, and these are questions about the recreational catch estimate uncertainty.

We spent a lot of time, the last time, discussing the 2020 data point and issues related to that, but there were a few more general questions that we left unanswered that I think would be easy to answer quickly, and so, first of all, and this is a question for Erik, but does the assessment model incorporate recreational catch uncertainty into the model estimate, incorporate the recreational catch PSEs?

DR. WILLIAMS: It incorporates it in the MCBE process, yes, and we use the PSEs directly to re-generate random recreational catch, yes.

DR. DUMAS: Great. Do you have any feeling for how sensitive the stock status and productivity estimates are to those recreational catch PSEs? Do the recreational catch PSEs have a large, small, or moderate influence on the estimates of stock status or productivity? Do you have a feeling for that, based on your modeling or sensitivity analysis?

DR. WILLIAMS: I don't think I have a feeling. I mean, it comes down to the basics of what proportion of the total removals does that fleet represent, and, if it's highly uncertain, then certainly it's going to then translate into uncertainty in the final estimates. I would say that this is a terminal year too, and so that has also has influence. You know, those terminal year points are a little more important in the assessment than the earlier year points.

DR. DUMAS: Thank you. Yes, and then a question for the SSC. Do we have -- Do we currently have a policy on what level of PSEs are acceptable in the data estimates for us to consider them to be valid data points, versus just uninformative data points? I think that maybe relates to the 2020 data point for the MRIP catch, but, also, just data inputs in general with the recreational catch estimates, or do we have some threshold PSE that we look at?

Similarly, do we have some type of criterion, say a standard deviation criteria or something, for accepting, for example, natural mortality estimates, whether those are -- If they would have a low enough uncertainty for us to consider them valid data points, or the uncertainty is so high that we would essentially consider them uninformative data points. If we don't have policies like those,

that's something that we might want to consider. If we have good reasons for not having the policies, then we might want to sort of repeat what the reasons are at this point. Thanks.

DR. BUCKEL: Thanks, Chris. Genny.

DR. NESSLAGE: That subject has come up before. I have suggested that and had my head chopped off, and so if that's -- I would support you in that and echo your comments that we need to think more carefully about how we -- These are estimates, based on data, but, at the end of the day, they are MRIP estimates, but, actually, I had a question for Erik, if I may.

DR. BUCKEL: Go ahead, Genny.

DR. NESSLAGE: About M, and I think -- I am actually -- Well, at this point, until we hear back with a little bit more detail from MRIP, and deal with -- Figure out how we're going to deal with the terminal year estimate there, I am actually growing more concerned about the M issue. All the other issues that we've outlined are not things that I see a quick fix for, or even a fix for, period, given the available data.

However, I am wondering about the range of M estimates that were considered, or explored, in the assessment and how they were incorporated in the MCBEs, and so I'm looking back at the stock assessment report, and it says that, of all the MCBE runs, 90 percent were in agreement that overfishing is not occurring, but, later, when I look down at the way that the M uncertainty is incorporated in the MCBE trials, it looks like there was a truncated normal distribution with a range of 0.3 to 0.42, and could you go to the M slide? Thanks.

That means, if I'm not mistaken, that the blue and the yellow line options for M would have a very low probability of being pulled in the MCBEs in a given run, whereas most of the weight would be on the purple line, correct, and, if that's correct, I am wondering if a different distribution would help us to capture more of that uncertainty, and I know we've talked about that in the past, and so I don't know, Erik, if you would be willing to entertain an answer to that.

DR. WILLIAMS: You're exactly correct, and, yes, you can consider any distribution you want around that, and expand the range, if it's not to your liking.

DR. NESSLAGE: I just think it might -- In the absence of new information on M for Spanish mackerel, which we are not likely to get any time in the near future, I don't think, and I'm looking at people around the room, and I'm not seeing anyone jumping up with a great idea, and that might be one way to incorporate some more of the uncertainty, because right now -- I was looking at our ABC Control Rule, again, and, based on our current control rule, we have maxed out our P*, as far as how the model is constructed, and so, if we want to -- There is no really -- We would have to go to something ad hoc to account for this additional uncertainty, unless we explicitly incorporated, and I would suggest that the group consider, and/or the Center consider, changing the distribution.

DR. BUCKEL: Erik.

DR. WILLIAMS: Another point to bring up is, you know, we are constantly changing the way we diagnose these models and some of the runs we do to test things, and, in this case, I'm pretty

sure we didn't run a profile on M itself, which we often do, and sometimes that can help us also determine how uncertain M is, or even potentially if it's biased. If the rest of the data is pointing in one direction or another, that sometimes indicates that we might have a bad M estimate, but it's tricky, because it's also wrapped up with selectivity settings and some other things, but, anyways, that level of diagnostics -- I don't think we did the full what I would call the modern set of diagnostics that we use for all of our assessments now on this one, because it was kind of a strict operational, in the sense of the way the TORs were set up.

DR. BUCKEL: Go ahead, Amy.

DR. SCHUELLER: This slide says that the likelihood profile was run on M, and I'm looking for the figures in the report, and I can't find them, and am I missing something? I have been circling around M a little bit too, and max age looks like twelve, and then the likelihood profiles are mentioned, but I can't find the figures.

DR. BUCKEL: They're in the report and Erik's presentation, and so maybe Erik's slides from August would be the easiest.

DR. CURTIS: Okay. One second. Let me pull that up. Just to direct you all, this is the stock assessment, SEDAR 78, Spanish mackerel report that was reviewed in the August SSC meeting that we brought up, and you can find that on the website under the August joint meeting briefing book.

DR. BUCKEL: Amy.

DR. SCHUELLER: First, thanks, and that's helpful. It's interesting that they're in the PowerPoint for the SSC, but they weren't in the report, and so let's not do that again. The other question I had, and so one of the other things, besides M, that I am interested in is sort of this range shift, or expansion, topic, and then the NEAMAP index was brought up, I think, in the presentation that you gave, Jeff, to the -- I saw NEAMAP somewhere.

DR. BUCKEL: Yes, and it was brought up in the -- It was in the report.

DR. SCHUELLER: Yes, and, on Slide 27, it says, "based on public comment and NEAMAP data, the stock may be moving northward", and do we have a plot of what the NEAMAP data look like, and I'm asking that because I'm looking at the other indices in the assessment report, and they're all just flat, but I don't recollect seeing the actual data plot from NEAMAP, mostly because my memory is totally shot, and so, if it's in some place that I am not seeing, and, if we could figure out where that is, that would be helpful for me as well.

DR. BUCKEL: It was not provided in the assessment report, and it was brought up either by an SSC member in August or a public comment in August, and I don't remember which one, and so it was in the report, and I did go to the webpage, and they are catching Spanish mackerel now, but they have a note on there not to -- You know, the numbers are so low and not to use these data for an index of abundance, but there are, in recent years, catches of Spanish mackerel in NEAMAP, and so I don't even know if I looked at the plot, and I just wanted to confirm that they were catching them, and they were, but it was low numbers, but I don't recall if there was a trend or not.

DR. SCHUELLER: So it doesn't sound like that would be a new potential data source that could be used.

DR. BUCKEL: I don't think it's data source. Well, based on what's on the NEAMAP site, it's not a data source for an index of abundance, but the pattern of the geographic distribution -- I didn't look at it spatially, because, you know, they're going from North Carolina northward, and so that could be something where, over time, you could maybe see the fish moving northward, but I didn't look at that.

DR. SCHARF: So if we -- If our technical group gets together -- I am asking Erik specifically like a path forward, right, and so you were -- You indicated that the Center could look at some of the concerns we had in the operational assessment, within the framework of an operational assessment, right, without having to -- I think, clearly, what -- The consensus of the SSC in August was that the next assessment for Spanish be a research track, but this one is still an operational, and it sounds like you can look at some of the concerns, in terms of providing some of the more modern diagnostic tools for this assessment, and so would a path forward be to have our technical group summarize these and provide that to the Center to evaluate and then bring back to us at a certain point?

DR. WILLIAMS: That's one possibility, and so certainly what the Center is going to have to do, because we have a full assessment workload, is look at what would be involved in that and kind of compute the workload associated with it and see if we can squeeze it in or if this needs to be kicked to SEDAR and be put into the SEDAR schedule itself or -- I don't know, and there's a lot of possibilities there, and part of it is going to be determined on how big the changes might be, essentially.

DR. BUCKEL: Marcel.

DR. REICHERT: I've been thinking about this a little bit, and, since I'm a member of that group, I think it -- Well, I'm not sure if this helps the conversation, but I see kind of basically four categories of issues, or let's call them issues, here. One is updates that we asked that were done, and they are what they are, and there is unknown information, such as population shifts, and I'm not sure what we can do about that, because that information is not available, or it would take an enormous amount of work to include, and so there were several issues that we, as an SSC, identified that I don't think would be feasible to explore in this framework.

Then there is, you know, the best available data, and there is data that is there that is not going to change, and we can discuss whether or not the uncertainty associated with those data is acceptable or not, and I think that's a conversation that we need to have, because, if that's not acceptable, then there may not be a need to rerun the assessment, and, again, there's nothing we can do about it. That data is the data. Then maybe, in a research track, or another framework, that can be looked at and see if there's better data available, better analyses, that may reduce that uncertainty.

Then the last category is, and I would like -- I'm thinking that that is something that the technical working group could concentrate on, is there is issues that can be investigated, because either we have the data or we have the analysis methods to do so, and there were a number of things that were in our report that we could discuss, and, these four categories, they are kind of interspersed in our report, and so, perhaps, as a path forward, and that's what I have been thinking of, in terms

of, okay, where do we go from here, but I think one of the important decisions we need to make is, given the assessment, and, given the uncertainty, is this something that, even if we are going to rerun, or investigate, aspects of the assessment, does that mean that the uncertainty is going to be at a level that we are comfortable with?

DR. BUCKEL: Jie.

DR. CAO: I guess I'm just going to follow-up on Chris's question regarding the uncertainty associated with the catch, because, from the assessment model perspective, my understanding is that you can basically specify the CV of the catch, and so my general impression is we tend to give a very low CV for the catch, like 0.05, but, given we know there is high uncertainty associated with the catch, why do specify a low CV? That's something I'm not sure about.

DR. WILLIAMS: That's an interesting topic, Jie, and it's one that is -- Actually, Kyle Shertzer and I have started already actively researching, and the issue is that these are catch-at-age models, and they often need to be conditioned on catch, that you know catch. In order to estimate catch, you have to have a really good index of abundance, and, even then, the index of abundance has to cover all the years that you are estimating catch in, and, from our analysis, it looks like maybe you can estimate one or two years somewhere in there of freely-estimated landings and let the model estimate what it thinks it should be, based on the index, but, if you try to go in and put really high CVs across a whole time series of say recreational landings for the whole model, it's not going to know what to do.

There is no information content to tell it what the landings should have been, and it's going to get wrapped up in estimates of M and other things that are going on in the model, and there is no information there to tell it what the landings should have been, and so what we do is we put those high PSEs into the MCBE process, and that's how we account for the uncertainty in the catch.

DR. CAO: Is there a way that we can give a specific CV, and like you just give a high CV for those years that you think there is high uncertainty associated with the catch?

DR. WILLIAMS: We can, and my only caution is, again, it hasn't been fully researched, and the idea is just kind of there. People think, oh, well, okay, we should be able to estimate landings, but the other concern I would have is, particularly if it's at the beginning or the end of a time series, whether it's really estimable at that point, because there's a lot of things going on, sometimes, at the beginnings and the ends of a model that might make it inestimable, but, like I said, Kyle and I are working on that. We have an indication that, you know -- Right now, the indication is that years within -- That are bounded well within an abundance index time can probably be estimated, but, when you start to get to the ends of the time series, you start to lose some information content.

DR. BUCKEL: Chris.

DR. DUMAS: So a follow-up question on that, and might we just want to consider some data points, if the PSEs, or uncertainty, are sufficiently high, that we just consider some data points as uninformative and just consider them as missing data, if the uncertainty with them is so high, and just run the models with a couple of missing data points?

DR. WILLIAMS: Right, and that is the reason we can't do that, and this is why we fit landings carefully, because there is removals, and we know there are removals, and missing data would basically -- The model would treat it as there was no removals, and we know catch was not zero.

DR. BUCKEL: Thanks, Erik. Everybody take a look at what Judd has written down, based on the conversation, and let him know if you need any edits to comments that you have provided. Go ahead, Fred.

DR. SCHARF: So what are our options, going forward, in terms of taking a more careful look at the 2020 MRIP data? I don't know, and I'm kind of looking at Chip, and he's not looking at me, and, in other words, what -- You know, we don't really have a precedent for how we deal with these, and I remember, from the workshop we had in 2019, that we had a lot of discussion about what Chris was referring to earlier, in terms of how do we identify when data points warrant a more careful look, right, and I think, clearly, we have a case here, with Spanish mackerel, where we think we need a more careful look at what is happening in 2020 in terms of those landings.

I mean, they're more than twice as high as the recent average, and so what are our pathways to -- Is that something that we have to request that data, and then look at it ourselves, or do we -- Or can we ask MRIP to look at some things very specifically?

I don't know what's our procedure to, if we wanted to look at that more carefully, while some other things are being done, as part of this operational assessment, which, you know, could take -- I don't know, and I'm not sure how long it could take, right, and, if it has to go back into SEDAR, it could be another year before we get back a new model run with some of the more recent diagnostics to look at natural mortality and steepness, et cetera. In the meantime, what are our options, in terms of looking at the MRIP data more closely, so that -- I just feel like I am not very confident at all in those numbers, and so I would like to have some confidence in those numbers.

DR. COLLIER: So a couple of things from that. I mean, you guys did have a review of MRIP, the change from CHTS to FES, back in 2019, and maybe that could be another thing that comes to this group again, and maybe have some additional -- Now that it's been in place for a few years, how have things worked out, and, you know, maybe begin to put in things, like Chris had suggested, some of his input and where this would actually impact some of the South Atlantic stocks. Maybe trying to put these practices in place, making sure it's available and asking for a timeframe for that.

The other thing to consider, maybe, and Erik will probably shoot me for this, but, when you start looking at the recreational data now, and compare it to when it was CHTS values, or even MRFSS values, from the previous assessment, maybe consider putting the shore-based mode as its own fleet. When you're looking at the overall catch estimates for the shore-based mode, and it has now become a dominant part of the fishery. It exceeds the commercial catch.

We have several different commercial fleets in that stock assessment, but it's the shore mode that is actually catching more than the private boat, and maybe consider are there different sizes of fish that are caught from shore, compared to private boat anglers, and we're trying to get a better handle on how the shore-based mode is actually impacting the stock assessment. Understanding the F that could be associated with that could provide you guys some -- Maybe some better information.

DR. SCHARF: Chip, I'm just thinking, right now, about can we get the data, the Spanish mackerel data, for 2020, simply just looking at by state, by wave, by mode, so we can see -- You know, do we see an increase across all states, all waves, all modes, or is it just one mode, or is it one wave, or is it one state, so that we can identify where this -- Is everything twice as high as it was before?

DR. COLLIER: Yes, and we can pull that for you. The one thing that's really good about Spanish mackerel is it actually matches the regional boundaries that are on the website, and so it is pretty easy to pull, and you can get the actual PSEs associated with those.

DR. BUCKEL: Erik.

DR. WILLIAMS: Just to comment on a lot of that discussion, so outliers are defined by the data that you collect, right, and so, the more data you collect, the more you can recognize true outliers from just low sample size, and that's the issue here, is this is suffering from low sample size, no doubt about it. Are those intercepts, which is what is being scaled up, are those intercepts real outliers? That's what I think MRIP looks at, and they determined that they largely weren't, and so what we're seeing as high increases is just an artifact of low sample size. The way to get around that is you collapse across frames, and so what we can do is start collapsing across years, to the point where we get below a PSE value that we're satisfied with.

If we do that, and this is important, because we're approaching it the wrong way sometimes, by thinking about drilling into the survey, and trying to find that one data point, that one intercept, that seems errant, and they already have a flagging and QA/QC process for getting rid of those. We shouldn't be messing with the survey at that level. We should be messing with it at the other end, which is, if we're not satisfied with the PSE, if we see a spike or something like that, we should be looking at ways to collapse across frames to embolden that estimate, to the point where it gets below a PSE that we're happy with, and maybe it ends up being a two or three-year estimate, but we can deal with that in the model.

DR. BUCKEL: Chip.

DR. COLLIER: Just a word of caution, because, when we're developing management measures coming out of the stock assessment, we have to base it on the similar -- It has to be managed in a similar way, and so, if it's going in as a three-year average, and we're dealing with spikes like that, we have to be able to develop something on the backend for management to compare to an ACL, to make sure that we're not causing overfishing or exceeding the ACL.

DR. WILLIAMS: Just to follow-up on that, Chip, I think the same rule would apply then, in that sense, and so, in other words, I would doubt the managers would want to use a single-year estimate if we're using a multiyear estimate. They would want to use the same matching multiyear estimate, the same rule-of-thumb of collapsing, until they get below a certain PSE, to actually even monitor the catch, so to speak.

DR. BUCKEL: Judd, one thing that we discussed that is not -- I mean, it's in our August report, but it's not here, related to the MRIP, is the -- I don't see the shore versus -- The rec shore versus the recreational private boat, and so that's a specific question for MRIP, and we didn't get any feedback on it, and so it's not clear if they looked at that or not, but it would be nice to get an explanation of what is happening there. Anne.

MS. LANGE: The third line, on the first bullet, Erik corrected that, if you remove points with high uncertainty, you're looking at a zero catch for that, and so it may be worth including that, so it's not forgotten. Like, however, that would result in a catch of zero, and is that -- Where it says, "remove some data points with high uncertainty", and you had indicated that would --

DR. WILLIAMS: Yes, and you can't really just remove them.

DR. DUMAS: A follow-up on that, and I agree with something that, because a missing data point is different from a data point with a measured level of zero, and so, earlier, I was talking about missing data points, but, Erik, you responded that including the missing data points would be assuming they were zero, and I don't think that's the case, but you're saying that, if we included some data points as missing in the modeling effort, then the ultimate results of that would be something would be zero, but not the data point itself, just to clarify, because there are methods to estimate with missing values, and you had some point about something was zero, and what was that?

DR. WILLIAMS: I'm not familiar with any methods in stock assessment to deal with missing values, because the model has to fill it in somehow, right, and, if it doesn't fill it in, it assumes it's zero, in this case, because what we're talking about is removals, and I think the answer is actually what Jie was suggesting, is you take that particular year and you just increase its uncertainty to a more reasonable level and let the model estimate. The model will try to fill it in. What I was saying is the information content that the model has to know what to fill that in with -- It's kind of unclear, and it looks like it can happen, but you have to have a really good index to go with it for that to work.

DR. DUMAS: I see, and, in regression analysis in general, there are methods to estimate models when some data points are missing, and so maybe we could look at it in that --

DR. WILLIAMS: Yes, and, in that case, they're filling with smoothing methods, essentially. It's an averaging, which is really what I am suggesting by going back to the frame collapsing method, is essentially the same thing.

DR. BUCKEL: Erik, to that point about the frame collapsing, is that something that is doable within the operational framework?

DR. WILLIAMS: So I think we would want to consult with MRIP, but they have -- The last I checked with them, they have the ability to do what they call custom estimates, and I think that includes -- You know, we could ask for a multiyear estimate, where they will collapse the frames and get us to a PSE below some value. I mean, the ad hoc way for us to do it would be to, yes, just smooth over it, and we're making an assumption then that we're collapsing correctly. I would prefer that MRIP do it, because they have an actual system for collapsing their strata.

DR. BUCKEL: Thanks. Chris and then Amy.

DR. DUMAS: By collapsing strata, we're just talking about aggregating the data over years, to get at an average estimate, an estimate for the average across those years?

DR. WILLIAMS: Right, and so what they can do is collapse across frames, to the point where they can -- You can tell them that we want a PSE below 0.5, and they will collapse until they get to that point, and then, boom, you have an estimate.

DR. BUCKEL: Amy.

DR. SCHUELLER: I am going to change the topic, and so I don't want to butt into this conversation, and so I'll wait until we're done with this topic.

DR. BUCKEL: Any other comments related to the MRIP data, or collapsing? Marcel.

DR. REICHERT: So, if we're doing that, we reduce the PSEs, but does that mean -- I know, again, this is probably an impossible question to answer, but does that also reduce the uncertainty? Do you know what I'm -- Because we can look at different distributions, and we can look at -- Again, correct me if I'm wrong, but a lot of the things that I've heard here is, yes, we can do that, but does that get us to an uncertainty level that we feel comfortable with, because you can explore more, for instance, natural mortality distributions, but that may also result in an increase in the uncertainty over the ultimate result of the stock assessment, or the stock status, and so I'm trying to wrap my head around whether the path we are taking gets us to a point where we're comfortable with the outcome, and does that make sense?

DR. BUCKEL: Yes. Go ahead, Erik.

DR. WILLIAMS: A hypothetical case is you've got two points at the end of the time series, and one has a PSE of 0.2 and one has a PSE of 0.7, and, if we collapse across those years, we can maybe get to a PSE of 0.4, which satisfies us. We would then model that uncertainty as a 0.4, but it would apply to both years, and so, in some sense, we're not losing the uncertainty in the model, because then we have two years that are going to be -- We're actually inflating the uncertainty in one year and decreasing the uncertainty in another year, and so we're not losing uncertainty by doing that, and so I don't know if that helps.

DR. REICHERT: Unless the patterns that you are observing are actually the correct patterns, and then you're increasing uncertainty, correct?

DR. WILLIAMS: Well, that's the basis of the survey, is you're assuming it unbiased, and you're assuming that, as you increase samples size, or you collapse across frames, that you're not altering that bias, that it remains unbiased, and I think MRIP has demonstrated that that is the case, and so I think that's the one thing that MRIP does have going for it, and I know we beat up on it a lot, but it is a pretty solid stratified survey design, so that it should be unbiased. If there's any bias in it, it's in the reporting, and that's a whole other issue.

The other thing I will say is, if you guys are going to go down the road of discussing a PSE cutoff, that should be handled very carefully, because that will set a precedent, so to speak, and that will ripple through probably all of our assessments in which we deal with MRIP data, and so just be cautious of that.

DR. BUCKEL: Thank you, Erik. I think, before we go to Amy, we'll take our midmorning break, and everybody can get caffeine to help finish out Spanish mackerel. Thanks, everyone, and we will start -- Let's see. It's 10:10. At 10:25, we'll start back up. Thank you.

(Whereupon, a recess was taken.)

DR. BUCKEL: Okay, everyone. Welcome back. Thanks for returning to your seats, everyone, so quickly. I appreciate that. All right, and I think, next up, we had Amy, and is that correct? Go ahead, Amy.

DR. SCHUELLER: Are you ready for me?

DR. BUCKEL: Yes.

DR. SCHUELLER: All right, and so I'm going to move beyond the MRIP discussion, and I guess I will start with, if we decide that this assessment gets a thumbs-down, and we're making the assumption that the previous assessment is still dictating, you know, the ACL values that the fishery would use, and that the risk to the stock is relatively low, that we're in a status that we would need to take action, I think I'm comfortable saying that at this point, and I will say why.

Genny brought up natural mortality, and so I started looking at the natural mortality, the likelihood profiles, and the age compositions, the max age, and the plus group, and it looks like, with that combined information, the natural mortality probably is higher, which, you know, means that it is probably less risky to make that assumption, and so I guess the way I view it is perhaps we should recommend this go to an operational assessment and look at all of those different things, and I think we can -- I think we're basically setting up the terms of reference for that operational assessment, right, and we need to look at MRIP, and I do think max and the plus group needs to be looked at too, because this is a plus group of ten, but there really aren't any data out that far, it looks like, and so I think that's something we haven't talked about that could probably be thrown in the mix, then, with that, natural mortality, which is a huge one, and so I guess that's where I'm sitting.

I think it's relatively low risk to keep depending on the previous assessment, and so I think we can probably move forward with requesting an operational assessment, and I don't think it will probably be in a year. It's probably going to be a longer ask than that, but that's what I am thinking, and I don't know what everybody else thinks.

DR. BUCKEL: Genny with a half hand.

DR. NESSLAGE: I guess I respectfully disagree, Amy, but I'm also not in charge of staffing at the Beaufort Lab, and so I would say, from my point of view, I would feel comfortable setting an ABC, at least for now, with the rest of this being research recommendations, or things that must be done, and put in the statement of work for the next assessment, whenever that may be, but, if the MCBEs can be rerun with a different distribution for M, and we get a handle on -- The subgroup is comfortable with the MRIP estimates and how they are rerun, or whatever we're going to call it, re-estimated, I think that can be done -- Those two changes can be done in one or two days by an analyst, with running the MCBEs overnight.

I don't think we need to bring SEDAR in, and I don't think we need to go for an operational assessment. I think we can set an ABC with this new revised assessment and just make some very -- Put some very clear guidance on what should be in the next statement of work for this assessment, but that's my two-cents, and I would love to hear what other folks think, and I'm happy to go with Amy's suggestion if that's what the group wants.

DR. BUCKEL: Amy.

DR. SCHUELLER: I can live with that, too. I mean, I think that's a good middle ground. I am just trying to throw something on the table, so that we have this discussion, because we do need to have a way forward. I think -- What are you thinking for the natural mortality specification in the uncertainty?

DR. NESSLAGE: Didn't we talk about alternative distributions for tilefish? What did we use for tilefish for M? Can I get back to you? I want to look at this old assessment.

DR. SCHUELLER: Sure.

DR. BUCKEL: Other comments on the direction that folks want to go? It sounds like one option was the research track, and it sounds like -- I haven't heard any strong arguments for the research track. Fred Serchuk had mentioned that he wasn't comfortable with where we were, but maybe he can chime in on this other alternative of continue with the assessment that we have, but having specific recommendations for the analysts to address in a revised OA. Fred Serchuk, go ahead.

DR. SERCHUK: I guess I would agree with Genny's proposal. You know, I think we can go forward a little bit on it. Thank you, Chair.

DR. BUCKEL: Thank you, Fred. I just want to be clear on the distinction between Amy's and Genny's. Amy was stay at status quo, but put an OA on the SEDAR schedule, with these recommendations, and so that would be a longer-term, where these changes to the OA are -- It would be maybe a new OA. Go ahead, Amy.

DR. SCHUELLER: I think we can just blend the two recommendations. I think that we can do what Genny has recommended in the short-term, and then we could start specifying terms of reference for an operational assessment, whenever that would occur, for the next assessment. I don't think they're mutually exclusive statements of ways forward, and I think that they're complementary.

DR. BUCKEL: Thanks for that, Amy. That's helpful to me to understand. Marcel.

DR. REICHERT: A question for Amy, and so you're talking about an operational, and so you feel that the research track may be overkill?

DR. SCHUELLER: My viewpoint on a research track and -- I think that, if you asked a hundred different people, you might get a hundred different responses about what a research versus an operational assessment is, and so my viewpoint on a research track is that a research track is for species that have not been assessed and for species that have some major new data source, something completely different, and this doesn't really meet my criteria for that, and so, yes, I

view it as operational with flexibility, and operational is supposed to be the update, standard language we used before, and so maybe I'm incorrect in my interpretation, but I don't see this as needing a research track, personally.

DR. BUCKEL: Genny.

DR. NESSLAGE: Just to get back to the question of what distribution, the last time we had a species with high uncertainty in M, that I can remember, where we tried to go with this was tilefish, and we used the uniform distribution. I would feel comfortable with that, but, just for everyone's reference, know that the answers could be quite different then, and so don't be surprised if the base run, the median of the MCBEs, is very different from what you see today, just as a warning.

DR. SCHUELLER: I guess the question is do we think that the lower end is as equally plausible as the higher end, because that's what the uniform distribution would assume, and, based on the likelihood profiles, that suggests that the higher-end values of natural mortality would be more likely, and so, I mean, I'm fine. We're uncertain, and it's natural mortality, and so --

DR. BUCKEL: Eric.

DR. JOHNSON: I just spent about five minutes on Google, and so this isn't particularly scientific, but, of all the congeners that I could find from different areas, the Caspian Sea or whatever, and all of these are all in the same genus, the natural mortality rate is between 0.49 and 0.54.

DR. BUCKEL: Thanks, Eric. That's helpful, and so, Genny, the recommendation that you have is dealing with the M just in the MCBE and not in the base? I think we should have some discussion about that too, given Amy's look at the -- Her take on the likelihood profiles and other data sources. Genny.

DR. NESSLAGE: Do we recall how the M that is currently used, that's been borrowed from previous assessments, was generated?

DR. BUBLEY: It's in the report, but it's based on -- They're using the Lorenzen, but they're scaling it to the Hoenig 1983 point estimate, and so we have other ones that Hoenig himself has said might be a better option, and so, I mean, that's something we could explore, is looking at the Then estimates, and see if that provides -- Where that leads us.

DR. BUCKEL: Thanks, Wally, and thanks, Genny. Other recommendations for the current recommended revised OA? Fred.

DR. SCHARF: Just a question, and so I guess two questions. Genny, what are you -- What kind of timeframe are you envisioning for this, right, if it's not going to go back? I mean, I'm just thinking ballpark, and like what kind of timeframe? Are we thinking that this will come back to us in April, and so that kind of six-month timeframe, and are we -- As part of what we're asking the Center to do, are we also going to ask the Center to do some aggregation with the MRIP, or the Center would request that from MRIP?

Like Erik said, he would prefer that they do it, since they have the framework, and that that's part of what we would ask for, is some aggregation, and so are we going to give them a PSE? Are we

going to give them a number to achieve with the aggregation, because that's what we were talking about, and we talked about having to be careful, because it's going to set a precedent for what that MSE is, if we have them aggregate across years, and so I don't know what that looks like. I am assuming that we should provide some specific guidance to the Center, in terms of what to ask for, in terms of aggregating the MRIP data to get the PSEs down to a level that we're comfortable with.

DR. BUCKEL: So I guess there's two parts, right, and does the SSC -- Is that the preferred option, to recommend the collapsing of years to achieve a lower PSE?

DR. SCHARF: So just another question on top of that. If we extend this out, and do this additional analyses, the terminal year is not going to change. In other words, are we not -- We're not going to bring 2021 data in now, into this assessment, because, if we do all this, right, is that even -- If that potential exists, to add the 2021 data, when you're rerunning the model -- I don't know, and is that something that is plausible, and, if it is, it is something -- Is it a path we want to go down, or just stick with 2020?

DR. BUCKEL: Erik.

DR. WILLIAMS: Hopefully this will help in your decision-making, and I will try to sort of cast our capabilities in the best light I can. If you have just a couple of model changes, like M or something like that, we can probably squeeze that in somehow. Anything beyond that, we're probably looking at having to fit it into the SEDAR schedule somehow, which would then probably entail -- You might as well add additional years of data at that point.

I would caution, also, with the MRIP. MRIP knew that we were supposed to get this change at the last council meeting, and they didn't provide it until just last Monday. They are not quick, and that's not to cast dispersions on them, but I don't know how quickly we can get them to give us this collapsed estimate.

DR. BUCKEL: Thanks, Erik. Fred Serchuk.

DR. SERCHUK: I understand the Center is willing to undertake some of the analyses that we talked about, and, to me, that sort of rerunning the operational assessment with the changes that we've indicated could be done by the Center. Anything beyond that, I think, in the future, that goes to SEDAR, in my mind, should be a research track assessment, and I say that because the previous assessment, I understand, was done a number of years ago, and, yet, the difference between an operational assessment, as I understand it, and a research track is that a research track can say, look, we're not going to use the framework that we used before, and we're not going to use that model, and we have three canned to look at other ways to do things that were probably either developed or not included in the operational assessment.

My feeling is, if the Center is going to undertake some of the analyses, given the current operational assessment, or with some of the additions that we talked about, my feeling would be that's fine, and appropriate, and we appreciate that. On the other hand, I don't think it's -- We should talk about an operational assessment, going back to the SEDAR process, and the previous assessment was done some time ago, and I think, if we're going to do anything, we should ask for a research track assessment. Thank you, Chair.

DR. BUCKEL: Thanks, Fred. All right. Let's take a look at what Judd has. Judd, is it the last bullet that has the --

DR. CURTIS: The last bullet is just some clarification there, and so I kind of heard two camps of thought, as far as adding to the SEDAR schedule with this, to revise the operational assessment, or not re-adding to the SEDAR schedule, and so just some clarification there.

DR. BUCKEL: I think that's the language that Erik, when he came to the table, said, if it's going to be much more than like the changes to M, or some of the other smaller things, and, if it was adding an additional year, where there is a lot more that would have to be done, then that would require it being added to the SEDAR schedule. Fred.

DR. SCHARF: So just as a -- One, I agree with Fred that I don't really care what you call it, but I think the next assessment should just be on constraint. In other words, the Center should be able to look at all of it and change models, change inputs, whatever. Just, whatever you want to call it, and call it what you want, but I would also be in favor of Genny's recommendation, in the short-term, for us to have something in April, with the caveat that I feel like we just -- I, personally, would want to have some more confidence in the MRIP data than I do now to make a decision in April.

I am looking at Chip, and so maybe Chip can light a fire under the MRIP folks, so they can get us data prior to the week before, right? Chip is pretty influential, I think, but I think that -- I agree with the analyses that we've talked about, just in terms of natural mortality, you know, and maybe longevity, but just some things that the Center could do without too much analyst time and that would be bring us back to where we could make a decision on an ABC for April, but the next assessment just be completely unconstrained.

DR. BUCKEL: Thanks, Fred. Genny, and then Marcel.

DR. NESSLAGE: On the three questions I think that have come up so far, the first being that MRIP data -- Revised MRIP estimates possibly being untimely, and I am very sympathetic. I think you should -- My recommendation would be to set a reasonable deadline, and, if they don't meet it, we go forward with the current MRIP estimates as they stand, and let the council deal with that, and it's the best available to us, and we set an ABC, and it will come back to us when MRIP gets us whatever we ask for eventually, which stinks for the Beaufort Lab, because that means then they have to do things twice, but that's the reality, unfortunately.

Regarding M, now that we're talking about opening it up to considering an updated, perhaps, estimate of the base M, then I guess I would feel comfortable -- I would feel comfortable leaving it to the analyst, at that point, and the sub -- What are we calling them, a working group, or a subgroup, working group, but to advise on, at that point, whether the distribution needs to change, because, if it shifts higher, than maybe the normal would be just fine, and I leave that in your very capable hands at that point, but as long as you give it a good, hard look as to what it should be, and then the last one was the PSEs and what do we give them for guidance.

I still admit that I am not an MRIP expert, but I am wondering if -- This is a much broader conversation that we need to have, because you're right that we'll be setting precedence, but, at this point, that would be perhaps a recommendation from the SSC to staff, that we set aside some

time to have that broader discussion at a future meeting, but considering that there is -- Folks are really hung up on these terminal year concerns, for the last few year concerns, and I'm wondering if we can draw on any of the previous National Academy reports on what a reasonable PSE would be and see what that gets us, but with the caveat that we may need to revisit this for future assessments, as far as our recommendations are concerned, as a committee.

DR. BUCKEL: So asking the working group to determine that CV, based on where they have more time to dig into the National Academy report, or are you --

DR. NESSLAGE: Would they be able to do that quickly? I think that would need to be done ASAP, like next week, or the week after, to get the request into MRIP in a timely manner.

DR. BUCKEL: Go ahead, Chris.

DR. DUMAS: On the MRIP website itself, they say they will not include an estimate -- They will not give out an estimate via their query tool, their data query tool, if the PSE is over 50 percent, over 0.5, and so that probably embodies sort of MRIP's best estimate of what a reasonable PSE would be to indicate data points that give some information, based on MRIP's expertise.

DR. BUCKEL: Marcel.

DR. REICHERT: I am still quite confused, in terms of the procedure, because we are talking, as a full SSC, about what we would like to see. At the same time, we have the working group that are asked to investigate what the SSC would like to see, and so -- You know, digging into the MRIP data, et cetera, I feel that is a task that is much bigger than that working group, especially if it only consists of three people, and I'm not sure if I misunderstand what you were suggesting, Genny, and correct me if I'm wrong here, and so -- Because, in the notes that we have here, and in our previous report, there is a --

There are a number of issues that we have identified, and I am still uncertain in terms of what we as an SSC want to see, what's feasible, and then what is the task of the working group, and so maybe it's me, but I am just a little confused about where we are, where we're going, and what the working group -- Since I'm a member of that working group, what the working group's task is, other than perhaps distilling stuff that we've discussed here and then investigate whether that's feasible by the Science Center without having to go back to SEDAR and request a slot, because I heard several of us say, well, this should be relatively easy to do, but, if you accumulate everything, you may get to a point where, well, that's a little much to ask, and so I think, ultimately, where we, or perhaps the working group, needs to come to is where do we get the best bang for our buck, and what makes us comfortable about the stock assessment that we can forward this to the council and the council using it for management regulations, and does that make sense? I am still a little confused here.

DR. BUCKEL: Yes, it makes sense, and I confused the issue, and Genny was talking about the full SSC, at some point down the line, to discuss that MRIP CV, and I was asking for clarification, and so that's -- I think Genny, and others, and Chris just made a recommendation of 0.5, and that's something that can come out of the full SSC, if folks are comfortable with that, using this MRIP webpage recommendation of 0.5. Then, Marcel, for the committee, for the working group, to -- Maybe Eric is willing to join that group, since he's doing some research on M for congeners, but,

instead of us coming up and trying to -- We don't have the time now, but to dig into that a little deeper for a potential change to the M base, and so that's where I see the working group -- That would be their charge, is some of this looking at congeners, looking at the likelihood profiles, some of the --

DR. SCHARF: Distribution.

DR. BUCKEL: The distribution, and so it's -- That would -- That is M, right, and then there were other issues that we brought up in August, just reviewing those to see if there is something else from that August report that also needs to be considered for a change in the revised OA, and, if anyone has those now, we can discuss those, but, right now, we've got the collapsing MRIP to achieve a CV of 0.5 or less and then the examination of M -- A few things with M, right, the base and then the distribution for the MCBE. Chris and then Chip.

DR. DUMAS: Just one additional point about the PSEs, and, with MRIP, what's written up on the screen is correct, but MRIP also says that they will provide estimates with PSEs that are 0.3 or higher, but, with estimates of 0.3 or higher, they provide a warning, and so 0.3 or higher -- A PSE of 0.3 or higher, they provide a warning. PSEs of 0.5 or higher, they're going to just not give you the data at all, because the estimates above those are so unreliable.

DR. BUCKEL: Anne.

MS. LANGE: But our request to them would be to collapse it to get so it was between 0.3 and 0.5, presumably, right? I mean, we wouldn't just -- You know, they wouldn't not just give us the data because it's not less than 0.5, and we would specify in our request to collapse as needed.

DR. BUCKEL: Chip.

DR. COLLIER: So MRIP did provide a working paper for SEDAR 78, and it's Working Paper Number 3. If you look at Table 5, it does have the CVs in there, and, for the most part, for Spanish mackerel, ever since basically the 1980s, it was below 30 percent, with the exception of 2020, and it was at 0.3, and so that is the one year that was higher than normal. Spanish mackerel is actually one of our better-sampled species in the South Atlantic region that's managed by the council, and so I just wanted to give you some guidance on the values that were going into this.

DR. BUCKEL: Thanks, Chip. That's helpful, because it sounds like there's no need to collapse, and is that how folks read that? Thank you very much, Chip. Marcel.

DR. REICHERT: Chip just mentioned that it's Working Paper 3, just to complete that information.

DR. BUCKEL: Thank you. Fred Serchuk.

DR. SERCHUK: I don't mean to question MRIP, but so many things were affected, in terms of the operations in a COVID year, and we know that the surveys were conducted, research surveys were not conducted, and I am surprised that they have the same CV in a COVID year, where I suspect sampling was not as intensive as it was, and perhaps not as representative. Again, I am just basing that on other activities that were curtailed, or eliminated, in a COVID year. I'm surprised the CV was 0.3 or less in 2020. Thank you.

DR. BUCKEL: Thanks, Fred. Dustin.

MR. ADDIS: Thanks. There was a workshop by the ACCSP, and the proceedings of the workshop are on percent standard error of recreational fishing data, and this was back in 2016, and this might be helpful. Beverly Sauls forwarded it to me, and I haven't read it, but there was a workshop that was done.

DR. BUCKEL: Thanks, Dustin. If you could forward that to the group, that would be great. Thanks. It sounds like we're still -- We've got this -- Folks have this uncertainty with 2020 that is still -- You know, we're not collapsing across years, and so that's not going to address it, and so thoughts? Genny.

DR. NESSLAGE: Maybe it's real then, as in maybe they're not such bad estimates as everyone thinks they are, and so sorry I didn't dig in as deeply as I should have into the MRIP data workshop reports before spouting off, but I don't know how we would get much better than 0.3, and I will just say that satisfies some of my concerns. Thanks.

DR. BUCKEL: Thanks, Genny. Judd.

DR. CURTIS: I will just let the SSC know that, in the April meeting, we will be receiving a presentation from the Science Center on some of the pandemic impacts from 2020 and 2021, and so that's some additional information that could help make some of these decisions. I think the majority of that is going to be socioeconomic information, but that could help maybe make some of these decisions for 2020 data.

DR. BUCKEL: Chris.

DR. DUMAS: Even if the 2020 estimate, interim estimates, are relatively good, have a relatively low PSE, they still might be -- Even if they're good estimates, they still might be unusual, in terms of an unusual year, just because of COVID, 2020 and 2021, and I think Fred Serchuk was speaking to that point, and, if you look at the slides on Erik's report, on sort of the time series of F and the time series of the SSB, and it's page 4, Slide 4, of Erik's report, if you don't look at 2020, and just say, you know, 2020 was COVID, and strange things were happening, and what was happening in 2020, even if we have a good estimate of it, likely, you know, won't be -- 2020 is likely not representative of future years.

You know, you look at the trends in F over FMSY and SSB over SSB MSY without 2020, and then, in my opinion -- I mean, it looks like that we're doing okay with the current assessment, even though, going forward, we should look into and address some of these ideas that we've been discussing to get even better estimates, with recruitment and natural mortality and so on and things like this, but, for the purposes of just, you know, setting an ABC in the immediate run, I think the current assessment is looking pretty good. Thanks.

DR. BUCKEL: I think the issue is, Chris, when we take -- 2020 is used in the projections, and then that's where we start seeing the -- It's leading to this large percent reduction in the ABC, and so, if we're concerned about 2020 and 2021 -- Well, 2021 is not being used, but 2020 is being used, and so, for the projections, I think, Fred, during the August -- Fred Serchuk, during the

August meeting, recommended maybe to use the previous three years and not 2020, and, Fred Serchuk, you can correct me if I'm wrong, but that may be something for the projections -- Erik.

DR. WILLIAMS: Just to confuse you guys even further, but, for full disclosure and transparency, 2020 and 2021 included imputed data, and so they borrowed from 2018 and 2019, and it wasn't much, because, if you look at the number of angler intercepts -- I was just looking at the bar plot, and roughly 10 to 15 percent of the intercepts were missing, and so they imputed it from 2018 and 2019, and, even in 2021, they imputed some values, but what has also been happening, over the last ten years, is a consistent, somewhat consistent, increase in total intercept sampling, and so we're at the highest levels of intercept in the whole survey that we've seen over the whole time series, and so that sort of balances it, in some sense.

DR. BUCKEL: Thanks, Erik.

DR. DUMAS: Given what Erik just said, but, in spite of that, if you look at the trends in F over FMSY, excluding 2020, and you look at sort of the trends in SSB over SSB MSY, there doesn't -- F over FMSY seems to be trending down, if you take out 2020, a little bit over the last twenty years, and SSB over SSB MSY seems to be flat, to maybe slightly trending up, and so --

DR. BUCKEL: Genny.

DR. NESSLAGE: I don't know whether to open this can of worms or not, but, you know, we have the flexibility to set our ABC in alternative ways, if we feel the need, and, if projection-based ABCs are not what we feel are most appropriate, because we don't think the current COVID -- If these MRIP estimates for 2020 and 2021 are high, but we anticipate effort will go back down, now that the pandemic is winding down, maybe we don't project ABCs out based on those years, and we do something alternatively, which I thought was, originally, in the July or whatever meeting, is what we were going to task the subgroup with doing, which was coming up with an alternative way to get an ABC, but that relies on the assumption that effort, if that's really the case, will go back down. Are we willing to make that assumption, or do we need to take into account that this effort has happened, and, therefore, we need to have an ABC that's appropriate to that, at least in the near-term, and maybe we need to consider when we need to revisit the ABC then.

DR. BUCKEL: Thanks, Genny. Thoughts? Thoughts on alternative approaches for setting ABCs? Marcel.

DR. REICHERT: I think you can predict my response. Unless I misunderstood you, Genny, in terms of the working group, I think that's maybe a task that should involve the SSC, rather than just a working group, and, I mean, I foresee the working group potentially coming back with some recommendations, but I think it would be more efficient if we go that route, to involve the entire committee, rather than a working group first, and that's just my personal thought.

DR. BUCKEL: Genny, what are some alternatives, or if you have a point that you want to make first.

DR. NESSLAGE: I guess, before we go down that route though, we have to deal with the issue of do we really -- If we accept the 2020 MRIP estimates as best available and reasonable for use in this assessment, then we are saying that we believe the magnitude is reasonable, at least, in the

right ballpark. Following that logic then, we need to respond accordingly, with an ABC that's appropriate for that, and, given that we've already taken a sneak peek at 2021, and it's even higher, how -- I guess I'm playing devil's advocate now, and why would we not use the projections and use our normal meeting for setting ABCs?

If we're come to the conclusion that this is the best available estimate for MRIP, for recreational catch and discards, then we should -- Unless there is a new concern, or we can predict, with our, you know scrying in some bowl or looking glass, that effort is going to go back down, then I think we just go with our normal approach, but people have raised the concern that these are anomalous years, because of the pandemic, and so I think we need to deal with that issue, and then we can figure out who is going to address it, but --

DR. BUCKEL: Thanks, Genny. Wally.

DR. BUBLEY: Going along with that aspect of it, I mean, when we -- We have dealt with projections for recruitment in assessments, and it's never -- If there is a high year, or a low year, or even a couple in a row, we haven't always went forward with that, because we didn't -- We had some thoughts that that potentially wasn't lasting, and I think we have some inkling that this might be anomalous, over the last couple of years, because of COVID, but we don't know.

Maybe this kickstarted the Spanish mackerel shore-based fishery, and now it's here to stay, but we don't know that, and so what we've handled with recruitment, in the past, is just using kind of what you had mentioned before, Fred, with having an average over that time period. We still do incorporate some of those higher years in it, but we also understand that it might not continue, until we have some of those lower years too, and so we're kind of hedging our bets, I guess, in that, because we don't know what the future brings.

DR. BUCKEL: Thank you, Wally. Fred Serchuk.

DR. SERCHUK: Thank you, Chair. When I look at the presentation that Erik gave, and the last box that he had there were the reference point values, and what he did, in this table, is he looked at the average F from 2018 to 2020, a three-year average, and he I think did the same with SSB over the minimum threshold. They both indicated that the stock was not being -- It was not in an overfished condition, and overfishing wasn't occurring, and so, I mean, if we're going to use a three-year average like that, it's not going to change anything. The stock is -- If you're going to use a three-year average to say what are the Fs over the past three years, versus FMSY and what the SSB is over the minimum stock size threshold, the values in the table basically say this is a healthy stock.

If that's the case, you know, one could make a number of recommendations about what the catch should be in the next few years. You could say it's the catches in the past three years, or something else like that, but, you know, you don't have to be very sophisticated, in terms of projections, and they may be not projections of recruitment going forward, but you can use catches as an indicator, if you believe that, you know, there have been no real changes in recruitment. We have a recruitment time series that is put forward, but it looks like recruitment is actually increasing in the last year.

DR. BUCKEL: Fred, for stock status, I think we agree with you. I think it's the how the projections are done, right, and it's -- I am trying to remember what years are -- How the 2020 catch is used.

DR. SERCHUK: I understand that, Chair, but all I'm saying is there are many cases where we don't have to be constrained, I think, in terms of, well, okay, we have some difficulties here, and so we're going to go forward with an estimate of recruitment and see what that means, or you can use the last three years of recruitment, and my feeling is that the stock is in a healthy condition, and has been in a healthy condition, and we just need to think about -- Maybe we let the working group think about what's the best way to go forward with setting ABCs in the future, for the next few years. Thank you.

DR. BUCKEL: Thanks, Fred. Chris.

DR. DUMAS: I just want to say that I agree with Fred's comments. Looking at the last table in Erik's presentation, and one column includes the new 2020 data, and the other one the old 2020 data, and looking at the estimates of the reference point values, it looks like it's a healthy stock, and, even if our estimates, MRIP estimates, for 2020 are good estimates, that we think that future years are going to be like 2020, or like 2021, which was still affected by COVID also, and I don't think so, and I think they were anomalous years, and that's my opinion, but I think they were anomalous years, even if we had good estimates of what was occurring during those years.

I think there are several reasons to think why effort might return back to values more typical of before 2020, and those include, you know, high gas prices for people wanting to run their recreational boats or go on vacation. High gas prices, low unemployment rate, good job opportunities right now, and so a high opportunity cost of going fishing, and you're giving up a lot of money at work to go fishing, and a lot of people have jobs now, and there's a low unemployment rate, and so, you know, I think those effort levels will return back somewhat, and that's an opinion, but that's my opinion, and I think, as Fred pointed out, and as Erik's estimates show, based on the best data that we have at this point, it looks like a healthy stock.

DR. BUCKEL: Thanks, Chris. Members of the working group, do you feel like you have enough information from the full SSC to move forward? We've got the discussion about M and then the recent discussion by Fred Serchuk and Chris on recommendations for the setting ABC, where it's not impacted by -- My take is, and maybe I'm reading too much into it, but where it's not going to be impacted as largely by 2020 as it is in the current projections. Genny, you had a -- Go ahead, Marcel. Genny is still contemplating.

DR. REICHERT: Well, I am okay with the first part, and, as I said earlier, if we're talking about alternatives for setting ABCs, I think that should be a full SSC committee discussion, rather than a working group, and that's just my personal opinion, because your original charge of the committee was to provide guidance to the assessment team of what work can be done to make the SSC more comfortable with the uncertainty levels of this assessment. I don't mind that we are moving away from that, but I still believe that that's too big of a topic, alternative ABC recommendations, for a very small working group, and that's just --

DR. BUCKEL: Wally.

DR. BUBLEY: In regard to that, Marcel, I mean, not necessarily having that working group come up with the recommendation, per se, but would it be possible to look back and see how things have been done in the past, either in this region or other regions, to maybe identify some other approaches, maybe, more of a literature search than an actual discussion, and then that gets brought forward to the full SSC?

DR. BUCKEL: I am going to ask Fred Serchuk to -- You know, he made a comment that it doesn't have to be overly complicated, right, and so, Fred, if you could -- If you had some ideas in mind, that would be helpful here for the projections.

DR. SERCHUK: Well, in some cases, the default is that you move forward with 75 percent of FMSY, and, I mean, councils use different metrics, but what I'm suggesting is -- First of all, it's a healthy stock, and you could use the last three years of estimated recruitment, and you could do many things, even in accord with our rules for our ABC rules, but, because I believe it's a healthy stock, I think we have some liberty here.

What would we do if we accepted the assessment at face value? What would be our default for going with an OFL or an ABC rule, and why is that not appropriate now for a healthy stock? I mean, I'm not exactly all familiar with -- I can't remember the details of how we've done it in the past, but it seems to me that, if it was a healthy stock in the past, why don't we use the same procedure going forward? Thank you.

DR. BUCKEL: Thanks, Fred. Genny.

DR. NESSLAGE: I think, Fred, because, if we use the average F of the last three years, relative to FMSY, you would end up overfishing, which would indicate that something needs to be done, right, and that goes forward into the projections. I will go out on a limb.

DR. SERCHUK: Just a question, and the F over the last three years was 0.768, or 0.752, according to the table that we were given. Am I making a misinterpretation here?

DR. DUMAS: I think, Genny, the point estimate for 2020 of F over FMSY is over one, but I think what Fred is saying is the average from 2018 to 2020 of F over FMSY is 0.75, the average.

DR. NESSLAGE: Sorry, and I'm getting confused, but the issue is still that, if you use the 2020 estimate in the projections, you end up with a major cut in the ABC, right, and so sorry about my misspeaking previously, and so I'm going to go out on a limb. Can we -- Given that we don't know what is going to happen post-pandemic, if we -- Can we set an interim ABC that does not include 2020, and, if 2022 turns out to be just as high, or higher, MRIP estimates, and so that would be three consecutive years with really high estimates, then we would revisit the ABC, and we would go back to our normal projection methods and include 2020, 2021, and, whoever can run it, if you've got it, 2022, and then there will be a huge drop in the ABC, but, at that point, there would be three consecutive years, and that's getting serious, and so I will go out on a limb and say I would be okay with that, but that we would need to revisit this ABC annually.

DR. BUCKEL: Thanks, Genny. Erik.

DR. WILLIAMS: Kind of following the conversation, but, if we're going to update projections, I would use the 2021 data in the projections as well, just so you know, because that's available, and there was no reason not to include that in the projection analysis, and so what you're looking at, if you use the projections from the assessment, is two years of overfishing are going to be injected into the system. What we do after that, or what we assume after that, sure, that's up for debate and discussion, but you've got two years of overfishing in place, according to this assessment.

DR. BUCKEL: Go ahead, Genny.

DR. NESSLAGE: Can we legally set an ABC that high? Don't we have to -- Is that what you're saying?

DR. WILLIAMS: What are you asking?

DR. NESSLAGE: Are we overfishing in the terminal year of the assessment, as it currently stands, and forget 2021, and the answer is no, correct?

DR. WILLIAMS: Right. Technically, by the stock status definition, we are not overfishing, in terms of kicking in Magnuson, but we're overfishing in the sense of the dynamics of the stock assessment, and so, in other words, it is going to cause the stock to decline. We don't know how far, and that's the reason we want to do the projection. What's the impact of these high catches, and so maybe I did misuse that term "overfishing", and there is the Magnuson definition, and then there's the stock assessment definition.

DR. BUCKEL: Erik, there is concern that 2020 and 2021 may be anomalous, and so that they would not be appropriate for use in the projections, and so setting an ABC and projection without inclusion of 2020 and 2021 is something that we were discussing.

DR. WILLIAMS: You wouldn't do that. That is counter to good science. The data suggests you had high catches in 2021, 2020 and 2021, and I think we've all agreed that those are real, and potentially uncertain, and we have to include those in the projections. Now, what we assume happens to the fishery after 2021, which is where really the projections start becoming true projections, conjecture, if you would, yes, then you can assume -- You can make the assumption that the fishery will return to fishing levels from 2017 through 2019, or something like that. Sure, we can do that, but your ABCs for 2020 and 2021, which already passed, or 2021 or 2022, are going to be somewhat affected, and so then you're going to reconcile with the fact that the ABC, or management, didn't adjust, and those catches did occur. I mean, all that comes into play.

DR. BUCKEL: Thank you. Fred Serchuk.

DR. SERCHUK: I mean, I understand what has been said by Erik, but I thought we were also concerned about the huge increase in recreational landings of 221,000 in 2020 from the year before, and we were talking about, well, that's a huge increase, and now we also talked about there is reasons that landings, recreational landings, would increase, but they were not from the fleets we normally would have expected, and so we have a -- I thought we had a lot of uncertainty, or at least we feel that that estimate has a lot of uncertainty about it, even if we accepted it at the point value, and that seems like a tremendous increase to occur in one year in a fleet that normally doesn't account for that much.

You know, we can either take it at face value, because that was the estimate that MRIP provided, or we can look at it and say, well, you now, I understand they wouldn't provide an estimate that had a -- That was any higher than 0.3, in terms of a probability distribution, but it still seems so far out that many of us are questioning it and the use of it, and that would lead to the overfishing, in my mind, if we use such a high value, accepting that that came from MRIP. Thank you.

DR. BUCKEL: Thanks, Fred. I have John Carmichael at the table.

MR. CARMICHAEL: Thanks, Jeff, and so, just to be clear, you're still working on like guidance for the subgroup, and so this would be a potential -- We're not necessarily talking about how you're going to set ABC at this point yet, but we're talking about guidance for the subgroup to factor into how they develop projections that may come out of the assessment, because, you know, I just want to be clear, because, if we still have issues with the assessment, and you've not accepted that, then we shouldn't even really be talking about using those projections to set ABCs.

At some point, you're going to have to figure out how long it's going to take for alternative runs and whether or not you set an alternative ABC in the interim and maybe use something, you know, based on your judgment, or your data-limited ways, that you have available that allows you to set an ABC that you think is appropriate, you know, and I think we're -- It seems like we're getting twisted back around with these MRIP estimates for those couple of years, which people seem to think, you know, pretty much everywhere, that, yes, there was increased effort, likely, that could have had increased shore harvest of Spanish, which anecdotally seems to have been the case, and the question is just how much.

As mentioned, that's been a question with this transition in MRIP to the mail survey from the telephone survey, is the shore mode is one of the ones that has always kind of come out as being, you know, one of the biggest sources of difference between the MRIP estimate thing, and so, to that extent, this is not a particular surprise, that here we are in a stock grappling with this, but I think we do need to be clear about, you know, what's guidance for the subgroup, and for a potential model to come, versus ABC, for right now, and I don't think we've crossed that bridge yet, to talk about ABC, right now.

DR. BUCKEL: Thanks, John. I think we were trying to provide the subgroup with some direction for the projections, guidance on how to move forward with the projections, related to that 2020 and 2021 years. Genny.

DR. NESSLAGE: If we wait long enough, we'll have even more MRIP estimates, and then we'll be really certain.

DR. BUCKEL: Marcel.

DR. REICHERT: Thanks, John, for that, and I have been -- Is the charge still to come up with guidance to rerun the assessment, or are we currently -- I am still a little uncertain about that, or unclear about that. Are we asking for more model runs, or are we now asking -- Are we now going to provide guidance for the projections, which are two different things? In other words, are we currently comfortable with the assessment before us, or are we still going to ask the Science Center to potentially investigate some issues and rerun the assessment, and that's my first question.

Then, in terms of the guidance for the working group, that now includes not only guidance for the stock assessment, but also for what to use in the projections, and that just goes back to some of the conversation that we had recently here, and so what's -- Are we currently okay with the assessment, or are we still going to ask for other model runs?

DR. BUCKEL: Based on what's written, we're not okay with the assessment, and so there was the language about the subgroup working on the M, and so that's related to the assessment, and so John Carmichael makes an excellent point, and we can get the input from the working group on those changes that are going to go to the -- A recommendation for the revised OA, related to M and whatever else we have that are non-projection related, and we then see the results of that, and then, as John Carmichael mentioned, we don't have to get into a projection ABC until we see the results of that assessment, and so does that help, Marcel?

DR. REICHERT: Yes, and that clarifies a lot, because that makes it a lot clearer, for us, where we're going from here, and then, in terms of the timeline, that is something we hope to discuss in April, I assume, as a full committee.

DR. SCHARF: So would we probably have like a January webinar to get input from this subgroup? Is that what we're -- In other words, the Center needs time to do the things that the subgroup recommends, and so there is two steps. The subgroup has to come to a consensus on what we would like to see, and the Center has to say, yes, we can do that in a reasonable amount of time, and then we need to -- Then they have to do it, and then we get that information in April, and is that what we're thinking?

DR. BUCKEL: Marcel.

DR. REICHERT: Yes, and I think, perhaps, to streamline this, I personally think it would be helpful, if we can do that, to have Erik, or one of the assessors, there, so they can provide immediate input, in terms of, okay, this is feasible, or, no, this is not going to happen until this is going to be part of a SEDAR scheduling, because, you know, I think -- Personally, I think that would be very helpful.

DR. BUCKEL: Yes, I agree. Judd.

DR. CURTIS: I think, Fred, to address your question too, I think we don't need to wait until the January meeting, which we do have one scheduled as a webinar, but we do not need to wait until then for the subgroup to meet and make their recommendations to the Science Center on what changes they would like to see in this assessment, and I think that's something the sub-group, with staff and potential Science Center support -- You know, we could tackle that, and then the Science Center can make their changes to the current assessments, as you guys have described from the August meeting notes, and then also in this meeting as well, and then, based on those changes, bring those to the entire SSC in April.

DR. BUCKEL: Thanks, Judd. That sounds good. Marcel and Eric, and -- Is Yan on the call?

DR. REICHERT: I think Yan and Dustin were part of that working group, too.

DR. BUCKEL: Eric Johnson, do you mind jumping on that working group?

DR. JOHNSON: Not at all.

DR. BUCKEL: Thank you, and so, the four of you, do you have -- I am not sure if Yan is on, and so, the three that are here from the working group, would it be helpful for us to go through this language one last time, as a full SSC, or have you been following along and you feel pretty confident with what your charge is? Marcel.

DR. REICHERT: I personally think it would be helpful if, Judd, you can share that with us, so that we have -- Maybe tonight we can take a look at that, and, then, if we have any questions, to come back, rather than reviewing this as a group right now, and then we can provide -- We can ask if -- You know, if there are some uncertainties, we can ask for questions.

DR. BUCKEL: Go ahead, Amy.

DR. SCHUELLER: I was just thinking I really don't know what we're doing, to be honest, and like I have no idea what the game plan is right now, because we have talked completely in circles, and so, in my mind, I feel like we need to have very specific things written down, as a plan of action, with timelines and everything, that we review as a committee, so we all understand what is going on, because I am very confused, and I can't be the only one.

DR. BUCKEL: Let's do that now. We have time, and let's -- Go ahead, Marcel.

DR. REICHERT: No, and I'm happy with that, but that's why I was asking, for my own -- For some time to read through this, and to look at the previous -- To again read our previous report over and maybe come back to this after we have done that, so we can streamline that conversation a little bit, but I am totally happy to discuss that now, or to come up with a timeline and a list now.

DR. BUCKEL: Amy.

DR. SCHUELLER: I was just going to say that I'm fine with doing it tomorrow, but I think we cannot leave here tomorrow until we have that plan of action, because -- We make sure that everybody around the table is onboard with what that plan is, because I think, when we walk away, and we have a lot of uncertainty, and people have different uncertainties, and different expectations, then we end up in this situation, and so I think it's fine if the committee reviews it and edits it and brings it back to the group, but I don't want to just walk away and think that we have resolved this, because I am very unclear.

DR. BUCKEL: Judd just went through a timeline, and so, Judd, if you can write down what you described to the group. Go ahead, Marcel.

DR. REICHERT: I would make it much more specific, in terms of provide recommendations to the Science Center for potential reruns, or however you want to wordsmith that, because --

DR. SCHUELLER: I thought we were going to look at this in January, during that webinar, and then -- What were we doing in January then? That was brought up.

DR. BUCKEL: I think we had talked about looking at what the working group recommendations to the Southeast Fisheries Science Center were.

DR. CURTIS: There was some discussion that the subgroup recommendations would then get reviewed by the entire SSC in January, and I am kind of suggesting let's cut out that middle section and just have the subgroup submit to the Science Center, to expedite the process, and then allow them as much time to work on these requests as possible. This is something that, I guess, once the subgroup meets, could just circulate by email, to make sure all the rest of the group, the SSC, is comfortable, but just I'm a little wary about delaying any further, and I want to give the Science Center as much time as they can to do these requests, so that they're ready for the April SSC meeting.

DR. BUCKEL: Are folks comfortable with that, or would they like to see the working group's recommendations, prior to them going to the Center? Genny.

DR. NESSLAGE: I appreciate the attempts at efficiency, but I would hate for the Center to go ahead and do a bunch of work and then have the SSC say, well, we really would prefer if it was a slight tweak, and it was this instead, and we're already asking for some changes, big changes.

DR. SCHUELLER: I feel exactly the same way. That was my thought, is I get that we're trying to be efficient, but I don't want to task the -- Not that we can even task the Center, and we can request to task the Center, and then not have it be something that everybody actually is going to agree on around this table.

DR. BUCKEL: Anne.

MS. LANGE: Well, to Amy's earlier point, to make this very clear on what it is that the workgroup is being tasked, just to say potential model reruns addressing what -- Is there any more clarity that we can provide in the assignment?

DR. REICHERT: I think we have that in our previous report and this report, the main items that we -- That I feel we can ask the Science Center to take a look at, and that goes back to what I said earlier. There is items that the data is the data, and there is items that we can't get, but there are some specifics, and I would like to, as Amy said, make that as specific as possible, by maybe providing a list, and natural mortality was one of them, and I am drawing a blank, and there were two others that I thought about earlier.

DR. BUCKEL: Amy.

DR. SCHUELLER: I thought the main tasks were basically M and then projections, and that's -- The other things are all data are what they are, and I can't think of anything else, and those are the two things that we've sort of circled around.

DR. BUCKEL: I think that group was going to look at the August report, Amy, just to see if there was anything, but it may turn out that it's just M now, right, and so this working group is not going to make recommendations on projections until we see how the assessment changes, or how the results change. Chris.

DR. DUMAS: If we don't -- If we do not accept the current revised operational assessment, then how is ABC set in the meantime?

DR. BUCKEL: Judd.

DR. CURTIS: If the model, the current model, is not accepted, then the consequences are basically go back to the status quo and the current ABC. If the model is not accepted, then we basically revert back to the last model that recommended ABCs and essentially maintain the status quo ABCs and OFLs.

DR. DUMAS: Thank you.

DR. BUCKEL: All right. Judd, maybe scroll up, or, well, before you leave this, Amy, you were concerned that we had gone in circles, and does this timeline help you and others? Is anyone confused on where we are with Spanish mackerel? Now is the time to ask. Go ahead, Erik.

DR. WILLIAMS: So, on this timeline, when will ABCs be revised?

DR. BUCKEL: Right now, we're going to review the results of a revised OA at the April SSC meeting, and then, at that point, we would discuss methods of setting an ABC from that.

DR. WILLIAMS: So projections, and everything should be then coming to the April SSC meeting, including projections needed to set ABC? I guess that's what I am trying to understand, and I was worried -- There was a point at which you were discussing first approving the model and then deciding on projection analysis, but it's all in one shot, and is that my understanding?

DR. BUCKEL: I think that John Carmichael had come to the table and recommended that we wait and see the model -- His recommendation was wait and see the model results, and then we can discuss how to move forward with projections. We were having discussions about giving you guidance on the projections, but John Carmichael is coming to the table. Maybe I am misrepresenting him, and he can comment.

MR. CARMICHAEL: Thank you, Jeff. I was just going to say that I just wanted to make sure that you weren't leaning toward using the projection without having resolved the issues with the assessment, which I think would be the issue. Like Judd said, you can fall back on the status quo, but remember that you're dealing with an ABC, and so you always have flexibility, under Magnuson, to apply your judgment to an ABC, if you felt that were appropriate, and so, you know, if you saw something in there that you felt the status quo were an issue, then you do have the ability to address it, as long as you can justify what it is you're doing and what you're basing it on.

I think this stock is interesting, because the long-term time series is pretty flat. You know, we even go into it without an overfished or overfishing recommendation from the assessment, and you're just really struggling with what has happened in the last couple of years and how you resolve that, and so, you know, it doesn't seem like I have heard anyone expressing concern with the long-term time series or the trajectory. There may be a concern with the, you know, recent MRIP spike, and, if that's real, what that could do to the stock, but it seems like, to me, that would probably be above the ABC you have now anyway, and so that concern would be covered.

DR. BUCKEL: Anne.

MS. LANGE: So there's one more step. After reviewing the terms in January, then we request that the Center do the analysis, and then we review the results of that in April, right?

DR. BUCKEL: Thank you, Anne.

DR. SCHARF: So just a question, and so, following-up on what John was saying, so Erik's group would bring new projections to the April meeting, yes? Okay. Based on whatever that new model looks like.

DR. BUCKEL: Using the standard BAM projection approach. Okay. Has everyone had a chance to look at the timeline? All right, subgroup members? Marcel.

DR. REICHERT: I am okay with the timeline. From what we discussed earlier, the potential model reruns, natural mortality, currently, it's my understanding is one of the few items there, correct?

DR. BUCKEL: Correct, but, as I mentioned before, if you could take a look at the August SSC report, just to go through each of the items that -- The concerns that were brought up, and there may be something else in there.

DR. REICHERT: Okay, and so, if that's -- We can do that, and that's what I suggested earlier, to take a look at that and see if M just is the only issue that comes out, because -- I am just thinking out loud, but, if that's the case, can't we shortcut that and say, okay, that's what we -- If that's something that the Science Center can do, we can shortcut this by making that recommendation right now, correct, or am I missing something? That means that we are cutting out an additional discussion of the subgroup, unless there are other issues that we need to include. Again, I think natural mortality is giving us probably the best bang for our buck, but, anyway, again, I am just thinking out loud, and this may shortcut some of those discussions.

DR. BUCKEL: I think the -- I will let Amy go, and then I will provide my thoughts.

DR. SCHUELLER: That's been my thought, Marcel. Like, instead of -- Well, we could make a recommendation at the table right now to deal with natural mortality in the base, natural mortality in the MCBEs, and the Center runs it, and we could -- I mean, the only other part is if we're going to make any other recommendation on the projections, if we want something different, and so we could do the natural mortality part, get the standard projections, review it in January, and then make a projection suggestion if we need to for April, so that we can actually set an ABC, and that's an alternative option.

DR. BUCKEL: The only reason I was letting the working group have some time with M was so -- You know, Eric said he spent five minutes looking at the congeners, but there may -- Having a little bit more time to dig into that, but, if the full SSC feels like we have evidence, based on what Eric found on the congeners and the likelihood profiling graphs, that we can make a recommendation here on the base M, and Genny is saying no, and so that's something for the workgroup, that you think they should have some time to -- Go ahead.

DR. NESSLAGE: Can we just task them with revisting the assumptions for M and the distributions for the MCBE for M? Just write that down, please.

DR. SCHARF: In the report from our August webinar, there were some other issues with some of the inputs, and, obviously, M was one of them, but I thought that the working group would have a little bit of time to think about a few of the others, but they would need some feedback, you know, assuming that Erik, or someone from the Center, is able to participate, and, if they have a couple of workgroup webinars, that they could talk about some of those things.

Steepness was one of them, and steepness always is a problem, but so there was high uncertainty with steepness, and the steepness value was used in SEDAR 78, and it was the same one as SEDAR 28, and I don't know that there's anything that they can do, but that's something that the working group could sort of discuss a little bit with them, about maybe there's some other things they could look at.

The other was a shift in the growth model and how it affected the productivity of the stock, and it seemed a little unclear, in the SEDAR working papers, about why the shift in the growth model occurred, and it seemed like it shifted by a year, and so that was another input, and so there was just a few things that looked at -- That all affected stock productivity that the working group I thought could look at and then communicate with the Center about, well, we know what they can do regarding M, but what can they do in terms of incorporating some other analyses into a rerun, to satisfy some of those concerns.

DR. BUCKEL: Thanks, Fred. Marcel.

DR. REICHERT: I think Judd is still looking for language there.

DR. BUCKEL: A concern over range, and is that --

DR. REICHERT: In the meantime, that goes back to the earlier comment I made. If it is just M, then perhaps we can make a decision here. If it's more, then, yes, we can discuss that, and so the issues you mentioned were steepness, growth, growth parameters, or growth models, M, and then, as I said earlier, we need to look back and see, both in this text and the other text, if there are other issues that we can potentially request, or discuss, in terms of including it in a rerun.

DR. BUCKEL: All right. Thanks, Amy, for getting us some explicit -- Getting us to provide the specifics here, and are you clear now on where things are headed?

DR. SCHUELLER: Yes, and I was going to say thank you. That's way better.

DR. BUCKEL: Thank you. Anyone else on the SSC have questions about where we're headed with Spanish mackerel, or concerns? Judd, it sounds like maybe there was some interest in sending the notes around, what you have to-date, and then we can -- Before we leave, we can have a chance to -- I think it's an agenda item, maybe, to go through -- I forget what we call that, but review the notes for consensus, but, if we have a chance, in the evening, to read through that, maybe folks can -- It will be easier on Thursday, if there's some edits that need to be made, or if folks are confused about some of the language, maybe, and so, if you could send that to us at the end of the day.

DR. CURTIS: Yes, and I will circulate the notes at the end of the day, and you can make additions or edits, or just review for clarity, and then we can hash them out during the consensus statement review tomorrow.

DR. BUCKEL: Thanks, Judd. Anything else on Spanish mackerel? We're right at noon, and so we're right on schedule for our lunchbreak, and we will reconvene at 1:30. Thanks everyone.

(Whereupon, a recess was taken.)

DR. BUCKEL: All right, everybody. I hope everyone had a good lunch. It's 1:30, and it's time to get started for our afternoon, and, first up, we have Dr. Heather Christiansen, who is going to give a presentation on the release mortality reduction framework, or a presentation to address release mortality in red snapper, and that's going to become part of the release mortality reduction framework, Amendment 35, and so it's a single versus double-hook analysis for Florida.

RELEASE MORTALITY REDUCTION FRAMEWORK AMENDMENT 35

DR. CHRISTIANSEN: Thank you. This one, I'm not looking at the mortality, per se, but we're just looking at the catch rates. We were using data from FWC's fishery-dependent monitoring at-sea observer program, and, just as some background on this program, the biologists are randomly assigned to headboat and charter vessels, where they collect a variety of information, including number of anglers, the number of rods each angler is fishing with, the type of rigs they were using, the type of hooks, number of hooks, and they don't record how many drops they're making, but they record the time fished, and then they collect some information on the fish that are actually captured, including species and length.

For this analysis, we were using data from 2011 to 2012, and we're looking at the red snapper data, and so here is a map of the east coast of Florida, and this is just presence/absence data for red snapper, and so black dots indicate absence, and then red dots indicate where the red snapper were present, and so, for this analysis, we determined that we were going to only use the three zones in northeast Florida, and so that's Zone 722, 728, and 732.

We also removed any of the rig types that do not typically target red snapper, and I will get into the rig types that were included in a second. This was kind of just a first glance at this data, and it's a really preliminary analysis, and so we just wanted to summarize the data, and we did that by adding up the number of rods that were fished using either single hooks or multiple hooks and then determining the proportion of rods that were positive for red snapper and also determining the number of red snapper that were captured.

We then calculated the CPUE as the number of fish captured per fishing hour for each hook category at each site, and what that means is we split the data into either single-hook or a multiple-hook rig, and all the anglers that were using single-hook rigs, any fish that were captured at a single site, or combined, and so we have one number for single hooks and one number for multiple hook at each site. Now, this is not paired data, because this is just how the fishery was working, and so it's not a standardized survey, where we had equal numbers fishing at each site. Then we took the

CPUE data, and we conducted a negative binomial model on it, using year, zone, and the hook category.

These are the actual rigs that were used, and they were either classified as single-hook or multiple-hook based on the number of hooks that was recorded by the observer, and so, whenever there was one hook, it got classified as single hook. If there was more than one, it got classified as multiple-hook, and so this data -- The majority of it was single-hook, and so there were 18,141 rods, and so this is by rod, and then there were 1,688 rods that were using multiple hooks.

Overall, of the single-hook rods, 16 percent were positive for red snapper, and, of the multiple-hook rods, 19 percent were positive for red snapper, and there were 4,972 red snapper captured using single hooks and almost 600 on the multiple-hook rigs. Using the negative binomial year, zone, and hook category, and so either single or multiple-hook, all came out to be significant, and the mean hourly CPUE for multiple hooks was slightly higher, at 0.43, and single-hook was 0.33.

Conclusions from this like first glance at the data is that the majority of the rigs used on the headboats and charter boats were single-hook rigs. However, the multiple-hook rigs had a higher proportion positive for red snapper, and the multiple-hook rigs had a higher mean CPUE than the single hooks, and I just wanted to reiterate and point out that this is from the headboats and the charter boats, and we didn't have the same type of data for the private recreational sector, and I will take any questions you guys have, or comments.

DR. BUCKEL: Thank you very much, Heather. That was a very enjoyable and informative presentation. Do folks have questions for Heather? Genny.

DR. NESSLAGE: Thank you, Heather, and so a question about the goal of this study. Is the goal to characterize whether getting rid of multiple hooks and going more toward single hooks would reduce discards?

DR. CHRISTIANSEN: Yes, I believe so, and so that was kind of just a first look at this data, if that would provide any information, if that was a good option.

DR. BUCKEL: Judd.

DR. CURTIS: Heather, thanks, and so kind of the idea here is so the council is looking at methods to reduce discard rates, and so one of the proposed mechanisms was implementing a one, or single, hook only rigs, as opposed to double-hook rigs, and so we were asked to gather some data to support what type of study this was, and so we got some data from Heather at FWC, as you saw, and I will present some data from a single trip that we took as council staff off the coast of South Carolina, but the idea here is to get some feedback from the SSC to just look at what kind of uncertainties there would be in implementing this type of regulation, going toward a single-hook, versus using double-hook, rigs, and so that's what we're looking for.

DR. BUCKEL: Go ahead, Genny.

DR. NESSLAGE: Okay. If that's the case then, would you really want to use all of the fish that you caught in your model, or would you want to use the ones that would have been discarded,

because you don't really care about the ones that are kept, right, and so you would collect length information, it looked like, and if this is a -- Do you see where I'm going with that?

DR. CHRISTIANSEN: Yes, and so this was just kind of the first look at it, and so I didn't have many like parameters put on this, and so we were just kind of looking at, from a high level, what is being captured by the single-hook versus the double-hook, but I did not include anything about like what was actually discarded or what was kept, and I have not looked at any of the length data yet.

DR. BUCKEL: Thanks, Heather. Chris.

DR. DUMAS: Thank you. I think it was a great presentation, and an interesting study, and so did you keep -- For each red snapper caught, did you record whether it was kept or discarded, and I think you just said no, or do you have those data on whether each one that was caught -- Was it kept or discarded? Was that on your survey data form?

DR. CHRISTIANSEN: I believe so. Sorry, and, if Bev wants to chime-un this weekend, she knows this survey better, and this was -- I am trying to look through right now, because I know I have like where it was hooked and stuff like that.

DR. DUMAS: Right, and, if you get a chance to check that, that would be interesting to know.

DR. CHRISTIANSEN: I have like the release condition.

DR. DUMAS: Can you say that again? I couldn't hear you.

DR. CHRISTIANSEN: I do have like the release condition. I do have that available.

DR. DUMAS: Great. That way, you could look at what the previous questioner was asking about, and that sounds great. I have an additional question, and that is, within the category of single hooks, were you able to compare across different rig types and see whether the different rig types had a significantly different catch rate?

DR. CHRISTIANSEN: At this point, I have not done that yet.

DR. DUMAS: That would be interesting. Also, were all your hooks -- Were the hooks the same size, or did you look at different sizes of hooks?

DR. CHRISTIANSEN: No, they are not the same size, and we have not looked at hook size yet either, but we do have that recorded.

DR. DUMAS: You do have data on the size of hooks?

DR. CHRISTIANSEN: Yes.

DR. DUMAS: That sounds great. I would really be interested to know whether the different sizes of hooks had a significant effect on the size of red snapper that was caught, and so, if you used

smaller hooks, did you catch smaller red snapper, or, if you used larger hooks, did you catch, on average, larger red snapper?

DR. CHRISTIANSEN: Yes.

DR. DUMAS: That was a question that came up in a totally different working group I'm on, whether the size of the hook affects the size of the fish that you catch, and so, if you've got those data and can look into that, that would be really interesting too, another sort of side question to look into from your dataset. Thank you so much. This is a really interesting study.

DR. CHRISTIANSEN: Thanks.

DR. BUCKEL: Thanks, Chris, and we have Bev online, I think to that point that was raised earlier, question that was raised earlier. Go ahead, Bev.

MS. SAULS: Hi, and I just wanted to respond to the question about the disposition of fish, and so that information is collected. I will mention though that, during the majority of the time that these data were collected, the fishery has been mostly closed, and so, even if she did include some harvested fish in there, they would be a very small number of fish.

DR. BUCKEL: Thank you, Bev. I believe Scott Crosson is next.

DR. CROSSON: This was a very, very interesting presentation, and I realize that what I am asking you is not the question that you were trying to study, but you have on here that the majority of the rigs that were used on the headboats and the charter boats were single-hook rigs, and was this a stratified sample when you were going out there, and, I mean, you were trying to get on boats I guess that would let you on there, but the unanswered question, for a lot of this, is what is the actual use of rigs, broken down by either the for-hire sector or, and I know this is totally off the wall, but the private anglers, and so did you -- You have something like you said ninety-one-and-a-half percent right there, and was that the average going across both sectors, both the headboats and the charters?

DR. CHRISTIANSEN: Yes, and so the data was combined for this analysis, and so it's both of them combined.

DR. BUCKEL: Fred Serchuk was next.

DR. SERCHUK: Thank you. Did you have any information on the anglers themselves, and the reason I ask is I don't know whether these were people that typically go out after red snapper or they are vacationers that just decide to go out for the day, and my feeling is that experienced anglers probably have -- They catch more, and they probably use rigs that catch more, rather than someone is going out on a fishing vessel just to spend the day catching fish, and they are mostly inexperienced, or I would say there were inexperienced anglers, but they could be -- They could have different levels of experience. My feeling is that experienced anglers probably are much more adept at catching fish than tourist anglers, but I'm just wondering whether there is any evidence, or any data collected, to evaluate that hypothesis. Thank you.

DR. CHRISTIANSEN: For this survey, I don't believe that they notate experience on the anglers, and they just collect the number of anglers, and like the total number of crew, but, as an aside to that, I don't know if it's fully published yet, but Brent Winner, also from FWC, and he's on the fisheries-independent monitoring, and he has a paper coming out, I believe it's *The North American Journal of Fisheries*, looking at angler bias.

It's a little bit different, because it was on standardized sampling, but it was comparing scientific samplers, the scientists who go out and fish, versus the captains and crew who would more likely have more experience, because that's their day job every day, whereas scientists don't necessarily fish every day, and I think the general finding was that experience did not bias what fish were being captured, but I know there were some caveats for certain species, and so there is starting to be some work on similar gear types, but I don't know that we could do that with the data that we have available for this study.

DR. SERCHUK: Great. Thank you.

DR. BUCKEL: Bev Sauls.

MS. SAULS: I am getting called like a couple of questions back now, but, just to give kind of a sense of what these data are, these are truly fishery-dependent data observed in the fishery, and so this is a good indication of how a management action might impact the real-world fishery. These boats are distributed up and down the coast of Florida, and we stratified by region and vessel type, and so charter and headboat, and so there's a lot of data in here that could be further analyzed, if you guys have any use for it, and we're willing to reevaluate it or share it or however it could be helpful.

DR. BUCKEL: Thanks, Bev. I think I'm curious about -- I mean, do you have any input on how the charter boat and headboat -- What you presented here and how that relates to the private rec boat, and there is 90 percent single-hook usage there, or just you can't speculate?

MS. SAULS: We have absolutely no data like this from the private boat sector, and so it's really hard, at this time, to speculate how this would impact that fishery. It certainly has raised an interest though in collecting some of that information.

DR. BUCKEL: Thanks, Bev. Next was Wally, and then Chris.

DR. BUBLEY: Thanks for the presentation. I was wondering if you had the data, offhand, of how many of those multi-hook rigs were actually catching more than one fish at a time, or was it just those fish were -- They were more likely to catch a fish because there were too hooks?

DR. CHRISTIANSEN: That is not something I looked into, but I could. This was just kind of like a first cut, getting all the basic information out, and so I could -- We have the data to be able to look at if they were catching multiple fish. The other thing is that they record the number -- The time fished, but they don't record how many drops, and so even a single hook could have been catching multiple, and it wouldn't be at the same time, obviously, though.

DR. BUCKEL: Scott.

DR. CROSSON: I put my hand back down, but I will just point out -- It was answering what Jeff said earlier about -- You know, obviously, we have no idea what the private recreational boats are doing, and I'm just thinking though, logically, that, because a charter or a headboat is handling multiple clients at a time, I would think they would probably be more likely to be using a single-hook rig, just to try and keep everything straight, because the anglers are probably, again, a little bit less experienced than the private anglers that are going out there on the boats, but, again, there is no way of telling how much more prevalent a double-hook would be for a private angler, and that's all.

DR. BUCKEL: Thanks, Scott. Other questions for Heather or Bev? Okay. Then we're ready for public questions. Dewey. Go ahead, Dewey.

MR. HEMILRIGHT: Thank you, and thanks for the presentation. A couple of things. For the private angler, you see, on social media, that a lot of them are using multi-hook rigs, and so that's one way of looking at it. Also, with your charter and headboat, as Scott was saying, you know, they have to deal with releasing fish, and dealing with this stuff, and so they're probably going to use a one-hook rig, and so that might wear people out more, and so, therefore, they don't have to fish as much, maybe, during their time. Also, did you -- Were you able to get latitude and longitude locations of fishing sites where this fishing effort was taking place at?

DR. CHRISTIANSEN: Yes, we have the lat and long available for each site.

MR. HEMILRIGHT: Something I think would be interesting, in the future, and I made mention to I believe Jeff earlier, and also the council and SERO, is about fishing maps that would help people understand what fishermen are talking about on the water, and there is maps unique, that is pretty detailed bottom structure and interesting stuff, from Georgia to North Carolina, that I think it would behoove everybody to get an idea of what the landscape is out there, and also what's available to the public, in GPS plotter data and stuff like that that would help you all understand the magnitude of the increase of the recreational industry with the data and gear technology that's out there, but this is interesting, and this type of study would be something interesting to go in the future, to further something out to help, but it's a good start. Thank you.

DR. BUCKEL: Thanks, Dewey. Who was up next? I didn't catch the name, Chip. Okay. That's it for public comment? Okay. Then we can go to our action item, and I think there's one. I forgot we have a second presentation before we get to the action item, and that's Judd. Our very own Judd is going to give this presentation.

DR. CURTIS: Thanks, Jeff, and so, kind of as part of this request from the council, we were able to put together just a small project comparing these single and double-hook tackle, just off the coast of South Carolina, looking at the catch rates and the probability of capture. We were only able to get one trip under our belts, and so keep that in mind, and I'm hoping to get a couple more, but, essentially, this was designed as kind of a paired angler by angler skill level setup, and we had similar fishing experiences.

Each member, or one member, of that pair used a single-hook chicken rig, and the other one fished with a double-hook chicken rig, and these were timed intervals, and so they would drop for a set amount of time and then bring up, unless they caught a fish, or caught a bite, and they would reel up then right away, and we hit a number of stops, and all those baits were typically randomized

amongst the different anglers, and then just a bevy of information was collected there, as you see there, on the fisher, the rig types, various bait, depth, time of gear in the water and out of water, and various species that are caught.

We also collected some additional information, though we didn't analyze that for this particular go-round, on the size, release treatment, fish conditions, kept or released, and then hook location. You can see there that it was just one day off the coast of South Carolina, about twenty miles offshore, a fishing depth range from about seventy to ninety feet, and so this was just analyzed for catch, basically using a logistic regression GLM, looking at angler group, rig type, bait type, and time fished. We used some modeled reduction techniques just to look at angler group and rig type.

Then just some preliminary results we had from the first trip here are presented below, and you can see that the majority of our catch was vermilion snapper, 55 percent, and there were more species caught on double-hook rigs, eleven to eight, and most species had higher catch rates on the double-hook rigs. There was a significant difference in the catch probability between the rig types, which is the one-hook versus the two-hook tackle, and that reduction in probability was around 14.4 percent in presence and absence.

To answer another question that was out there, two fish were caught on twenty-six out of 709 drops on those double rigs, and so, below, we just have kind of a summary table of the different species that were captured, and you can see, in total, we did have more species captured on the double-hook rigs than on single-hook, and more species, and then just a figure with the numbers and a table then on the probability of catch by angler group and rig type, and so, combining those angler groups all together, to just compare the rig types, we saw a catch probability of 39.3 percent for the Rig Type 1, the single-hook, and then 53.7 for a double-hook rig, and so a difference of 14.4 percent, and so we're hoping to get out there and replicate this at least one more time, or maybe twice, if the weather holds, but that's it for now, and so any input on what else would be valuable from the SSC is most welcome.

DR. BUCKEL: Questions for Judd? Chip is going to provide some comment. Go ahead, Chip.

DR. COLLIER: There was another study done by FWC, over in the Gulf of Mexico, and they had very similar techniques. They explored different sized hooks, and so they have that kind of information available, and we can forward that, or even put it in additional materials, that paper, and we're going to be analyzing that with similar methods, or whatever recommended methods that you guys suggest for this type of data.

DR. BUCKEL: Questions for Judd? Jennifer.

DR. SWEENEY-TOOKES: I just had a quick question. I see you went out on a research vessel, but I'm wondering how you decided where to go.

DR. CURTIS: I wasn't actually on the trip, and so Chip can speak to that.

DR. COLLIER: Although it was a research vessel, it was an ex-commercial captain, and we just said we want to go fish, and we left it up to him, and so he selected the locations, similar to what would happen if you were on a charter boat.

DR. SWEENEY-TOOKES: So he understood the objectives of what you were doing that day, or he had no idea?

DR. COLLIER: As well as anybody understands me, but, no, he knew we were out there to catch fish, and that's what we told him the goal was, and we were going to compare single hooks versus double hooks. As far as rigging the tackle, that was all done by staff.

DR. BUCKEL: Other questions for Judd? Anyone online? Go ahead, Fred Serchuk.

DR. SERCHUK: Were there any differences in terms of size of fish caught between -- For the same species, any differences in the size of the fish between single hooks and double hooks?

DR. CURTIS: Fred, thanks for the question. No, we have not looked at any differences in the size at this point.

DR. SERCHUK: Thank you.

DR. BUCKEL: Other SSC members? Okay. Seeing none, we'll go to public comment on Judd's presentation, or questions from the public. Judd is shaking his head no, no hands from the public. Go ahead, Dewey.

MR. HEMILRIGHT: I was just wondering -- The folks that participated in this, was there anything surprising to them on the outcome of this, because it seems pretty -- For me, it seems pretty much commonsense, what's presented here as the outcome, and I was wondering if anybody else that participated there had any other thoughts, and what type of bait were they using for the bait, using for bait?

DR. BUCKEL: Go ahead, Chip.

DR. COLLIER: The bait question is probably one of the ones that is pretty interesting. It seemed like, when fishermen were fishing with Boston mackerel, they were having to do -- To drop more often, and that bait just doesn't stay on the hook as well, when you compare it to something like cut bait. Cut baits, when they were fishing with that, it tended to stay in the water a little bit longer, and so those drop times were a little bit longer.

The other thing that was pretty interesting -- You know, I expected there to be -- The time that you were fishing would be substantially different between a single-hook versus double-hook rigs, and with the thought that it would take more time to get a double-hook rig, and you potentially had more time, or it would take more time, to bait a double-hook rig, and it would also take more time to deal with some of the issues that might come up, either tangling or different things like that, taking fish off the hook, and that didn't seem to be too much of an issue.

There was a slight increase in the number of drops for single-hook rigs versus double-hook rigs, but these were guys were paired up and just fishing -- They were told to just fish like they wanted to, whether if they wanted to get something to drink, get something to eat, and we gave them complete flexibility, trying to act like a recreational trip, with the exception of having to fish a single-hook or a double-hook rig.

The other thing that was interesting is the amount of time it takes to descend a fish. When people were descending fish, that definitely took away from fishing, and it could range up to maybe an extra five minutes on a drop, to deal with a fish that you were descending, and, when I'm talking about a drop, it's generally around a little over a minute is how long people actually had bait in the water, and that goes from putting it in the water to taking it all the wait out.

MR. HEMILRIGHT: Can I have one follow-up question, or two follow-up questions?

DR. BUCKEL: Sure. Go ahead, Dewey.

MR. HEMILRIGHT: The Boston mackerel, I mean, that's a real soft bait, and, for your cut bait, I mean squid and cut bait, but, given the regulations for descending devices, it's in the regulation that you only have to have one descending device rigged and ready aboard a vessel, no matter how many anglers you have, and is that correct?

DR. COLLIER: Yes.

MR. HEMILRIGHT: So, not going to the regulations, but what happens on a headboat, when you've got forty or fifty people? Does everybody got to wait their turn to use the descending device?

DR. COLLIER: When they were talking about the regulation for descending devices, it was definitely a concern, how to deal with headboats, and what was recognized is getting fish back in the water was also a primary component of a best fishing practice, and so, as opposed to waiting for, you know, one of the potential descending devices to be available on a headboat, the idea was to allow them to continue venting, and they felt like their staff vented fish very well, and they knew where to vent them, and maybe training could be a little bit better for that, but the captains that had spoken up about using descending devices on headboats felt very comfortable that their staff could vent fish very well and get them back in the water much more quickly than having to wait on a single rod to put all these fish over.

MR. HEMILRIGHT: I will also point out about the recreational private boat angler also, because I'm sure the charter boats are more experienced, and I was just curious, but it's an interesting study you all did here, and hopefully it will have some help in the future. Thank you.

DR. BUCKEL: Thanks, Dewey. Scott Crosson.

DR. CROSSON: I'm not sure if Heather and Bev are still available, but, looking at their stuff, I see that what we have up here shows the seventy to ninety-foot was the depth range, and I just wanted to make sure that the information from FWC also had some information on the different species distribution by depth, because that's information that would be of value, just above and beyond the single versus double-hook factor, and it's something that's very necessary for a lot of the different options that are before the council for dealing with red snapper.

DR. CHRISTIANSEN: Yes, we do have the depth, and so we have the depth and the lat and long as well, and so we could look into that.

DR. BUCKEL: Okay. No more hands from either the SSC or the public, and so we'll move to the -- Amy.

DR. SCHUELLER: Maybe I missed this, or it's not really part of the study, but do we have an estimate of the proportion of fishers in the South Atlantic that use double versus single-hook rigs? I mean, if this something that you're going to try to apply across-the-board, to look at like reduced catch rates and reduced discard rates, that's a pretty critical piece of information.

DR. BUCKEL: There was a pie chart for Florida, their sectors, headboat and charter boat, and it was 91.5 percent single and 8.5 percent multiple, but there is no information on the private boat.

DR. SCHUELLER: And nowhere outside of Florida, and so we don't have any coastwide information or across fisheries or anything like that? Okay.

DR. BUCKEL: But just to remind everyone that -- I think Amendment 35 is the red snapper, or is a -- It's both, but mostly red snapper, right, and so the bulk of the red snapper discards are in Florida, and so that would pertain -- That pie chart is very informative for those two sectors on the east coast of Florida. Okay, and Judd has got our action item. Comment on the utility of using single-hook versus double-hook tackle for reducing catch rates in the snapper grouper fishery, which goes right to what Amy was talking about, and so, Amy, do you want to lead us off with some language there?

DR. SCHUELLER: I guess. You know, according to the pie chart, only 8.5 percent of anglers are even using multiple hooks, and so it sort of seems like it's not going to be something that will drastically reduce catches, or discards, in a way that they might be looking for.

DR. BUCKEL: Thank you, Amy. Are there others? Dustin.

MR. ADDIS: I would specify that's for-hire and not total -- Like it doesn't include private anglers, of course.

DR. BUCKEL: Wally.

DR. BUBLEY: Going with that point, if we don't have any way to try to get at the number of double hooks versus single hooks for the recreational private rec fishery, and that's what is causing a lot of the heartburn, it would be difficult to apply any results from these, regardless of how sound they are.

DR. BUCKEL: Thanks, Wally. Scott Crosson.

DR. CROSSON: The point has already been made about that the eight-and-a-half percent is only for for-hire, and, as Dewey stated, the for-hire -- It's likely the private anglers using double-hook rigs is probably a little bit higher, because the for-hire sector has incentives to keep tackle as simple as possible, both because of the skill of the angler and the fact that there are multiple anglers that they're usually trying to assist and untangle rigs, but we have no idea how much higher.

DR. BUCKEL: Thanks, Scott. Anne.

MS. LANGE: I am just curious what the ratio is of private boat effort and in snapper grouper catches, relative to the charter/headboat. Are 90 percent of the catches, and 90 percent of the effort, made up of the private sector, or is it like 5 percent, or, I mean, how much does this capture of the whole fishery?

DR. CURTIS: Anne. That's a great question, and it's largely unknown, because we don't have any kind of census on what the private recreational universe looks like, and so we have better data on the charter and for-hire sectors, but, overall, in the private rec, it's unknown, and so calculating like a ratio, as described, is not possible without that information.

MS. LANGE: I was going to say, doesn't MRIP provide both estimates of catch and effort?

DR. CURTIS: I don't have that off the top of my head here, but I could go find that.

DR. BUCKEL: Heather or Bev, if you're still on, if you have any information that addresses Anne's question about the ratio of -- This would be specific to like red snapper discards for private rec relative to headboat and charter boat. Okay, and Mike Schmidtke is at the table, and he's going to weigh-in. Thanks, Mike.

DR. SCHMIDTKE: So the majority of the effort in the recreational sector is from the private component, rather than the for-hire, and then, to the question of usage, while there isn't a specific study, we did at least poll our Snapper Grouper Advisory Panel, when they met last week, and the -- I am compiling the notes from that right now, but the general -- The general point that was made is multi-hook rigs are more often used when you are targeting smaller species, or you're targeting a variety of species, as opposed to going for like a large grouper.

If you're going for a large grouper, you're going to tend to use more of a single-hook, and so there may be some information in looking at target species. If you're looking at smaller species, and that's the primary target, or something like that, there may be some information to glean on, you know, potential usage there, but that was the impression that was given, and that was for a few different areas within the region.

DR. BUCKEL: Thanks, Mike. A question for Heather or Bev. Any insights on the private boat fishery on the east coast of Florida and what the targeted species are? Is there any indication, or datasets, that identify what the top snapper grouper species that are being targeted -- Because they're not targeting red snapper, as was mentioned, except for the day or two a year that the season is open, and so, the bulk of the year, they're targeting other species.

MS. SAULS: We do have some data to look at the target species. We did a three-year MARFIN study that did dockside interviews with reef fish private boat anglers, to determine what type of fishing they were conducting, and, since we started the State Reef Fish Survey in mid-2020, there is some data there that could be looked at, and so I'm not sure how -- I'm not sure that I understand what the question is that's being asked and how that would help this discussion, other than I guess you're interested in how many anglers are targeting vermilion, and other smaller species, versus red snapper?

DR. BUCKEL: It was targeting -- It's mainly if the dominant species that folks are targeting are grouper, then the AP has suggested that, when they're targeting grouper, or other larger species,

they're using single-hook rigs, and, when they're targeting smaller species, they are using double-hook rigs, and so we just wanted to get some insight.

MS. SAULS: I think the dataset that Heather has looked at could maybe tease some of that out, but we don't have anything like that for the private boat. I will say though that I think it is the case that private boat anglers probably are using rigs to target the smaller species that are open, that they can put in the cooler.

DR. BUCKEL: Thanks, Bev.

MS. SAULS: Vermilion, black sea bass, gray triggerfish, those are kind of the bread-and-butter species in the area you're talking about for a lot of the private rec fishery.

DR. BUCKEL: Thanks, Bev. John Carmichael.

MR. CARMICHAEL: I think, considering what Mike said, and what Bev just said there at the end, it sort of illustrates how this is kind of a complicated situation, and we shouldn't be -- I guess it would be expected, with fifty-five species, and the variety that's out there, but I think it does -- You know, if you look back at that bar chart, in light of what they said, because I'm not sure that the 8.5 percent really captures the real impact.

While that's true, when you look across all these different kinds of rigs that could be fished, including artificial, and, you know, if you think about the different targeting, using egg/Carolina/sliding/fixed, versus the chicken, it seems like the chicken is the go after the wide variety of species, dropping down and catching all those things, and the chicken rigs are 98 percent single-hook, and so, you know, you've got different things going on in here, related to the rigs, and, as you see, most of the rigs being used in this fishery were Carolina rigs versus chicken rigs, and probably getting at different trips, maybe different depths they fished at, maybe different experience levels of the fishermen, and different things that they were hoping to achieve on the trip, all of which also are implicated in propensity for catching, you know, things like red snapper that we need to have discarded, and so it might be a little more complicated than just the 8 percent, perhaps, and the council may have to consider these things when they get around to trying to do some regulations that somehow modulate effort in this fishery.

DR. BUCKEL: Thanks, John. Genny.

DR. NESSLAGE: I might just be getting really confused now, but, on Slide 3, it says the data filtering removed rig types that do not target red snapper, and so, if they're not targeting red snapper, because the season is closed, why are you removing the --

MS. SAULS: I think a better way to state that is that we removed rig types that weren't necessarily targeting bottom fish, and I believe that there was some drift fishing, and stinger rigs are more used to target pelagics, like king mackerel, and we didn't feel like those were appropriate to include in a single versus multi-hook analysis for red snapper.

DR. NESSLAGE: So you mean gear that wouldn't typically catch red snapper and not that they weren't targeting red snapper.

MS. SAULS: Correct.

DR. NESSLAGE: Got it. Okay. Thanks.

DR. BUCKEL: Other questions or edits to the text that we have under that action item? Go ahead, Fred.

DR. SCHARF: So, since we have no data on the private sector, that means that, during the state creel surveys, they're not asking about gears, right, and so how feasible is it to get at that information?

DR. BUCKEL: Bev, if you're still on, I believe you made a comment about that --

MS. SAULS: I'm not sure I understood the question, and did he say something about piers?

DR. BUCKEL: Fred is going to restate the question.

DR. SCHARF: No, and just the private recreational anglers, and the intercept data is based on creel surveys, where people are interviewed at ramps, et cetera, and so I'm assuming that there is no indication of whether they used a double-hook or a single-hook in those surveys, and is it feasible to add that to the -- Add that question when they're fishing -- You know, when they're fishing bottom fish, when they answer that they were fishing bottom fish, can they ask whether they were using single or double hooks?

MS. SAULS: Yes, and I think that's an interesting thing to consider adding to some survey questions.

DR. BUCKEL: Thanks, Bev. Anne, and then Erik.

MS. LANGE: I am just -- There is a double hook, which is a hook that has two hooks on it, and then there is multiple hooks on separate lines, and I think it would be important to clarify that this is the one where they're separated, and they're not -- They're two separate hooks, or multiple hooks, as opposed to a double hook, and I just hadn't heard it called double hooks before, aside from meaning a hook with two -- Never mind. Anyway. Sorry.

MS. SAULS: Those were not included in Heather's analysis either, and we do see some what we call linked hooks, where it's two hooks linked together, threaded through a single bait, and those were not included in her analysis.

DR. BUCKEL: Thanks for that clarification, and so single versus two-hook.

DR. CURTIS: I think the rig type kind of specifies that though. We have like schematics on what those look like, and it's kind of assumed that the hooks -- That there is separation between the hooks on your terminal tackle, and so they're not just directly together.

DR. BUCKEL: Erik.

DR. WILLIAMS: Thanks, and so I was just going to -- Again, because I have been into the MRIP data further than I ever thought I would, but I would be careful about expecting too much from just adding a question about one hook versus two-hook, because the way private boat anglers fish is far more complicated than we can imagine, and a perfect example is if you try to use the MRIP data for say trip classification, based on species, and it's a mess, because you see king mackerel being caught with, you know, vermilion snapper, and with grouper, and it's like, okay, what gear were they using then, if they're catching all those species that basically require very different gear.

That's the problem, is the recreational angler is extremely wily, and they will change their effort based on the conditions on the water, and so, when they come back in, and you're doing one interview, and they fished multiple types, multiple areas, multiple rigs, what are they going to answer, and it just really gets really detailed really quick, and it gets really hard to parse that all apart, and so just realize that that's the complication, and, in fact, I've come to the conclusion that, because of that feature, we probably should not be using catch per unit effort from the MRIP survey for anything, because that effort part, that denominator, is so ill-defined.

DR. BUCKEL: Thanks, Erik. All right. Do you think we have enough there? Then we will move on to our next -- Item Number I is the Red Snapper Recruitment Patterns, and we have a presentation by Dr. Mandy Karnauskas.

RED SNAPPER RECRUITMENT PATTERNS

DR. KARNAUSKAS: Thanks for the time, and I want to acknowledge my coauthors on this paper that we just published, and Kyle is online here to add his thoughts as well, and I think you're a little bit behind, and so I will try and be brief here, but I will be talking about source-sink recruitment of red snapper between the Gulf of Mexico and the Atlantic Ocean.

The motivation for this study was, due to uncertainty in connectivity between these areas and episodic recruitment, it could potentially lead to incorrect conclusions on population status, and that was the conclusion of an SSC review of the red grouper assessment, and, of course, similar concerns have been raised for other species, and so we were interested in examining connectivity for a suite of species, and we started with red snapper, and other species are forthcoming, and the approach that we're using combines an individual-based larval transport model with an oceanographic circulation model, or, actually, a series of a models.

The software that we're using is called the Connectivity Modeling System, and this was developed by Paris, and there's a paper on that, published in 2013, and the schematic -- It kind of gives you a detailed view of what the software does, but, essentially, you take particle release times and locations, and then the model grabs hydrodynamic files, and so information on ocean current regimes, and steps through time and updates the location of the particles, and the really unique part about CMS is, on the bottom there, you can see the parallel modules, and so there's a bunch of sort of behavioral attributes that you can add into this model, and so these are everything from like including tidal transport to vertical migration to egg buoyancy, mortality, et cetera, and so you can put sort of real biological attributes into the -- Or actually simulate the behavior of the larvae and include them in this model.

We have used this software for multiple applications for predicting annual recruitment strength for some species in the Gulf of Mexico for driving inputs to help guide spatial stock assessment, and so, for example, if you have a two-area model, you're looking at the larval exchange between those areas, and then, of course, what we're doing here is understanding connectivity across jurisdictions.

The idea here is, of course, if we have data on where fish are spawning, when fish are spawning, we know something about the eggs and density of the eggs and size of the eggs, and then we can simulate, you know, how buoyant they are, given the temperature and salinity and density of the water, and we also have information on sort of the ontogenetic vertical migration of the larvae as they develop, and then we need information on the recruitment habitat, which, for red snapper, we have defined as fifteen to sixty-four meters depth.

Then we also can observe the currents, and we can do this through satellite data, and also a lot of the instrumentation that's out there floating in the ocean, and we have floats, profilers, taking in situ observations, and the hydrodynamic models assimilate this data, and so we actually have pretty accurate models, in terms of representing the actual current flows that are occurring in that place and time.

We put all these together, and we can model the process of recruitment, and this is sort of a 2-D representation of what the CMS is doing, and, again, it's just updating the particle trajectories, in this case larvae, based on the hydrodynamic regimes, and this is, of course, a 2-D representation of a 3-D process, and so the larvae are moving up and down, according to their larval stages, et cetera, and then this is sort of a game of musical chairs. When the music stops, at the end of the pelagic larval duration, you can look at what has settled in the places where the recruitment habitat is supposed to be, and, you know, what's been lost out to sea, and, obviously, what gets killed off.

Going down into some of the inputs for the red snapper study that we did, in the Gulf -- We had two separate species distributions models. For the Gulf, we used a species distribution model that was developed in a paper, Karnauskas et al. 2017, that gave the distribution in space, that it was static, and so we used information from Porch et al. to look at the -- Or to implement some seasonality of spawning throughout the year.

Then, in the Atlantic, what we did was we updated a modeling approach that was published in Farmer et al. 2017, and this is using SERFS data, and we used a spatiotemporal GAM model, and so looking at predictions in space and time in egg production, and what I have highlighted here, in the little arrow, is just to note that, up here, sort of off the coast of North Carolina, we have an area of high red snapper egg production, where the survey just cuts off, and we didn't have any information further north, and so it's unclear whether that hotspot of red snapper egg production, you know, would extend further north, and so this is an area that we had to sort of consider and simulate separately as a part of the study, and that area isn't fully resolved, and we'll get into that in a little bit more detail.

Some of the sensitivities we considered in the study, first of all, we looked at different hydrodynamic models, and we looked at SABGOM, HYCOM, and Mercator, and these are all, you know, in some ways, similar, and they, obviously, have similar representation of the loop current and the Florida current and the Gulf Stream, the major features, and there are some slight

differences in kinetic energy, and there is differences in the resolution, horizontally and vertically, of these different models, and, also, the years of the simulation.

In this case, because we're not interested in predicting recruitment for a particular year, but just looking at, you know, annually, or over a series of years, how much recruitment flux we would expect, the particular years chosen is not really influential, and then there's some differences in the type of product, basically how the data are assimilated, in the observations of current flows.

Another sensitivity we considered in the study was the ontogenetic vertical migration, and we don't actually have, surprisingly, really detailed studies of red snapper larvae and where they're occurring at the different larval stages throughout the time, the states of development, but we do have these detailed studies, and so we looked at different lutjanid species and varying the ontogenetic vertical migration according to those different species patterns, but, generally, for lutjanids, they are pretty shallow in the water column, generally, higher than thirty or forty meters depth, in the stages of larval development.

Then, finally, one of the important sensitivity runs that we considered was whether or not the basically southeast Florida, the sort of Keys region, is actually suitable settlement habitat, and so, with the SERFS data, and that cuts off around Jupiter, I think, and so we can't actually resolve the abundance trends further south than that with that survey, and then it's not really clear whether or not red snapper are recruiting to these areas from the actual visual surveys that we do in these areas, and they have not documented young red snapper in shallow waters, but that doesn't mean that they're not recruiting at all, and we, obviously, know that they are being caught, to some extent, in these waters, and so, again, that was kind of an unknown, and just ran a sensitivity including this as possible settlement habitat and then excluding it as settlement habitat, to see how that would impact the results.

The first thing we did, to sort of scope the problem, was to run the full Gulf Atlantic Connectivity Modeling System, spawning particles from all locations in the Gulf, and looked at what areas are potentially connected to the Atlantic, and what we found, from those initial set of runs, was essentially nothing west of Florida is contributing to the Atlantic, and so then, for the rest of our simulations, we focused on just west Florida and then the South Atlantic Bight. The runs are pretty computationally expensive, and some of them can take days to run, because we're simulating, you know, millions of particles, and so that's why we did this initial scoping, for staff to just narrow down the areas that were actually important to look at.

Then what we see is this is showing you, again, the areas of the Gulf of Mexico that are visibly contributing to the Atlantic, and you can see that there's actually pretty similar results, depending on the oceanographic model used, and so, generally, the models are estimating that larval supply to the Atlantic is limited to, you know, south of Tampa, for the most part, and, to some extent, there is a few particles from the Big Bend that are also contributing to the Atlantic.

Then, for the North Carolina hotspot, as I mentioned, we had to simulate that separately, for a couple of reasons, and, first, we weren't sure whether or not we were actually resolving the full extent of that hotspot, and the other issue is that a lot of the oceanographic models cut off right around Hatteras, and so we actually used separate high-resolution oceanographic models, SABGOM and HYCOM models, and the Mercator is a global model, but separate hydrodynamic

models that are resolving that area, and it's, obviously, a very dynamic area, with respect to the currents, and so these separate models were better able to resolve those areas.

That northern hotspot, off of North Carolina, is accounting for 16 percent of the total egg production in the South Atlantic, and that is, again, according to that species distribution map that we updated, and what we see is that there's relatively low self-recruitment, and so around an average of 8 or 9 percent, and that is only recruiting back to North Carolina, and so none of the particles actually recruited south of North Carolina, and so this is basically sink area, and it's receiving some input from Florida, from east Florida, and, to a lesser extent, west Florida, but it's not contributing any particles back to that, and it's losing most of its larvae, and it's generally just sending larvae out to sea, and so, again, the self-recruitment rates that you see here, 9, 14, and 2 percent, is in contrast to about 40 or 50 percent off the coast of Florida, and so this is, again, generally just a sink area, and it's got some limited self-recruitment, but is losing most of its particles to probably just the open ocean.

This figure shows you kind of the overall result, in terms of the percent of Atlantic recruits spawned in the Gulf, and this is, again, for those two sensitivities, with the Florida Keys and without the Florida Keys, and, also, for the three different hydrodynamic models and then the three different vertical migration behavior assumptions, and so what this plot is answering is, if I am a red snapper in the South Atlantic, what is the probability that I was spawned in the Gulf, and you can see that there is actually quite a bit of interannual variation that is represented in the individual box plots there.

There is also quite a bit of variation, depending on the hydrodynamic model you use, with SABGOM being sort of an outlier, and then there is a little bit of variation, based on the ontogenetic vertical migration assumptions, and then, obviously, with the Florida Keys, the values are slightly higher, because you are giving more settlement area to the Atlantic, and so those percentages are slightly higher.

This, of course, is all dependent on the relative biomass between the western Florida coast shelf and the South Atlantic, and so we thought about how best to kind of summarize the results, given that the ratio of spawners in the Gulf to the Atlantic is kind of a moving target, because you have the eastern Gulf along the western Florida shelf, and you've had a lot of increasing populations, increasing spawning biomass, in recent years, and the population has gone way up in the last ten years, and then, obviously, there is trends in the South Atlantic side as well.

What we decided to do was to sum this up in terms of assumptions based on the ratio of the biomass between the Gulf and the Atlantic, because, obviously, the probability that recruits in the Atlantic are coming from the Gulf is a function of both the larval transport, but then the relative number of spawners between those regions, and so these are showing the overall conclusions, in terms of the percent of Atlantic red snapper that are coming from the Gulf, based on different assumptions regarding the spawning biomass ratios.

We looked at some survey data, and like we compared headboat CPUE, and we also looked at some of the FWRI surveys, the video surveys that are done on both the east and west coasts, and we also looked at historical landings, and all of those together indicate that the actual ratio is somewhere between one-to-one and four-to-one, and so, in terms of sort of the overall contribution, those numbers in that red box are kind of where we think the actual contribution is, but, of course,

we have the recently done Great Red Snapper Count, and then we have the snapper count going on in the Atlantic as well.

One of the reasons we did this is because, as new information comes along, we can basically plug in the numbers and then update to get to the answer, in terms of what the model is estimating to be the overall recruitment contribution.

Then this final slide has the number of Atlantic red snapper at-age, and those are showing in the color bars, with the gray being age-one red snapper in the Atlantic, versus the black line, which is eastern Gulf spawning output, and then what we're showing here is that there does seem to be sort of lag response when you have increases in the eastern Gulf spawning output, and there does seem to be, some years later, a bump-up in the age-one, in the recruitment, for the Atlantic, and so, again, there's a suggestion that the recovery in the eastern Gulf has potentially contributed to the populations in the Atlantic, and that is all I have, and thanks to a lot of folks who helped out with this study, and you know where to find Kyle and I if you have questions, and I can take questions now, of course. Thanks.

DR. BUCKEL: Thanks for that great presentation, Mandy, and we'll take questions from SSC members present or online. Fred Scharf.

DR. SCHARF: Mandy, could you talk a little bit about -- It's on Slide 14, but just what the three different assumptions were about vertical migration behavior, and then, you know, it seems like, for the first two models, that third assumption ended up with a lower proportion of recruits coming from the Gulf, but then, in the third model, in the Mercator model, the third OVM assumption ended up sort of with a higher proportion, and could you talk a little bit about the vertical migration behavior assumptions and how they sort of interface with the three different models?

DR. KARNAUSKAS: Yes, and so, if you look at the box plot, in terms of there were basically -- We have the ocean models, the ontogenetic vertical migration, and then there's interannual variability, and so, of those three things, the OVM assumptions really contribute the least, and that's probably because, you know, they're pretty similar. The gray snapper tends to be a little bit shallower, and that's the OVM Number 3 there, and so you get slightly different results for gray snapper, but the lane and mutton are a little deeper, but that has kind of negligible -- Not negligible, but more minimal influence on the final results, and so where the big difference is, as you pointed out, is in the SABGOM versus the HYCOM and Mercator.

There is a couple -- It's not -- It's difficult to figure out what exactly is going on without really digging into the differences in the hydrodynamic models and comparing fields. There is a figure in the paper, and I don't have it on the slide show here, but, essentially, what's going on is the SABGOM model predicts higher self-recruitment in the Atlantic, and so like this hotspot that off the eastern coast of Florida, and so, right here, what we see is this hotspot.

SABGOM is predicting a higher level of self-recruitment here, and approximately the same amount of flow from the Gulf to the Atlantic, but, because the recruitment in the Atlantic, the self-recruitment, is higher, then the probability of a recruit in the Atlantic coming from the Gulf is lower, and so that's the main difference between those models, is that SABGOM predicts a lot higher self-recruitment, and that could be a function of just how the model is resolving like the

eddy structures in the Gulf versus the Atlantic, and so let me know if that doesn't answer your question.

DR. SCHARF: No, it did. Thank you. I appreciate it.

DR. BUCKEL: Other -- Amy Schueller.

DR. SCHUELLER: Hi, Mandy. Thanks for the presentation. I just had a question, out of curiosity, and is there any genetic analysis that's been done to look at whether or not these are genetically different?

DR. KARNAUSKAS: There has been, and Kyle and I have been speaking to Dave Portenoy, and he's done some genetic work, and he actually published a paper, and it came out just about the time this one was coming out, looking at genetic differentiation. That paper had very limited sampling, and it had, I think, only like sampling from one location in the South Atlantic hotspot off of Florida, and it did show that it was genetically --

I am really bad at genetics, and I don't know if it's like genetically indistinguishable, or homogenous, with the West Florida Shelf population, and so my understanding of that paper is that it did show pretty high mixing between the West Florida Shelf population and the South Atlantic, and then it did show some differentiation with like the North Carolina population, or hotspot, and so, again, that paper is out there, and it's Portenoy et al. 2022, but it's based on pretty limited sampling, I think. It would be great to -- That would be kind of the next step that Kyle and I have thought about, is trying to validate this model with genetics or otolith chemistry or some other validation technique.

DR. CURTIS: To that point, I know that, for the South Atlantic red snapper estimation project, they're gaining a lot more samples as well, and Dr. Patterson and Dr. Portenoy are collaborating on that, and so I think a lot of those samples that come from the South Atlantic are going to be going in for genetic analyses, to bolster those sample sizes in the Atlantic.

DR. KARNAUSKAS: Yes. Thanks, Judd.

DR. BUCKEL: Other questions for Mandy? I have one, Mandy. I'm curious if you -- Is there a plan to do this for some other species, and like one that comes to mind, with a long pelagic larval -- Or a long pelagic duration, and I think it's larval and juvenile, are gray triggerfish. I've always been curious about the Gulf-Atlantic connectivity with that species, and so any plans to do some work with other species?

DR. KARNAUSKAS: Yes, and so Kyle and I had originally hoped to get through sort of a list of species, but then getting the inputs refined gets very complicated, and takes longer than one expects, but we have done the simulations for scamp, and most grouper species have a pelagic larval duration that's about twice that of red snapper, and so red snapper is around thirty days, and most groupers are fifty-six to sixty days, and the results are pretty similar, but, as you would expect, there is a little bit more connectivity.

Groupers also tend to be deeper, where the current flows are a little bit slower, and so that kind of offsets some of the extra time that they're in the water, and so the results for scamp are not too

dissimilar from what we see for red snapper, and, yes, it would be great to do species with much longer pelagic larval duration, and so we'll be thinking about what will be next on the list.

DR. BUCKEL: Thank you. Next up is Marcel.

DR. REICHERT: I think red grouper would be a very interesting species to look at, in that respect, and I think we've discussed that in previous stock assessments, the connectivity between the Gulf and the South Atlantic, especially since they have that disjunct distribution, and so I would be really interested in seeing some results on a species like red grouper. Thanks.

DR. KARNAUSKAS: Thank you.

DR. BUCKEL: Kyle Shertzer, go ahead.

DR. SHERTZER: Red grouper is one that is on our current list that we're looking at. Also, black sea bass, which isn't prevalent throughout the whole Gulf of Mexico, but they do find them off the west coast of Florida, and gag, and Mandy mentioned scamp, and the focus of this next stage of the work is to examine the effectiveness of the special management zones that the council has set up for spawning, and so, in addition to sort of general connectivity with the Gulf of Mexico, we're looking into that.

DR. BUCKEL: Thanks for that additional info, Kyle. I appreciate it. All right. I don't see any other SSC members, and so any public comment or public questions? Okay. Chip is not seeing any hands, and so we will move on to our action items for this, Item Number 8.

While Judd is working on that, I will read the action items for this, and so review paper on red snapper source sink dynamics, and we just did that, and then discuss the implication of these findings in the context of the latest red snapper OA and for providing fishing level recommendations, and so what are the implications for the recent assessment, red snapper assessment, and providing fishing level recommendations? Fred Scharf.

DR. SCHARF: I think it means that now we really can't estimate recruitment, right? I think that's what it means, and so maybe we just have to use a long-term mean. I mean, we talked about that in some of the recruitment projections workshop, and all those workshops are starting to blend together in my head, and so I'm trying to remember our conclusions, but, I mean, it seems like -- In other words, stock-recruit data from the Atlantic may not be fully informative, right, and so it probably means we probably need to use more recent mean, or long-term mean, data for recruitment.

DR. BUCKEL: Go ahead, Genny.

DR. NESSLAGE: We don't use the stock-recruitment curve for red snapper.

DR. BUCKEL: Go ahead, Marcel.

DR. REICHERT: Well, we have a research track prior to that operational assessment, and so I think this may be something that should be discussed in there too, to set us up for what decisions need to be made for the operational assessment. I mean, we were asked to look at the implications

for the operational assessment, and I think it has also consequences for what we were looking at, or what should potentially be looked at, during the research track.

DR. BUCKEL: Thanks, Marcel. Kyle Shertzer.

DR. SHERTZER: I wouldn't say that the estimation of recruitment is more challenging, because that's really determined by the data that we have in the Atlantic, and what's more challenging, as Genny alluded to, is trying to identify a spawner-recruit curve, if one exists, because of the input from the Gulf of Mexico. In many ways, it doesn't matter where the recruits come from, in terms of the estimation of their values. It does make it more challenging to forecast recruitment, if we're having input from the Gulf of Mexico, as we have this new source of variability that we haven't considered before.

DR. BUCKEL: Fred Serchuk.

DR. SERCHUK: Thank you, Chair. I just have a question about using the ten-year average, and forgive me, because I'm not up-to-date on how that came about, and I can understand using an average, but why was ten years taken? Is there something special about ten, versus eight or six or five or fifteen? Thank you.

DR. BUCKEL: I think that -- Fred Serchuk, I think Judd had put that in because that's what was used in the latest, but, for the future, that this is not just applied to the latest OA, and Judd just made a change that it lends more support for using recent average, and I think the point is just using average recruitment, instead of a stock-recruit.

DR. SERCHUK: Okay, and I agree with that. I just wanted to know where ten came from, and that's all, because I understand, because of the variations and the contributions from the Gulf, that it would be useful to use an average that would cover a period where the -- It would cover the differential recruitment over the years from the Gulf, but I didn't know where the ten came from. Thank you, and I agree with the statement as it's written. Thank you.

DR. BUCKEL: Thanks, Fred. Other comments on this, the text that Judd has up there, related to this action item? The text that's up there has to do with the red snapper stock assessment, but this other -- There's another point about providing a fishing level recommendation and implication of the findings for fishing level recommendations, and so does anybody want to comment on that? I will take that as a no, that no one wants to comment on that one. Fred Serchuk.

DR. SERCHUK: It relates to that point, and, I mean, I think, if we use recent average recruitment, because we're unsure of contributions, then I think the fishing level recommendation would come from the assessment itself, and I don't think we need anything more than that.

DR. BUCKEL: Thanks, Fred. That's logical and makes sense. Great. I don't know if they were thinking about if we have an area like off of North Carolina that's a -- If it's a true sink, that you could go ahead and fish hard and keep getting recruits from somewhere else, but I don't think we need to get into that one. Okay. Is everybody happy with what we have? All right. Judd, are we ready to move on? Should we take a break? Let's do our midafternoon break, everyone, and we'll come back at 3:15. Thank you.

DR. CURTIS: Just a quick note on a schedule change, and we're going to do the greater amberjack estimation project update right after our break, and the Agenda Item Number 9, the Southeast Fisheries Science Center minimizing discards project, will be tomorrow morning, or potentially this afternoon, if we can squeeze it in.

(Whereupon, a recess was taken.)

DR. BUCKEL: All right. Let's go ahead and resume our afternoon session, and next up is Dr. Mark Albins, who was nice enough to make the trip, and we appreciate that, Mark, and he's going to present on the greater amberjack estimation project and give us an update on where that is, and then we have some action items, and so please take a look at those as you're watching Mark's presentation. Thanks, Mark.

GREATER AMBERJACK PROJECT UPDATE

DR. ALBINS: Thank you very much. I appreciate the invitation, and I just want to point out that this is a big project, and there's a lot of co-PIs involved, and I am not, by any stretch of the imagination, the subject matter expert on every single part of the project, but I do play a coordinating role, in particular, and I liaise a lot between the statistics and design group within our group and the field biologists and field team, and so hopefully I have a pretty good overview of the project that I can share with you today, and I believe we're going to be joined virtually by the lead PI on the project, Dr. Sean Powers. He apologizes for not being able to be here in person with you today.

The greater amberjack abundance, distribution, and movement in U.S. waters in the South Atlantic and Gulf of Mexico, essentially, the rationale behind the greater project is, as you know, reef fish management in the southeastern U.S. has been, in certain cases, contentious, and, in particular, this contentiousness has revolved around disagreements regarding stock status and catch levels, and these disagreements have caused the public to question the scientific basis for some management decisions.

As we all know, stakeholder buy-in is critical to effective management, and so, in response to this situation, the U.S. Congress has funded two independent studies, to-date, to provide independent estimates of absolutely abundance to help guide future management and build stakeholder confidence. The first of these was the Great Red Snapper Count, and that was in the Gulf of Mexico area, and that project is completed, and I won't be talking about that today, but it is relevant, because of the background.

What I am going to be talking about today is what we're calling the Greater Amberjack Count. The difference, one of the main differences, is that this project spans both the Gulf of Mexico and South Atlantic, and not just the Gulf of Mexico, and it's an ongoing project and, really, in some ways, in its early stages.

The Greater Amberjack Count, essentially, what we hope is that this project builds on the successes and lessons learned from the Great Red Snapper Count, and the overarching goals of the project are, first, to provide an independent estimate of greater amberjack absolute abundance in the U.S. Gulf of Mexico and South Atlantic using fisheries-independent sampling. A secondary

overarching goal is to expand our general biological knowledge of a range of things, including the spatial ecology, the movement, the connectivity, growth, mortality, et cetera, of amberjack, to inform management decision-making and to also circle back and address some of the key assumptions that we make in reaching our estimates of overall absolute abundance.

Finally, challenges that we anticipate, that we are currently facing, and will face in the future, the amberjack count will be much more challenging than the Great Red Snapper Count, simply because we know less about greater amberjack than we do about red snapper, and they're just a less well studied species. They move more, both on small scales and large scales, over short times and long time periods, than red snapper, and this project covers a larger area, the Gulf of Mexico and the South Atlantic, instead of just the Gulf of Mexico, and it also includes less time. This means that we, as a team, have a reduced capacity for gathering preliminary data and planning and adapting to changes.

Like the Great Red Snapper Count, some of the big challenges here are the fact that we lack detailed comprehensive knowledge of bottom habitats across the entire study area. While we're confident in our ability to estimate abundance at local scales, scaling up to larger geographic frames can be problematic, primarily because of that lack of detailed comprehensive knowledge of habitat.

The way that we've structured the project is a phased approach, and I am going to present this kind of in a couple of different ways, so that you hopefully get an overall idea of the philosophy behind the project. In Phase 1, and, again, I will talk about each of these bullet points in a little bit more detail later in the talk, but this is just to give you an overall view of how all the pieces fit together, and so, in Phase 1, we synthesize existing fisheries and habitat data, including local ecological knowledge of fishermen, and we calibrate our different sampling gears that we're going to be using, including eDNA methods, which is a new sampling gear, essentially, that is being developed in this project, and used in this project, and we use that knowledge, both from our sampling gear calibrations and our synthesis of existing data, to design our sampling strategy, and this will be based on those abundance estimates.

Once we have a finalized sample design, we will implement that in a regional study using region and habitat-appropriate calibrated gears, as well as complementary connectivity and movement studies. Now, that's a place where we see a lot of opportunity for stakeholder participation in the overall project, and, again, this feeds into the regional studies, or at least the conclusions that we make from them, because it addresses some of the key assumptions of our abundance estimators.

In Phase 3, we use the data collected in the field to estimate region and habitat-specific, as well as overall absolute abundance estimates for greater amberjack, update basic biological parameters, and hopefully use those estimates, and those biological parameters, to help you guys, to inform NOAA's stock assessments and, ultimately, the council's management decisions. We also have a plan to communicate the results with other stakeholders, and I will talk, again, in more detail about each of these bullet points as we go, but the key features of this overall phased approach, and the things that we were going for, is we wanted it to be adaptable to differences across regions and habitats.

We wanted it to be scalable from the local to the regional to the entire study region, the whole Gulf of Mexico and South Atlantic combined regions, and to be efficient. Our sample design -- Basing

our sampling design on existing catch data and stakeholder knowledge basically means that we don't leave that existing data on the table, and we actually use it to hopefully make our approach more efficient.

Looking at all of these specific objectives in a little bit more of a simple format, and I'm just going to list them for you, and one is synthesize existing bottom habitat observations, synthesizing existing abundance data, including catch data and stakeholder knowledge, design and carry out a comprehensive study to estimate the regional, habitat-specific, absolute abundance of greater amberjack, using video and hydroacoustics.

Determine the movement and connectivity of the species, using acoustic telemetry, conventional tagging, and genetic markers to assess the efficacy of eDNA to determine presence and relative abundance of greater amberjack and related species to update the biological information across the study region and to engage in outreach to facilitate stakeholder input and communicate results. This list of objectives, I went through and kind of read them very specifically, because this is going to be the framework for the rest of the talk, and we'll go through each of these numbered points and kind of expand on them a little bit, especially Number 3.

Number 1, synthesizing existing bottom habitat observations, essentially, this is the idea that there are existing sources of habitat data out there, and there are quite a few different sources, but most of them represent partial coverage and they, as a whole, represent variable resolution, variable scales, spatial scales. One good example of a dataset that does this is this dataset that was collected as part of the FWRI fishery-independent sampling off of Florida, and this is side scan coverage, and so all the little dashes that you see on the map -- Essentially, for each one those dashes, we have side scan data that has then been manually digitized into different habitat categories.

For some areas, we have fairly detailed designed experiments that have gone out and randomly sampled the bottom, and so we have a pretty good idea of at least the percentage of habitat cover for these regions. Unfortunately -- There are other examples of this. For example, off of Alabama, there is a similar dataset that is usable, and, in various other places, there are other datasets that have different levels of coverage and different resolutions, but there are no existing comprehensive maps for the entire region, and so part of our plan, and one of the things that we're in the process of doing right now, is compiling those existing sources of habitat data into a comprehensive GIS product across the entire region. This product will inform both sampling design and ultimately allow us to extrapolate our final abundance estimates.

Moving on to Objective 2, synthesizing existing abundance data, this comes from both fishery-dependent and fishery-independent catch data and stakeholder knowledge, and so fishery-dependent and independent catch data for greater amberjack are obviously available, and here's just two of many examples. An at-sea observer program would be fishery-dependent source, on the left, and the bubbles show different catch per unit effort of greater amberjack, and then a fishery-independent survey, and an example of that would be the video survey depicted on the right-hand side.

Obviously, this gives us ideas of where we can and can't find, or do and don't find, greater amberjack and relative abundance of those, and so we didn't want to leave all this preexisting data on the table, and we wanted to basically use that to focus our efforts.

We also have existing stakeholder knowledge that we didn't want to leave on the table, and so we have a comprehensive part of the project that is designed specifically to extract local ecological knowledge of recreational anglers, commercial fishermen, and for-hire captains and to use those surveys, essentially, to create alternate maps of expected abundance of amberjack, for example this heatmap that you see on the right-hand side of this slide. Those heat maps can be incorporated into a Bayesian prior, along with fishery-independent and fishery-dependent catch data, to give us an idea of expected relative abundance and, importantly, the variability in abundance of amberjack across the region.

We take these two different forms of data and synthesize them to inform our expectations, in terms of both of presence and absence of greater amberjack, relative abundance of amberjack, and the variance that we would expect to see in a metric of amberjack abundance.

This leads us to a more efficient sample design, because we can essentially then sample more where abundance and/or variance are expected to be high and sample less where both of these are expected to be low, and so we're basically using this to decide where to allocate the bulk of our sampling. That doesn't mean that we won't sample at all when we expect abundance to be low, or variance to be low, but we'll sample less in those locations.

Okay, and so this is the big one, and Objective Number 3 is the actual surveys themselves, and so a comprehensive study to estimate regional, habitat-specific, absolute abundance using video and hydroacoustics tools, and this is basically going to come at a few different parts. First, I will talk about the sample design and the framework, our abundance sampling methods, the calibrations that we're going to use for our gears and methods, and then I'll give you an idea of our cross-regional and regional workplans, in terms of the number of samples that we expect to collect.

In terms of sample design and framework, our plan essentially is -- We don't have enough money to go out there and do a naïve study. In other words, if we pretended like we didn't know anything about amberjack, we wouldn't have enough funding to go out and sample everything in a random way, and so we're going to leverage existing surveys conducted by the National Marine Fisheries Service and partner states, including SERFS here in the South Atlantic, and programs like G-FISHER in the Gulf of Mexico.

We're going to supplement these surveys both directly, by increasing the number of samples that they're capable of collecting and by augmenting their methods. For example, G-FISHER doesn't include a hydroacoustics component, but we're basically going to provide funding to use hydroacoustic tools at a lot of the G-FISHER sampling sites. We will also be conducting some drop-camera work in the South Atlantic, to augment the SERFS sampling, and we'll also be doing some towed camera work in the South Atlantic, to augment that sampling, because SERFS is largely limited to natural hardbottom habitats, and so we also need to sample artificial habitats, using drop cameras, and softbottom habitats, using towed cameras, and so that's just a couple of examples of how we're going to supplement existing surveys. We'll also deploy independent regional and cross-regional surveys, where our teams actually go out and collect data as well.

Our sample design will inform the supplemental sampling and independent sampling, and so, for example, if the existing sample design of G-FISHER, if we feel like we need more samples on artificial reefs than in already built into the G-FISHER system, then that's where our supplementary samples will be allocated.

Basically, we have divided the entire region up into five sub-regions and three different habitat types, and this forms kind of the underlying foundation of our sample design, and so we're planning to come up with an absolute abundance estimate for each of these three habitat types of artificial reefs, natural reefs, and uncharacterized bottom for each of the six regions that you see here on the map.

The initial default, or minimum sample design, will basically be based on a stratified random or cluster sampling by region and habitat type within those areas that I just showed you, but we'll also allocate our effort, based on the results of those preliminary models that I told you about. In order to optimize efficiency, again, we'll sample more where abundance and/or variance is expected to be high and less where these are expected to be low, and so, for a particular region, and a particular habitat type, we can make those decisions based on what we see in the existing datasets. When we're leveraging existing efforts, that supplementary sampling will be used to attain our effort targets.

Essentially, we're estimating region and habitat-specific greater amberjack abundance by using both design-based, or stratified random, or cluster sampling, and model-based, using a hierarchical spatial regression model, to infer greater amberjack abundance in a unified framework. In Phase 1, we'll develop preliminary Bayesian regression models, or maps, of greater amberjack occurrence and abundance as functions of habitat and environmental factors. This is based on the data that I talked about from Objectives 1 and 2.

We'll then use these models and maps to create sampling strata and allocate sampling effort. In Phase 2, we collect the data, and, in Phase 3, we use those data to make both design-based abundance estimates for each region and habitat combination, and, also, we'll use that sample data, or survey data, to update our Bayesian models and maps of greater amberjack occurrence and abundance. This will provide improved model-based estimates of abundance by region and habitat.

If you're familiar with Bayesian modeling, the idea is that that existing data that's on the table serves as the prior for these final Bayesian models, and the data that we collect during the study serves as, you know, the new information, to basically refine our final estimates, but, because we are a little bit worried about those Bayesian models, and the hierarchical modeling system, being able to be fit and for it all to work out, our backup is essentially these much simpler design-based abundance estimates for each region and habitat, which we have a lot more confidence in being able to accomplish, and so it's kind of a two-pronged approach, and hopefully we'll be able to do both, and, at the end of the day, our hope is that the Bayesian models, the Bayesian approach, will allow us to have smaller uncertainty in our final estimates.

Essentially, I won't go through every single box in this flow chart, but I just wanted to show you how all the parts kind of fit together, and, in our Objectives 1 and 2, we get habitat and abundance data, and we feed that into our preliminary Bayesian regression models. Those produce preliminary Bayesian maps of amberjack abundance, and we use those maps to create our sampling strata and allocate efforts. That informs our field sampling and calibration, and then we use that field sampling data to revise our preliminary Bayesian models and come out with basically a map of absolute density estimates with Bayesian confidence intervals and estimates of total abundance by each stratum with Bayesian confidence intervals.

Then, of course, the backup plan, the fallback plan, which is the one that we may or may not have more confidence in, is that we'll do a more traditional estimate of total abundance by stratum from a design-based, or stratified random, sampling approach.

This is just a little bit more detail, and the design-based abundance estimates give us model-free estimates based on simple random sampling, and then we apply the calibration coefficients for each gear type from the calibration component of our study.

The model-based abundance estimates take a few more steps, right, and we use the spatial regression model that is updated with our Phase 2 field survey data and use that to predict occurrence and abundance of amberjack across the region, and this essentially regresses abundance on habitat, bottom type, depth, latitude and longitude, and can incorporate any other factors that we think are important.

We use the residual autocorrelation between samples, which is included as a formal component of the model, and this allows imputation of missing covariates, essentially allowing nearby cells in the spatial model to inform each other, improving our precision, and that's why we think we'll end up, at the end of the day, with this method having smaller confidence intervals. We incorporate calibration coefficients from the calibration study directly in the models, allowing extrapolation to our absolute abundance estimates, and, of course, we'll have a model selection component in which we use regression diagnostics, information criteria, and cross-validation to come up with the best fitting models, or the most parsimonious hierarchical models.

How are we going to sample for greater amberjack? In general, the strategy is to combine video gears, such as stationary cameras, ROV-mounted cameras, and towed cameras, combining those with hydroacoustic surveys to measure density, and the specific type of video used will be habitat and region specific, because each gear type has different advantages. For example, towed cameras are really effective for sampling large swaths of low-relief habitat, whereas ROV-mounted cameras are much more effective for sampling higher-relief artificial habitats.

We'll assess the efficacy of emerging eDNA technologies at a subset of stations, and I will talk a little bit more about this later, and all of the gears will be calibrated to each other, and the goal is to calibrate them also to a groundtruth abundance metric, which will come from a Lincoln-Peterson estimate from within a VPS array, and, if you have questions about how all of this works, again, I don't have time to go into the details, but I would be happy to talk about it afterwards.

The hydroacoustics tools that we'll be using, essentially, we're deploying multifrequency scientific echosounder systems, and these give us quantitative density estimates of greater amberjack across habitats and regions. How do we distinguish amberjack from other targets? Well, essentially, there are three methods applied to distinguish greater amberjack. Multifrequency volume backscatter summation is one method, and there's also target strength thresholding and broadband classification.

In addition to these approaches, we have actually taken a number of live amberjack and run them through a CT machine at a hospital to help develop acoustic signature models of greater amberjack that are specific to their shape and size of swim bladder, so that we can distinguish them from other species. On the plot on the right, you don't see greater amberjack, but you do see that, for example,

red snapper, tomtate, and vermilion snapper have very different acoustic profiles, and we're hoping that we can differentiate red snapper using these acoustic fingerprints, essentially, after developing models from the CT scans.

Everybody has seen a fish finder, but this is essentially what we're doing when I'm talking about hydroacoustics, and we pull a tow fish with a hydroacoustic transmitter and receiver through the water, and we run a pattern over whatever habitat we're interested in sampling, and then, basically, we can produce a heatmap of density of fish, and we can easily separate the fish that are up in the water column, which are going to include amberjack, from reef materials, bottom materials, and other smaller schooling fishes. The trick, the real trick, is to separate amberjack from other species, like red snapper, that may be hovering up over the reef, and that's where that fancy acoustic fingerprinting stuff comes in.

In addition to the hydroacoustics, we're going to be using video types for different habitats, as I mentioned before, including baited drop cameras, on the left, and ROV-mounted cameras, with the yellow kind of jaguar spots on the right, and that's jaguars for the University of South Alabama, by the way, and towed cameras, which is the C-BASS system that you see in the middle, and that's going to be run by Steve Murawski at the University of South Florida. These three different camera types will be deployed in the regions and habitats in which they make the most sense to deploy, but we'll also deploy them all together, for calibration studies, in the same place at the same time.

Video is, obviously, the most common method to quantify trends in abundance of reef-associated fishes, at least in terms of fishery-independent sampling. It has a lot of advantages, and it's not extractive. It's low-risk, and it's archival, and it also has a lot of disadvantages.

There is high processing times, and we have to worry about things like fish behavior, are the fish attracted to or not attracted to the cameras, and this leads into the next disadvantage, that there is a variable probability of detection, both in terms of fish behavior and in terms of visibility, when the cameras are deployed, and it can be difficult to estimate what kind of area is associated with each camera sample, and so these are some of the things that we have tried to address with our calibration design.

Essentially, we realized that we need dedicated efforts to understand these potential biases and how they influence the probability of detection, including, as I said before, attraction and avoidance, the influence of bait, and a lot of the G-FISHER drop cameras will have bait attached to them, and how the fish are enumerated, actually how the video -- When the video finally makes it back to the lab, and someone is viewing it, what methods they're using to count and identify fish, and then identification difficulties. We're talking about greater amberjack, which is one of several species that could be hard to differentiate, visually, from one another, and so we have to make sure that we hit all these points and take care of these potential issues in our methods.

Calibration studies and coupling the video with hydroacoustics will help to address some of these, right, and that's our hope, that our calibration studies will allow us to understand exactly how the different cameras are affecting the fish and how that might affect our overall abundance estimates.

This is just a little bit of fun stuff that I wanted to show you, and this is some footage from our ROV, and there are three different species of Seriola in this footage. What you see mostly is almaco jack, but there is at least one greater amberjack that just swam by a second ago, and then,

at the end, you will see three banded rudderfish swim by, right here at the bottom left, and so that's a good example of what our video viewers are going to be looking at, over and over and over again, hundreds of these videos.

This is video that was taken from one of the stationary drop cameras, rather than an ROV-mounted camera, and the nice thing about the drop cameras that we're using is that they have 360-degree cameras, and so they look all the way around, and this minimizes the chance of double-counting fish, because, essentially, as soon as a fish swims off one end of the frame here, it swims onto the other end, and so you're seeing all the way around you, in 360 degrees right now, and, again, this is a mixed school, mostly almaco, but, also, a fairly good number of amberjack mixed in, greater amberjack mixed in.

The calibration part of our study will essentially compare the different camera gears, and we're going to compare baited versus unbaited stationary cameras, stationary versus ROV, stationary versus towed, ROV versus towed, and we'll also compare acoustics to all the camera gears, and so, during our calibration study, we're running all of this stuff at the same time, and all gears will be run versus a ground-truthed Lincoln-Peterson estimate of abundance, within a VPS array that has a whole bunch of greater amberjack tagged in it, and so the idea is to try and use the Lincoln-Peterson estimator to estimate how many amberjack are actually in the near vicinity of where we're deploying the gears, and then we drop the camera gears.

All the fish that are tagged in that VPS array also have external tags that will be visible on the cameras, and so we can identify, on the cameras, whether we're looking at a tagged fish or a non-tagged fish, and then that -- So we know the abundance of fish within the array, from the Lincoln-Peterson estimator, and then we see what all the gears see, essentially, and how they all compare to each other.

The nice thing about the VPS array is it also allows us to get, you know, one or two-meter position data on all the fish at the time that the gears are being deployed, and so, in other words, if you plop the stationary camera into the middle of the array, you can see if the fish tend to move away from that camera or towards that camera, and to what degree, and hopefully come up with some metrics of how far away the cameras are seeing fish and whether the fish are moving in relation to the camera deployments.

At the same time that we're deploying all these gears, we're also taking water samples for eDNA, and, again, I will talk a little bit more about that in a second, and doing also repeat drops of stationary cameras at a number of sites, and the idea here is that we want to try and separate structural zeroes from sampling zeros, and so, if within twenty-four hours, we see an amberjack -- If we drop the camera and don't see any amberjack, and then, within twenty-four hours, we drop the camera again and do see amberjack, then that identifies the first zero as a sampling zero and not a structural zero, and enough of those will start to give us some quantitative estimates of the ratio of sampling to structural zeroes in the dataset.

This is just a quick look at our regional workplan, and so kind of an allocation of the different gear types. That you will notice is that we're deploying hydroacoustics, the EK80, across the entire region, and we're also deploying -- SCA means stationary cameras across the entire region, in all habitats. ROV will only be used in select habitats in certain areas, mostly on artificial reefs, but also a little bit on natural bottom, and then towed cameras will mostly be used over natural bottom

and uncharacterized bottom, because we don't really like to tow the camera around large artificial reefs, and it's a little bit dangerous. This is just to give you an idea of the numbers of stations that we expect to collect by the end of the project and what our sample size looks like, essentially, for each of the gears.

Objective 4 is to determine movement and connectivity using acoustic telemetry, conventional tagging, and genetic markers. It's important to know how much these fish move, right, because what we're essentially saying is we're taking a giant geographic snapshot of how many fish there are. The problem is that we're doing that across some time, right, and it takes a little bit of time to get all these gears out in the water in these different places, and, if fish are, in the meantime, moving from one region to another, that could change our estimates, and so, in part, this Number 4 is just for basic knowledge, but, in part, it's also to feed back into the abundance estimate and give us some idea of movement for those fish.

To address this, currently, the Gulf of Mexico and South Atlantic are managed as separate non-mixing stocks, but very little is known about the migratory behavior and population connectivity of greater amberjack, and so our combined strategy is to use both internal acoustic tags and an extensive receiver array, in combination with high-reward external conventional tags and a very extensive population genetics component, to get a handle on movement and connectivity, and mortality as well.

This part of the project is a major opportunity for angler engagement, right, and we're actually engaging with the for-hire community, to help us get the tags out, and then engaging with the entire fishing community, recreational, for-hire, and commercial, to get those returns back, and, each contact that we have with a fisherman that provides a return tag, we're also doing a small survey and trying to get an idea of some of their motivations for fishing the species.

Alternate estimates of abundance, and so, in addition to giving us movement, connectivity, and mortality, these tagging programs, and population genetics, can also provide alternate estimates of abundance, right, and we can use tagging-based estimates, where we combine landings and estimated exploitation rates, to get at an alternative estimate of abundance, and we can also use genetic-based abundance estimators, using the frequency of parent-offspring or sibling pairs in our sample. This, we don't currently have funding for, and it wasn't part of this RFP, but we are going to be collecting all the samples that would be necessary for this study, and we're actively looking for additional funding to do that part of it, the parentage part.

Objective 4, again, and I mentioned acoustic and high-reward external tags, and so this map just gives you an idea of both the receiver array network, which is all the circles on the map, and part of those from the iTAG arrays, and part of them are from the FACT arrays, and we also have a number of arrays that we're going to be putting out, as part of this project, which are the purple dots there, or, actually, most of those are out already, and then our tagging effort is going to be, as you can see, distributed across most of the region.

This part of the project will give us data about reef residency, site fidelity, seasonal movements, the connectivity among habitats, as well as exchange in mixing between regions, in particular between the Gulf of Mexico and the South Atlantic, and it will also us to estimate fishing and natural mortality rates.

This is an update slide, and so this basically was our proposal, and this is what we've done so far, and so everywhere there is a little red pin is where we've tagged fish, and we have, so far in the South Atlantic, 156 conventional tags, seventy-four acoustic, and seven of the conventional tags have been returned by anglers. It's similar numbers in the eastern Gulf of Mexico and the western Gulf of Mexico. We currently have about 40 percent of our conventional tags out in the water, and about 75 percent of our acoustic tags out in the water, and we're already above twenty returns on those tags, and we hope to see quite a few more through next year.

The population genetics component, essentially, we're using double-digest restriction-site-associated DNA sequencing, and this will allow us to answer questions about stock structure and connectivity. There have been previous studies on the genetics of greater amberjack that suggest a two-stock model, but they don't have clear geographic delineation for this two-stock model, and I think that's been a problem in the past.

Previous studies were limited by incomplete sampling of the geographic range and very small numbers of genetic markers. We're going to overcome both of those by using genome scans, and so literally thousands of SMP markers and comprehensive geographic sampling from North Carolina all the way to south Texas, and so we'll have genetic samples across the entire region.

Objective 5, this is kind of a new, moving forward, part of the project. We're partnered with some eDNA specialists, some folks that have made great strides in eDNA technology, looking at conservation of endangered species, and they're now interested in applying these tools to looking at managed species that aren't necessarily in danger of extinction, but that we would like to be able to go out and decide whether they are present or not.

Part of the project will include assessing the efficacy of eDNA to determine the presence and relative abundance of greater amberjack and related species, and, essentially, this uses something called a ddPCR assay, which is digital droplet PCR assay, and what that means is that each water sample basically can be -- This machine divides each water sample up into thousands of microdroplets, and then you run a PCR on each of those microdroplets.

By doing that, what you end up with is a measure of the relative abundance of the DNA of that species in that water sample, and so, for example, if you're running primers for both greater amberjack and almaco jack, you would be able to get a relative abundance of the two species in that water sample, and so the cool thing about this is that we'll be able to compare this eDNA technique to a whole bunch of different other fishery-independent gears, including all the cameras, the hydroacoustics, and all that stuff, and so it really has a potential --

It's a great potential proving ground for the technology, and it also has the potential to confirm our identification of species for the video surveys and to help estimate the prevalence of those sampling versus structural zeroes that I mentioned before. This is a real proving ground for the use of these tools in multidisciplinary approaches to study the distribution and abundance of marine fishes, and so it could be very valuable to future work.

Objective 6, updating the biological information across the study region, this is just something that's really important for greater amberjack, and there hasn't been an update in quite some time, and so the idea is that, you know, recent stock assessments recommend expanding the demographic sampling of greater amberjack, and we'll use this as an opportunity to collect age and growth

information from the western -- Excuse me. Age and growth information from the western Gulf has been limited, and we'll use this as an opportunity to collect both fishery-dependent and fishery-independent collections to update that biological information and develop updated age-length keys. We're also going to archiving gonad samples that could be used, if we identify additional funding, to update the reproductive indices, such as fecundity, spawning season, et cetera.

Last, but not least, we've included a comprehensive plan to engage in outreach, to facilitate stakeholder input and to communicate our results at the end of the day. We have a dedicated research team within our group that plans to work closely with established groups, including the greater amberjack visioning team and the Sea Grant Reef Fish Extension Collaborative, to facilitate communication and cooperation with stakeholders, and so it's a start-to-finish approach.

Essentially, before our group was even involved in this project, the greater amberjack visioning team collected a whole bunch of stakeholder input, and that was used to formulate the goals of the RFP that we responded to, and our research proposal, I think, was extremely responsive to that RFP, and, in other words, we basically went through and addressed every part of the RFP, to the best of our abilities, and, also, incorporating local ecological knowledge in the study design is an important way to engage stakeholders.

Also, we're actively engaging with for-hire fishing sectors, to provide platforms for scientific sampling, tagging, et cetera, and we're highly dependent on commercial and recreational anglers for returns of those tags, and we plan to work with established groups, at the close of the project, to communicate our results.

I am not going to go into too much detail here about the project management and coordination, but we do -- I just want to point out that we have a very highly-qualified team of investigators, with many years of experience at the interface of science and management, led by Dr. Sean Powers at the University of South Alabama. Our coordinating committee meets regularly, and we also have regular weekly check-in meetings for upcoming critical issues that are happening within the project.

We are open to, and actively encouraging, input and exchange with National Marine Fisheries Service and with Sea Grant and other interested parties, such as yourselves, throughout the project, including meetings at critical transition points, for example between phases, to try and get early feedback and incorporate that, if possible, into the project.

Our outreach and engagement team is dedicated to communicate progress and seek continued input from stakeholders, and, just to clear this up, we plan to release the final abundance and variance estimates only after completion of National Marine Fisheries Service, SSC, and independent reviews of the project, and so that's a lesson learned from the Great Red Snapper Count, that we don't plan to repeat that mistake that was made.

I won't walk you through this whole thing, but just to show you this is where all the different PIs and co-PIs fit into the project, and we've got a hierarchical structure, with different groups involved in different parts of the project, to try and make sure that all of those phases are completed and integrated well together.

This is a large-scale survey, using some, integrated in a novel way, sampling approaches, and the plan is to leverage existing datasets and ongoing research to augment data collection and cost effectiveness, and we see the primary benefits of this project as providing an independent, robust estimate of absolute abundance of age-one-plus amberjack in the Gulf of Mexico and South Atlantic, improving our overall understanding of spatial and habitat-related distribution of the species, understanding of population and movement dynamics in the region, and, also, we hope that we're developing an approach that won't just work for now, but that can be applied to future greater amberjack abundance estimates, and maybe even for those of other reef fish species.

Secondary benefits, of course, include estimates of growth, mortality, site fidelity, population connectivity, very important pieces of data that I think can be used well by groups such as yours, and an improved understanding of reef fish community structure across the study region, and so these cameras that we're deploying don't just see greater amberjack, and they see lots of other species as well, and so the dataset that we're collecting could be utilized for a lot of other -- To answer a lot of other questions as well.

What I want to leave you with today is some pictures of our high-dollar external tags. Some of you may be fishermen, and many of you know lots of fishermen, and please get the word out, as much as you can, that, if you catch a greater amberjack with one of these yellow and red tags, to be sure to call the number, or go to the website, here and claim your $250 cash award, and, with that, my presentation is done, and I am here and happy to answer any questions that you might have.

DR. BUCKEL: Thanks for the great presentation, Mark. I will open it up, for questions, to the SSC members. Anne.

MS. LANGE: That was a very good presentation. I have a couple of questions. Why was greater amberjack selected, of all the species that there are issues with within the regions? Was that something beyond your control, or maybe you just applied to the RFP?

DR. ALBINS: That's a great question, and I would love to know the answer to that question.

MS. LANGE: Okay, and then, associated with that --

DR. ALBINS: National Marine Fisheries Service and Sea Grant made that decision, and, why, I'm not sure.

MS. LANGE: Okay. Congress?

DR. ALBINS: Congress, yes.

MS. LANGE: Who likes amberjack, and so, I guess, sort of economy of scale, or the efficacy of such a great giant, enormous project, and how relevant is it, as far as being able to transfer that, to be something that could be used for assessments and that type of thing, and, basically, you're talking about a snapshot, for one year, and then what happens beyond the one year? I understand you said your camera stuff and everything will be -- That you will observe other species while you're doing it, but it's directed at the life history and the regular distribution of amberjack, and

so there's a bias associated with that, but then one number, and then what happens the following year, and how many years is this project going to take? I guess that's sort of a --

DR. ALBINS: Okay, and so I will take the first question first, and, again, I don't know the answer, because we didn't, as a group, write the RFP. The central goal of the RFP was to get this one snapshot absolute abundance estimate, and, you know, for one species, and I've talked to folks, and I think it's presenting an issue for the National Marine Fisheries Service, the people who fit the models, the stock assessment models, and things like that, but it can be used as essentially a point-in-time groundtruth for their abundance estimate, and that can adjust it either up or down or not at all, depending on how broad our uncertainty in that estimate is and how much confidence we have in it, and so I am not sure what the answer is to your question, but we're responding to the RFP, and I guess that's the best way to answer it. What was the second part of your question? I'm sorry.

MS. LANGE: The timeline.

DR. ALBINS: The timeline, and it was supposed to be a two-year project. We got the funding a little bit late, and so that pushed us into what is essentially the third year, but what we're trying to do is a lot of prep work and a lot of the calibration studies and stuff like that, getting ready, and then we're going to hit really hard, next year, for the sampling, and so all the sampling will happen, hopefully, or most of the sampling, and I shouldn't say all, because some of it actually happened this year, but the great bulk of the sampling will happen within I would say a six-month period in the middle of next year.

MS. LANGE: The other part was the process, your whole flow chart and everything, and application to another species, or to other assessments, and is it beneficial? Is it cost-effective to use those monies for one species at a time, if this is just for one-shot amberjack, and all that technology, and all the developments and the process, and that's it, and, I mean, it's --

DR. ALBINS: It's above the project, right, and we responded to an RFP, and the goal of the RFP was this kind of snapshot abundance estimate, and I think that I can speak for most of the PIs on the project that we think that may be very valuable, but also that what is for sure going to be valuable out of this project is all of the ancillary stuff that happens. We're going to be learning so much about the movement of the species, and we're going to be learning so much about the population structure of the species, genetics and things like that, that I think it's going to be a net gain, in terms of all that stuff. Whether it's cost effective or not, I'm not sure. That will depend on whether the central goal is able to be implemented into the stock assessment models in a way that's informative or not, and that's not something that we're actually in charge of doing.

DR. DUMAS: Thank you for the great presentation. This is a fascinating project, and you guys are collecting lots of great information, and I have a few questions about the eDNA analysis.

DR. ALBINS: Sure. I will try and answer them, but that's one of the places where I'm not an expert.

DR. DUMAS: They're not about the genetics itself, but just I missed it, and what's the sampling area for the eDNA? Is it the whole Gulf and South Atlantic area?

DR. ALBINS: So far, we've deployed eDNA in all of our calibration studies, and it's going to be -- We're going to sample eDNA on a subset of our surveys.

DR. DUMAS: So how many data points do you think you will get, roughly? Do you have any idea?

DR. ALBINS: I don't know, but it will probably be in the hundreds, I would guess.

DR. DUMAS: So, for those eDNA samples, you're going to try to detect like presence and absence of amberjack, and also try to develop abundance estimates.

DR. ALBINS: Yes.

DR. DUMAS: From those eDNA samples, can you also try to detect presence of other species?

DR. ALBINS: So they're developing primers for amberjack and for the other closely-associated Seriola species, but the technique only works for things that you develop primers for, and so we'll be throwing those primers at all of the samples and basically getting a relative abundance of all four, or five, or those species in any given area at a given time, when we're also deploying the other gears.

DR. DUMAS: Can those eDNA samples be preserved, or do they have a shelf life, where primers later can be developed for other species and the same eDNA samples could be analyzed for presence and absence of other species?

DR. ALBINS: That's a question that I don't know the answer to. I'm not sure whether they are preserving them, or archiving them, or whether that's even possible. They are simply water samples though.

DR. DUMAS: Right, and I know, but will you be sampling throughout the year, including the fishing season, for amberjack and for --

DR. ALBINS: We will be sampling during part of the fishing season in some of the areas, yes. The sampling will be going on during kind of the middle six months of next year, and so when the weather starts to get, you know, workable, until the weather isn't workable anymore, and that's kind of where we're going to concentrate most of our efforts.

DR. DUMAS: So this is a future research question, but, if a human was baiting a hook, and dropping that hook, and they were collecting eDNA samples, could you detect the human DNA in the water? You may not know the answer to this, but could you detect the human DNA in the water, and, if so, if you had a greater number of anglers dropping a greater number of hooks in that location, could you get a presence and absence of human anglers in a location, and then some estimate of abundance, or effort, by location?

DR. ALBINS: I think that that's theoretically possible, if you had the human primers, and if the fishermen weren't wearing gloves, and I think the other issue with that would be residence time, right, and so you've got currents and movement patterns, and, if that parcel of water has -- Since the fisherman was there, if that parcel of water has moved on, and this is also a problem for fish,

right, and, once that parcel of water moves away, and it's at different rates in different places at different times, that DNA is no longer in the water over that habitat, and so it takes persistence, and that's the idea here, is that, if there are fish persistently in the area, while we're sampling, we expect to detect them, but, if they were there twenty-four hours, or forty-eight hours, previously, we may or may not, depending on how fast the current is moving.

DR. DUMAS: I am getting some chuckles around the room, and is that because people have done this already or that people have not done this? Have people looked at that before? I'm just curious, and I don't know.

DR. ALBINS: You can put hydrophones on, for example, an artificial reef and get the number of boat visits to that reef, based on motor noises, and, whenever a boat is fishing a reef, especially if they're live fishing, they will go into and out of gear over and over again, and you can hear that on a hydrophone, and so you can get quantitative estimates of fishing pressure on a specific site over as long as your hydroacoustic microphone sits in the water, and that's a technique that we just recently published on, and gentleman named Kelly Boyle published a paper on that, out of our lab.

DR. DUMAS: Thank you.

DR. BUCKEL: Other questions for Mark? Wally and then Kathleen.

DR. BUBLEY: All right, and so, when you were talking about the movement, and, I mean, obviously, large-scale movement, connectivity and stuff, is important to go along with this, and, if I recall correctly, with the red snapper stuff in the Gulf, wasn't an issue with concerns about those red snapper moving between like the artificial reef or the natural hardbottom or the uncharacterized bottom, and, with greater amberjack, wouldn't that be even a bigger problem, and how is that going to be addressed, I guess?

DR. ALBINS: I mean, absolutely. Fish move, and they're going to move between habitats, and it depends on when you're there and whether you encounter them or not, and the idea is that, if your sample size is high enough for any given habitat, and they're in that habitat, even if it's in a transitory way, you're going to encounter them a certain percentage of the time, and, you know, if you're doing that in a lot of different places, then you get an abundance estimate, because you basically are going to get some zeroes when they're not there, and you're going to get some non-zeroes when they are there, and those will all average together to give you, you know, an area abundance.

DR. BUBLEY: I mean, I guess the concern is are you kind of double-counting, or are you going to be counting some fish that might be, I mean, potentially, in different habitats, but they're utilizing all of those different ones?

DR. ALBINS: As long as your double-counting is non-biased, it's okay, because you're also going to double zero, right, and those will balance out, and so, if your gears -- If you being there makes it either more likely or less likely to double-count, then it's a problem, but, if they don't, if there's no bias, then it's okay, with enough samples, if that makes sense.

DR. BUCKEL: Fred.

DR. SCHARF: I had a question on the hydroacoustics, and so have you guys -- You mentioned that you were going to do some CT scans, and other things, to estimate target strength.

DR. ALBINS: Yes.

DR. SCHARF: So I wondered if that had been done at all yet, and if not --

DR. ALBINS: We've done the CT scanning, and they're actually working on the acoustic fingerprint models of greater amberjack, currently. We have hydroacoustic data from the first two calibration studies, one off St. Pete and one off of Alabama, and they're going to be trying to use those CT scan models to differentiate greater amberjack from other species in those hydroacoustic surveys.

DR. SCHARF: Okay, and my question was the other Seriola species and whether the hydroacoustic target strength would be really similar between greater amberjack and -- You know, it seems like most of the video examples you showed us were mixed schools of banded rudderfish and --

DR. ALBINS: Yes, and we're trying to get some of those to scan as well, and so hopefully they can differentiate. If they can't differentiate with the hydroacoustic kind of fingerprint stuff, the idea is that you apply what you see from the cameras, and you get a ratio of -- Say there is two species present at a site, and you get a ratio of those two species and then apply that ratio to the number of hydroacoustic hits that you get, to kind of correct the hydroacoustics for a species.

DR. SCHARF: So the stereo camera stuff would be paired with the hydroacoustics, generally, or is that --

DR. ALBINS: Yes, and, in general, hydroacoustics will be on every one of our surveys, and that's one of the things that we're doing. When we're leveraging existing surveys, like G-FISHER, they don't -- Hydroacoustics isn't part of what they do, and so we're, you know, giving them additional funding, to make sure that they get hydroacoustic samples from some subset of the G-FISHER sample sites.

DR. BUCKEL: Kathleen.

MS. HOWINGTON: While you're going out and you're getting the genetics, and now the hydroacoustics, are you planning on marking like, hey, we're also encountering these species, and like, for video, if you see a black sea bass or a vermilion, and I recognize that you all aren't going to have the time to be able to count, because those videos take forever to read, but at least marking a presence or absence, and so, that way, people can follow behind you and use those videos?

DR. ALBINS: Yes, and so, obviously, most of the groups that are involved in this project are also involved in studies of other species, and they have labs with grad students in them, and they're doing all kinds of other project, and so my guess is that, for most of the different labs that are collecting video data, those videos will get used for multiple purposes.

The first pass through those videos will probably address the most important species to each of our labs, including, obviously, all the Seriola, but also red snapper, for example, would be something that we're going to count, no matter what, just because everybody is always interested in red snapper, but, again, my guess is, even though we don't have funding to do a deeper dive in those videos, that they will be utilized for other projects and other species.

MS. HOWINGTON: What about like the genetics and the hydroacoustics? Same idea?

DR. ALBINS: Same idea, yes.

MS. HOWINGTON: Okay, and then what -- So I know you gave us the timeline, that most of the sampling will be occurring in 2023, but what do you think is your end timeline for this report?

DR. ALBINS: That's a good question, and my guess is that we're looking into mid to late 2024.

DR. BUCKEL: Other questions for Mark?

DR. DUMAS: If money were available, would you have time to develop the -- I don't remember the --

DR. ALBINS: The human primers?

DR. DUMAS: Yes, and the profile or whatever for other species, for other fish species?

DR. ALBINS: The eDNA stuff, specifically?

DR. DUMAS: Yes.

DR. ALBINS: Yes, if other money were available, and they can develop primers for just about anything, as long as they have enough samples of that species.

DR. DUMAS: Is that a long process or a relatively quick process?

DR. ALBINS: Again, that's not my subject, but I know that they've been working on it for several months now, and you run into pitfalls and stuff, just like with most of the work that we do, and so it can come easy, or it can come hard, depending on how things go, but my understanding is that it's fairly straightforward, and so, yes, I think you could, and, again, I think two of the places where, if I had additional funding, where I would put them, to kind of leverage, or maximize, this project would be to use the genetic tissue samples to do a parentage analysis and come up with a complementary estimate of abundance, as well as more detailed estimate of movement and connectivity across the range, and I think that's one place where you could -- Low-hanging fruit, essentially.

DR. BUCKEL: Jennifer.

DR. SWEENEY-TOOKES: I just wanted to quickly comment on how much I appreciate that the whole project was bookended by seeking out work with stakeholders and having them co-identify

priorities with you, and ending with the outreach, and I think that's a really nice model for this kind of work.

DR. ALBINS: Thank you. We have some people in our group that are specifically dedicated to that part of the project, and so we're letting them run with that and do as much as possible to bring folks in.

DR. BUCKEL: All right. I don't see any other hands here. Anything online? Then we'll move on to the public comment, or questions from the public, for Mark. Go ahead, Dewey.

MR. HEMILRIGHT: Thank you for your presentation, and I was wondering, and what's the deepest depth that you all plan on sampling, or are thinking about sampling, or what's your range, from shallowest to deepest, in fathoms, that you all are looking at?

DR. ALBINS: I will have to convert to fathoms, because I think in meters, but I could tell you in meters pretty quickly, and our sampling universe goes from twenty meters to 150 meters. Now, that 150 meters has a little bit of flex in it, because we are running some of our C-BASS transects, and so that's the towed camera that goes over mostly softbottom and flat hardbottom substrates, and we are going to be doing a few of those tows out in deeper than 150 meters, but most of our other gears and logistical limitations are going to set us at about a 150-meter depth limit. We believe that will capture the bulk of the population, within those bounds.

MR. HEMILRIGHT: With your ROV, you're not coming in the South Atlantic, correct, and you're just in the Gulf of Mexico?

DR. ALBINS: I don't believe there are any plans to run an ROV in the South Atlantic. The South Atlantic is going to be based mostly on SERFS surveys, but then we're going to augment those with drop cameras, in particular on artificial reefs, and with towed cameras on softbottom, non-hard habitats.

MR. HEMILRIGHT: Thank you.

DR. ALBINS: And with hydroacoustics as well.

MR. HEMILRIGHT: How about your bait? You said what bait you were using, and are you all using any live bait, because that's used a lot to catch amberjack, live bait is, and I was curious if you all are using live bait.

DR. ALBINS: Yes, and hardtail would be a typical live bait that we would use.

MR. HEMILRIGHT: Okay. Thank you.

DR. BUCKEL: Thank you, Dewey.

DR. CURTIS: Dewey, just to answer your question, I did a quick conversion, and 150 meters works out to be eighty-two fathoms.

MR. HEMILRIGHT: All right. Thank you.

DR. ALBINS: Do you think we're missing them, if that's our deepest depth limit? Is your opinion that we would be missing a lot of fish deeper than that?

MR. HEMILRIGHT: No, and I would think that you're pretty much -- If you get out to a hundred -- My familiarity is Cape Hatteras and north, and I would think that, if you're in the eighty-two-fathom range, and inside of that, that you would cover -- As you get further north, there is less of a bottom that would be conducive to amberjack, and so, you know, I would think you're covering in that range, of my knowledge, where I know.

DR. ALBINS: Good. Yes, that was our consensus, as a group, and, you know, we've kind of bounced it off a few fishermen, who generally know more about fish than we do, and they have seemed to agree that that's a pretty reasonable limit, and so I'm glad you agree as well.

MR. HEMILRIGHT: Yes, and I also think that some of the fishermen you've got, particularly in the northern part of North Carolina, are pretty dialed-in with catching amberjack, and so it should be a good help for you.

DR. ALBINS: I appreciate your questions.

DR. BUCKEL: Thanks, Dewey. Okay. Judd doesn't see any other public with hands up, and so we can move on to our action items for this item. The first is comment and provide feedback on the methods and potential uncertainties for the greater amberjack research project, and the second is discuss how this estimate will be integrated into the next greater amberjack stock assessment process, and so let's take the first one. Any comments or feedback to Mark on the methods that he described or potential uncertainties? Anne.

MS. LANGE: So it's a very ambitious project, and I think some of the uncertainties that I see are being able to ensure that your fingerprints that you do in a CT scan in the atmosphere, and trying to use those to target amberjack whose swim bladders are going to be in a different state, at thirty, fifty, sixty, eighty meters, and I'm not sure how possible that would be.

Also, and since it's a single -- Basically a snapshot, the ability to apply that in the assessments, and I guess that would be more like the last bullet that was there, and, the DNA stuff, I just -- It's a big ocean out there, to be able to get a spritz of DNA to be able to identify a volume of one species, and, again, this is all stuff that you're just trying, I assume, and so it's like one giant experiment, to see if all these different things will come to fruition or not.

DR. ALBINS: To some degree, you're right. Some of the stuff that we're doing is fairly cutting edge, or at least pushing the envelope of what's been done before, but, at the same time, and I will talk specifically to the eDNA stuff, eDNA has been trialed and tested in a lot of systems now, and mostly they've been freshwater systems, and so, like you said, it's a big ocean out there, and that's still an issue, but water is water, and, if we're sampling a parcel of water that has a fish present in that parcel of water, and we have a primer for that species, we should be able to detect that it was there, or that it was there within a certain amount of time in that parcel of water.

The uncertainty, I think, comes from whether that parcel of water was somewhere else, whether it drifted from another place to the place where we sampled it, and then away, and so are we

measuring fish that aren't actually where we're sampling, but somewhere else, and that all depends on the current and how it's running that day and things like that, but there are models for how molecules behave in water, like DNA, and so we know theoretical dissipation rates and things like that, and we can start to apply some of those ideas, and, as I said, these have been --

These methods have been tested, and they can detect, for example, a sawfish in a river, and it could be a mile-wide river, but, if they take a few samples across that river, and there's a sawfish there, they know it's there, and so there's been some groundtruthing with this stuff in other types of systems, and, you know, again, it's a little bit of a proving ground for these technologies, but we think that's important, right, and so we don't just do the tried-and-true tested things, but we also push the envelope and try and bring something new to the table that is valuable.

As far as the acoustic fingerprint thing, again, that's similar, and we're pushing the envelope a little bit there, but we think that's valuable and important, and we have a fallback plan for that, which is to use the ratios of the different species identified on the camera gears to then correct the hydroacoustics, and so, in other words, the hydroacoustics, I think, corrects the camera gears, in that it can see -- Even if the water is a little bit turbid, it can see all the fish around, for example, an artificial reef, whereas our camera gears might miss some of those fish. The camera gears will get a ratio of the species that are present, and then we apply that ratio to the larger number that the hydroacoustic sees, and then we have at least an estimate of the number of each of those species in the area.

MS. LANGE: Okay. Well, I guess, like I said, it's a very ambitious project. Each of the things that you're talking about doing are, in and of themselves, a major project. To do the eDNA would be something that would be -- To validate it sufficiently that it says, hey, fisheries people, we can start using eDNA to get an idea of where these species are, and that, in and of itself, is a major project. The acoustics stuff, trying to get a fingerprint, and using it more -- I mean, hydroacoustics have been used for decades, but, you know, to do it on a deeper-water fish -- I think you've bit off an awful lot to do in a two-year project.

DR. ALBINS: I agree, but we have a lot of really smart people working on the project. There are seventeen co-PIs, from twelve different institutions, and so we've got a lot of smart people working on these projects, and I'm hoping that we will -- You know, if every individual part of the project -- If not every individual part succeeds, I think enough of them will succeed that we'll come out with something very valuable, at the end of the day, and, for the parts that don't, I think we'll learn something very valuable, and that's my hope.

DR. BUCKEL: Other feedback from the SSC on the methods and the uncertainties? Wally.

DR. BUBLEY: I will throw in something with the methods, and one of the questions was asked about the depth going on, and somebody who is listening in who is with our group, and I'm with the SERFS group, and so we're intimately familiar with that, and they said 17 percent of the greater amberjack positive catches that we have were from depths greater than 150 meters.

DR. ALBINS: Greater than 150?

DR. BUBLEY: Greater than 150, and so some of the gear that we're using is hooked gear and short bottom longline and long bottom longline gear, and 17 percent of those interactions were 150 meters or deeper, just for your information.

DR. ALBINS: That's really good to know, and that's something where we may have some flexibility, since we haven't gone out -- We haven't finalized our sampling design, and we haven't actually gone out and done a lot of the sampling yet. You know, if we get enough people telling us that we need to go to 200, or 180, or 170, or something like that, then we can definitely talk about expanding that horizon, and so that's important.

DR. BUCKEL: Wally, I just wanted to -- Judd, has the SERFS data -- Was it the longline?

DR. BUBLEY: It's the -- Traps generally end at about 100 or 110 meters, and so it's not mostly likely the traps, and Tracey -- I'm trying to respond back and forth with her, but most likely it's going to be our short bottom longline gear, and maybe our long bottom longline gear, that are deployed in deeper waters.

DR. ALBINS: Is there a chance that those are fish that are being hooked in shallower waters than the bottom is deep at that point in time, if you're using --

DR. BUBLEY: They would have to be pretty high up in the water column, I think, and, I mean, maybe, but odds are they're probably -- When we seem to interact with them, or at least with the videos, they are swimming through the water column, but they're not like eighty meters up in the water column or anything like that, and so it's possible, but that's a fair number to be interacting with, I think.

DR. ALBINS: Yes, and I mentioned earlier that we set that rule, or that limit, but then we kind of broke it with some of our towed-camera survey work, because of some input, and, also, because there is some habitat, and the Alabama Alps, and I don't know if you've heard of those, but there are some deepwater habitats that are really high vertical relief habitats off the drop-off near Alabama, and some of the pinnacles rise up to 150-plus feet, but most of the habitat around there is much deeper than that, and so we wanted to run some transects out in that region as well, to kind of double-check ourselves, and so, yes, that's definitely something that we've been discussing and we're open to more input on.

DR. BUCKEL: These are great. Let's keep them coming. Other comments from the SSC? Marcel and then Anne.

DR. REICHERT: You are collaborating with the SERFS survey, and is the calibration of the cameras that they're using on those traps -- Is that part of the overall calibration?

DR. ALBINS: Yes, absolutely, and, in fact, we drove a truck all the way to somewhere in South Carolina, and maybe even here, and we had some folks come out and pick up some of the traps from -- I'm not sure who it was from, but one of Nate Bacheler's people, and they loaned us a few of their actual traps that they used, and we trucked them all the way back to Alabama, to deploy in our calibration study off of Alabama, and then we brought them back, so that he could use them again for his survey, and so, yes, we're incorporating those gears, and, just to be clear, we're not using the trap catch at all, because they don't catch greater amberjack, but we're just using the

cameras mounted on them, but we wanted to account for the structure of the trap, it landing, causing a disturbance, the bait that they use inside the trap, and all that stuff is a factor, and so, yes, those are absolutely being calibrated to the other gears.

DR. BUCKEL: Anne.

MS. LANGE: Again, the bottom bullet was the fact that this is just a snapshot, a one-time thing, and so, as far as trying to incorporate it into assessments and the likelihood of repeating it is not -- I mean, I wouldn't expect there would be a lot of repeating of the whole process, year after year.

DR. BUCKEL: Great. Thanks, Anne.

DR. ALBINS: I would just want to add that I wouldn't say it's non-repeatable, necessarily, because I think that some of the tools that we're using, if proven to be valuable, could easily be incorporated into things like SERFS or G-FISHER. I mean, for example, the hydroacoustics part, and, you know, if that pans out, and if we really kind of nail that part, and folks see a lot of value in it, that's something that could, with a fairly small investment, be incorporated into some of these larger-scale surveys that are ongoing, and so there is a lot of potential, I would say, for lessons learned to be translatable to other studies.

DR. BUCKEL: Other comments, either on that first or second bullet? Amy.

DR. SCHUELLER: On the second bullet, it's a single snapshot in time and space, and then it's going to have some uncertainty bound around that, and what that looks like I'm not sure. It could be extremely large, to the point where you don't know if it really tells us anything, or it could be narrow. It could overlap with the current estimates coming out of the assessment, which would be like great, right, but we don't live in an ideal world, and so then the question becomes what if it's below or above, significantly, and what are we going to do with that, and how do we -- I don't know. What are we going to do if those two scenarios play out? I don't know that I have a good suggestion, off the top of my head right now, but it's definitely something that needs to be thought about.

DR. ALBINS: If I could add to that, just real quickly, when I gave this talk at the greater amberjack scoping meeting in New Orleans earlier this year, Katie Siegfried was there, and she and I had some long conversations, after my presentation, about some of the really nitty-gritty details about the Bayesian modeling stuff and about our uncertainty estimators and things like that and how they're going to be incorporated into somehow groundtruthing, or rectifying, or modifying the stock assessment outputs, and they're not sure exactly how they're going to incorporate it, and we're not sure, but we are communicating directly with those folks and trying to come up with -- We're trying to be responsive to the RFP that we were awarded, but, at the same time, if we can make changes that benefit -- That make that transition, or that use of the data, easier in the long run, then we're absolutely open to and willing to talk about that stuff.

Our whole goal is to, number one, include all of the sources of uncertainty that we can identify in our ultimate estimates, and so to not ignore any of that uncertainty, but to come up with an accurate estimate of uncertainty and to make sure that those bounds at least realistically reflect the information that we've collected.

Whether they're big or small, we're going to try and incorporate everything that we can into their calculation, and that's why we're using the two-pronged approach, is because the more traditional approach is easier to explain to folks, and it's easier mathematically to deal with, and we know that we can come up with estimates, and we don't have to worry about models converging or not, but the uncertainty estimates, or the uncertainty in those estimates, is probably going to be fairly large, and so the whole drive behind bringing in a statistician that specializes in hierarchical Bayesian modeling and can incorporate all the priors, and can incorporate all these different levels of uncertainty into those final estimates, the hope is that we can provide a better estimator, at the end of the day, with a smaller uncertainty, but we don't know, and we won't know until we get a lot closer.

DR. BUCKEL: Wally.

DR. BUBLEY: So you were talking about updating the biological information, and who is dealing with the ageing of this species, as we go forward?

DR. ALBINS: In our group, in our project, Michael Dance and the lead PI, Sean Powers, are kind of co-leading the biological data update.

DR. BUBLEY: I mean, are they planning on working with other groups that are established already with some of these species, just to ensure continuity, I guess, across the region, and we've had an issue, relatively recently, about the potential -- Not issue, but trying to ensure that they are using the same metric, or the same methods and protocols, in terms of getting the ages.

DR. ALBINS: Well, I mean, our lab does age and growth work for a lot of other species, and we've been doing them for amberjack for a while, and the same with Mike Dance's group at LSU, and so we're using kind of the established protocols for our region, and I don't know about who the folks are, and, I mean, Jeff is on our team, and I don't know, Jeff, if you know of folks in the South Atlantic that we need to be coordinating with, in terms of that stuff.

DR. BUCKEL: The one who just asked the question. That's the person to talk to.

DR. ALBINS: That's the person? Okay. Good.

DR. BUBLEY: Just to make sure, and, I mean, typically, in our region, we're passing around calibration sets and things like that, but just to ensure that everybody is on the same page and just not, later on down the line, trying to figure out why this all of a sudden looks different than what we've seen, and so I just wanted to throw that our there, right off the bat.

DR. ALBINS: It's a good point, and I think that, so far, most of the individual fish that we've been collecting for that part of the project have been from the Gulf, just because we're kind of a -- We're a little bit Gulf biased, but I would be more than happy to get you and Mike Dance in contact with each other, and you guys can talk about making sure that at least what we're doing is compatible with what you guys do in the South Atlantic.

DR. BUCKEL: The other lab, Mark, would be Jennifer Potts' group and the NOAA Beaufort Lab.

DR. ALBINS: Okay.

DR. BUCKEL: Anyone else, Wally? Are those the two groups ageing greater amberjack in the Atlantic? Okay. Thanks.

DR. ALBINS: Yes, and, in fact, maybe you can help us out with some samples, or we can help you out with some samples. Either way.

DR. BUCKEL: Amy.

DR. SCHUELLER: I mean, that kind of brings up something that I've been rolling around in my head, which is, is the expectation that everything in the Gulf and South Atlantic will be sort of uniform, and so I think you need to consult with the ageing folks, because you should have representation across your study area, but I am just -- You said you did some calibration in the Gulf with some traps from Nate Bacheler, and I'm just wondering if there's going to be calibration in the South Atlantic or if we expect there to be differences between the two regions that we need to account for in some way, and I'm asking that as a completely naïve question just rolling around in my head.

DR. ALBINS: No, and it's a good question, because, essentially, when you're calibrating, say, in just the simple case, two gears together, you're looking at whether there's a gear effect or not, and there are going to, obviously, be some environmental factor that interact with that effect, and so, if you have an interactive effect of region, whether it's western Gulf or eastern Gulf or Gulf and South Atlantic, that changes that calibration coefficient, and that would be really important to know, and that's something that we have struggled with in designing our calibration study, is that it's really easy to come up with a very long list of potential factors that may interact with those calibration coefficients, and it's very hard to design a study that incorporates all of that.

There is probably going to be a point at which we just have to say we're doing our best, and I think we have done -- Jeff, correct me if I'm wrong, but we have done some gear calibrations in the South Atlantic. We haven't done the full combination of all the gears together, but the plan is, whenever we have opportunities to deploy multiple gears in the same place at the same time, even if it's outside of an organized calibration experiment, that we'll do so, and that those kind of incidental calibrations that happen along the way can also be used to inform those calibration coefficients, and so it's tough to plan to logistics of that, but we're trying to do our best with it, but that's a good point.

DR. BUCKEL: Other comments on the first method uncertainty bullet or the second integrating into the assessment bullet? There are no hands up in the room here, and just one last chance for folks that are online, either SSC members or other folks that are online, the public, et cetera, and please raise your hand if you're online and you have a question or addition to add to the action addressing these action items.

The assessment folks that are here can correct me if I'm wrong, but I think I remember Kyle talking about how, even though it's a point estimate, and so from one year, that could be linked to the existing fishery-independent index, to help scale that for future years, and I may not have captured that language right, but I don't know if that's something we want to add to that second bullet. I don't know if Kyle Shertzer is still online. Go ahead, Genny.

DR. NESSLAGE: Well, I think, as far as the potential obstacles, there isn't a plan for integrating it into the assessment, would be the way I would put it. There are multiple ways that you could do that, correct, but that's not part of the project, as you have outlined it. You've already got enough on your plate, and you're very ambitious already, and so I think that's a huge obstacle, and I think what Kyle had proposed, possibly, for red snapper, just to clarify, was to fit that single estimate of abundance to the estimate of biomass, or abundance, depending on which comes out of it, in one year, and so not to the survey, but to the actual estimate in that year, total abundance or biomass in that -- I think it was abundance in that year for red snapper.

DR. BUCKEL: All right. Thanks for that clarification.

DR. ALBINS: Just to clarify, I think that what was in the RFP, and what we're shooting for, is going to be a size-specific abundance for each region and habitat types, and then, obviously, you could put that all together into an overall abundance for the whole region, or for subregions, or however you wanted to add it all up, and it would just be a matter of propagating the uncertainty from the individual estimates to the final -- To the final numbers, which is not an easy thing to do, but it's something that is tractable, at least.

Then, just to clarify as well, I think one of the problems that happened with the Great Red Snapper Count was they came up with that final estimate and then publicized that estimate, and it was higher than the stock assessment estimate, and that basically caused all of the fishermen, and everybody, to say, oh, we can catch more fish, and NOAA was wrong, and the feds were wrong, and there is more fish out there than we thought, and we can catch more.

We know, from experience, that that can be a problem, and so we just want to ensure everybody that we're going to make sure that that number gets to the people who need to see it first first, and that they have time to work with it before it becomes public, if that makes sense.

DR. NESSLAGE: That's an awesome suggestion, but I'm not sure how we do that, given that these are public meetings.

DR. ALBINS: Well, yes. That's a good point. At least we won't have a press release before -- You won't have to read it in the paper.

DR. BUCKEL: Kyle Shertzer.

DR. SHERTZER: I think there's multiple ways this information could be integrated into the stock assessment, but the simplest way is the one that I think Genny just alluded to, which is basically treat it like an index of relative abundance, except it's absolute abundance, and so it doesn't scale by Q, or you say Q equals one, and you only have the one year, and so, essentially, you're just threading the needle with absolute abundance, but it may help to scale the entire estimates of abundance in the stock assessment, and that could be done with the estimates of uncertainty that will be provided, just like relative abundance is fitted with the appropriate CVs. I think, also, it would be -- I mean, from the presentation, I think you're going to have some estimates of abundance by space, but we would certainly need these estimates to be separate for the Atlantic and for the Gulf of Mexico, since those assessments are done separately.

DR. ALBINS: Yes, and I think we'll be estimating it by stratum and by size class, if not age class, and I think size class is probably the best bet, or the best that we're going to be able to do, and so you will have an estimate for each region, each habitat type, and each size class of greater amberjack.

DR. SHERTZER: Cool.

DR. ALBINS: I'm not sure how big those size bins will end up being, and it just kind of depends on our resolution of the different gears and what we kind of -- You know, where we decide to bin them, but there will be some size information there.

DR. BUCKEL: Thanks, Kyle. I'm glad that you were still on to help with this action item and confirming Genny's -- All right. Genny has got the half-hand again. Go ahead, Genny.

DR. NESSLAGE: I guess maybe I'm not understanding, and I need to go back and read your materials most closely, and wouldn't you then be able to aggregate that up to a total biomass, if you've got --

DR, ALBINS: Yes, if you make some -- Sure.

DR. NESSLAGE: Okay, and so then we could still -- It's not like -- Will you just be producing the abundance at-length though, by region, and then we would have to do the expansions?

DR. ALBINS: I'm not sure. I mean, our purview, the RFP, and what we're responding to, asked for abundance by size and region and habitat type, and so that's our goal, and so, you know, if we have sizes, we can probably translate that to biomass, but there's some stickiness there, some assumptions.

DR. BUCKEL: Chip.

DR. COLLIER: I guess, when you answered the last question, it got me thinking of another one, the stratum, and I'm just trying to make sure that the stratums match up with what is used for the stock assessments, and I think that's going to be very important, especially down in the Keys, where it's likely a spawning area, and making sure that that matches up with the management boundaries.

DR. BUCKEL: Thanks, Chip.

DR. ALBINS: Yes, and I'm trying to remember exactly how we drew the lines, when we started to build our GIS products and the things that we're working with, and I'm pretty sure we used the management area lines and then kind of subdivided those, because the RFP also says by state, and so we're trying to, you know, conform to that as well, but I will double-check on that.

DR. BUCKEL: Judd, on the first response to the second bullet, where it starts with "single snapshot of absolute abundance and how to integrate into the stock assessment", I want to capture Genny and Kyle's language, which was, you know, maybe before the parenthetic statement, that there are many ways to integrate this into the stock assessment, and then --

DR. CURTIS: You've got to put it through another process to get biomass, which has another layer of uncertainty.

DR. BUCKEL: Yes, Erik.

DR. WILLIAMS: I think -- I'm not sure what the point of this bullet is anyway, or this whole question, because, really, we'll see what we get is really what it's going to come down to, because, from what was described, there is a lot of things that actually could get pulled into the stock assessment, including they talked about an updated age-length key, updated life history samples, and all of that stuff could impact the assessment in a very positive way, and so I think it's just premature to try and game exactly what we're going to do with it, and we'll see what we get, is really what it will boil down to.

DR. BUCKEL: Thanks, Erik. Marcel.

DR. REICHERT: To that point, I think our nature is always to shoot holes in stuff, and I think it's also important for us to recognize that this is a very ambitious project that has the potential to provide a lot of information that is very useful for stock assessments, but also for our ability to provide the council with management advice, and so I think I just wanted to mention that, because it's in our nature to say, well, we should we do this, and we should do that, and so I think that's important to also put in our report.

DR. BUCKEL: That's great, and I think just this -- Some of the discussion about what could go in has already prompted checking the boundary, and making sure that the ageing is done in the way that the production labs are doing it, and so that's good stuff for the PIs to make sure that are handled, so the data can best be used for the assessment. Anything else? No hands online, Chip? Okay. I think we've got enough there for those two action items. Thanks again, Mark, for not only the presentation, but sticking around for the action item discussion, and we appreciate that.

DR. ALBINS: Was I not supposed to be responding this whole time? Thank you, guys, very much for having me. I really enjoyed coming, and, again, this is part of our group's goal, is to be involved in stuff like this, and we're trying to not be in a silo and trying to take in information and give it out, as much as we can, and try and keep an open-door policy, and so, if any of you has any other questions that come up afterwards, feel free to -- I don't know if you guys can get everybody my email address, but feel free to send me an email, if anything comes up, and we'll try and be available to that. Thank you.

DR. BUCKEL: Thank you.

DR. CURTIS: I can circulate Mark's and Sean Powers', the lead PI, email addresses to the SSC.

DR. BUCKEL: Excellent. Thanks, Judd. Okay, and so it is ten of five, and we're going to end here, but let's just make a plan, and we can let folks know the order of items tomorrow, so they can be planning for that. One thing that we've already tackled that's on the agenda for tomorrow is Kathleen's SEDAR, and so we took care of that yesterday, but one thing that we didn't get to today was the presentation from Scott Crosson and Kyle Shertzer on the minimizing discard presentation, and so we'll be moving that to tomorrow. How do we want to do the order tomorrow, Judd, so we can let presenters -- Should we start with the Crosson and Shertzer?

DR. CURTIS: Yes, and Scott and Kyle, and so they would be available tomorrow morning to start off, with Agenda Item 9 that we had to push to tomorrow morning, and so I suggest we start with that at 8:30 tomorrow.

DR. BUCKEL: So we'll start with 9, and then we'll follow the rest of the current order for Thursday. Any public comment? Dewey.

MR. HEMILRIGHT: No, I ain't got no comment, and it's just a long-ass day.

DR. BUCKEL: I think I will second that, and we will end for the day, and we'll see everyone tomorrow morning at 8:30 a.m. Thanks.

(Whereupon, the meeting recessed on October 26, 2022.)

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OCTOBER 27, 2022

THURSDAY MORNING SESSION

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The Scientific and Statistical Committee of the South Atlantic Fishery Management Council reconvened at the Town and Country Inn in Charleston, South Carolina on October 27, 2022, and was called to order by Dr. Jeff Buckel.

SEFSC: MINIMIZING DISCARDS IN SNAPPER GROUPER FISHERY

DR. BUCKEL: Welcome to day-three of the South Atlantic Council's SSC meeting. We had an agenda item yesterday that we did not get to, and that's Item Number 9, the minimizing discards in the snapper grouper fishery presentation, and Scott Crosson and Kyle Shertzer are going to present that, and then, after this presentation, we'll pick up with Item Number 12 that is on today's agenda, and we'll follow the rest of the agenda items. All right, and so, Scott and Kyle, are you ready?

DR. CROSSON: Ready.

DR. BUCKEL: Okay. Take it away.

DR. CROSSON: Good morning, and so this is a project that is internally NOAA funded. Obviously, there's been a lot of issues in the South Atlantic region, and, from listening to council discussions, we constantly hear these concerns, from both the recreational anglers and the commercial fishermen, about discarding, and one of the big complaints is that they are trying to -- They are wondering why they have to keep discarding fish when they could keep them, and so what I, and a number of people, have been working on is a project where we're looking at improving the discard estimates for the reef fishery, especially on the commercial side, and that's

one part of the project, is that that's a data need that we have, but the other is that we're trying to figure out are there different ways that we could regulate both the commercial and the recreational fisheries so that we could minimize the discards, but people could actually keep more fish than they are right now.

Obviously, that's going to require some changes in effort and changes in how much activity there is on the water, but, if we can find a way where people would be happier, and we could increase the amount of fish that they are able to retain, is that something that the council would potentially be interested in and could also address a lot of the issues that we're having with these multispecies interactions that are going on in the snapper grouper fishery.

The people that are on this workgroup, the core members of this workgroup, are Rick DeVictor from the Regional Office, Erik and Kyle from the Beaufort Lab, and Genny and Chris, and, of course, myself, from the SSC, and, of course, I'm also a Science Center member, and I'm the PI on this, but it's really a group effort, and, although I have this listed as a workgroup, we met up there in Beaufort in May, and pretty much everybody from the stock assessment group came into the meeting and participated in that, and so it really is a larger group that is participating, because all those are the people that have the expertise in these different fisheries and these different stock assessments that have been going on for the past decade-plus.

The timeline, we're still in the first phase of it, and we got the funding last spring, and I'm going to ask for more funding pretty soon here for another year after this, but we met up there in May, once the pandemic restrictions for travel started lessening, and we've had several meetings online since then, and part of this is that we are looking at for a contractor to go through the logbooks, because the commercial logbook information --

The discard information in there, it's doubtful that that's indicative of the actual amount of discarding that's going on out on the water, because they are required to report, a certain percentage of the trips, about what species they're putting back into the water and what the distribution is with that, and the cooperation on that has been going down, and so we do have a data need, and we're looking for contractor to go ahead with that. We do have a pretty good potential lead right now, but, if anybody else does know of a post-doc, or a grad student, that might be interested in this project, let me know, because we have the money right now, at a federal contracting firm, and we can get started on this very, very shortly. Then we also -- There is some preliminary modeling underway right now by Kyle on the biological front, and he's going to present that pretty shortly, and then there's a second component.

Okay, and so what scenarios are we modeling? Well, right now, I mean, the biological modeling that Kyle is working on, and that he will explain, is basically looking at reductions in effort and changes in the way that the fishing is executed, but we are looking at some of the short-term options, because there is a strong demand, because of Red Snapper Regulatory Amendment 35, to look at the potential impact, if there were time and area closures, and I'm aware that the council has rejected those, but those are still something that there's need to see what would happen, if there is some potential way of, at least in the short term, stopping the overfishing of red snapper, and so what would be the potential effects of doing some of those.

In the long term, we would like to look at -- You saw that Chris Dumas and I are both on here, and we're both economists, and so we would be interested also in looking at what are some more

individually-oriented effort reductions that could happen, and we always hear -- Tags I've seen come up before in the context of red snapper, but also in the context of other species in this fishery, and what are some of the potential programs that could be put in place where people would have to have a limited amount of tags that they could go, but, if they were able to use those whenever they wanted, that might be a way that you could lessen the discarding from what's happening right now, to people going out there and fishing and having to discard species when the season is closed, or they don't meet the restrictions, in terms of length.

One thing that we did notice, between this, is that -- You know, from the regulatory side, the way that Magnuson-Stevens and the council process is designed is it is relatively simpler, from a regulatory perspective, to just put time and area closures in, but those are the ones that tend to make people -- That provoke the most hostile response and that have the most potential negative economic impact, and so we're really interested in that second aspect of it, whether there's some kind of what we call angler freedom, right, and it sounds odd to call it that, but, really, if you can increase the amount of freedom that people have to -- You know, they're not going to be able to go out every day that they want, but, when they go out, they're going to have the ability to go and catch the fish and actually keep them in the cooler.

That's difficult to design, because it's certainly not the way that a lot of our regulations have been written in the past, and certainly not from the recreational side, but, if it's something that could be implemented, it probably would produce better economic results, and probably better satisfaction among the angling community, and potentially among the commercial fishermen as well, and so that's the second big part of this project, once we really get the biological modeling underway.

The key species, when we met up there in Beaufort back in May, I mean, this really is designed to be a multispecies project, because we know, very, very well, that we treat all these different catch levels separate, and we're always trying to -- You're all a part of the process, and so we know how we keep the discarding information and the retained catch in separate categories, but we know that, when you're fishing for red snapper, you're also catching black sea bass, or you're catching vermilion or whatever, and so, right now, those are all sort of done as separate projections, and so really would like to try to make this one big multispecies.

We can't do every species in the complex, and there are just too many, but we are starting with red snapper, because that is the species that has the most immediate regulatory need, but we would like to expand it, and the key species that we started with, after discussing up there that they're caught together mostly, and you can see red snapper, black sea bass, red grouper, gag, scamp, red porgy, vermilion, gray triggerfish, and greater amberjack. They tend to cluster together, and there is assessments for all of these species, and they all have high landings and high discards.

The deepwater complex is a separate thing, but, of course, in terms of barotrauma, those species are even more prone to it, and so, eventually, if this works well, we would like to go and do a similar thing for blueline and for golden tilefish and for the snowy, if the first category is well received, and so, at that point, I'm going to hand it over to Kyle, and Kyle can explain some of the modeling that he's already been doing so far.

DR. SHERTZER: I am going to walk through how we've developed this model, and I just wanted to say, to start, that the main reason for coming to the SSC with this right now is to try to get feedback, while the project is in its somewhat early stages, on the multispecies front, but we also,

as Scott mentioned, are trying to focus, right now, on red snapper, because the council is moving on red snapper, in terms of management, and, if there's anything from this work that might be useful in guiding visions, then we could probably provide that information much more quickly than the long-term project.

Let me just walk through how the model is structured, and it's somewhat generic, in the sense that it can have any number of species, and we've been thinking that it would be just probably focused on some of the core species in the snapper grouper complex that make up most of the landings that were on one of Scott's previous slides.

Each one of those populations is age structured, and we've set it up to be spatial model, and it's also generic, in terms of the number of areas, and so we can specify any number of areas. At our meeting in Beaufort, we decided to use six areas, and I will go into a little more detail about that later, but, primarily, we were dividing the areas latitudinally, as North and South Carolina is one area, and then Georgia and north Florida as an area, and then south Florida as an area, and then each of those would have an inshore and offshore component.

The model has two fishing sectors, commercial and recreational, that could each have their own definition of selectivities and effort and catchability, and so fishing effort -- The different populations aren't interacting, in the sense of having predator-prey relationships or competition or any of that, but they do interact, in the sense that they share fishing effort, and so we're thinking that effort is --

Because it's a mixed-stock fishery, the effort is common across the stocks, and the effort would be specific to area, or specific to sector, and specific to year, but that each species would have its own catchability that would link the effort, the common effort, to a fishing mortality rate, and so the fishing rates would be different for the different species, depending on their catchability. Then each of the species would have the discard mortality rate, and that could also differ by sector and area, and our goal of making it area-specific is mostly to allow for a depth effect on discard mortality rate.

As Scott mentioned, it's multispecies, but, for right now, we're saying N equals one, and that one is red snapper, just to start the model, parameterize the model, and perhaps provide something useful to the council, if they're interested, and so, to set this up for red snapper, we had six data needs.

We had to parameterize the life history information, the selectivity, the discard mortality by depth, the spatial distribution of abundance, and then we also need the mixed stock effort from the commercial sector and the recreational sector, and we have started working on that, and we haven't finished that part, and so we don't have those inputs yet, and I would mention those aren't -- We aren't intending for those to be specific to red snapper, but general across the snapper grouper complex, and so we don't have that information yet, but we do have the other four pieces, the other four data needs, and so, the next several slides, I'm just going to walk through how we set each of those pieces up to get a model that's running for red snapper.

The life history information, this mostly just comes straight from the last stock assessment for red snapper, and there is just one trivial difference, I would say, that the model that we have here uses Beverton-Holt recruitment dynamics, but SEDAR 73, if you remember, had that mean recruitment

model, and we tried to approximate the mean recruitment model by setting steepness equal to something very close to one, and we do have the ability for stochastic recruitment, but that is turned off for now, and I'm not sure if we'll turn that on or not, and it depends on if we're interested in the effects of stochasticity, or variance, but, for right now, the dynamics are deterministic, and so the results are -- I guess you could consider them to be expected values.

The way the simulations work is that we would run the model for a certain number of years, to get status quo dynamics, and then implement some management change, and then look at what the resulting changes in the dynamics, after simulating for another number of years.

Selectivity is a little different from -- We handled it a little differently from how it's done in BAM, and so, in BAM, in the red snapper assessment that used BAM, it's an age-based selectivity, with landings and discards treated as separate fleets, and so they would each have their selectivity. This model that we're using is not age-based, and it's length-based selectivity, and we separate landings and discards using a retention function, and so I tried to configure this as closely as possible to SEDAR 73 for red snapper, by fitting a catch selectivity that had the ascending limb equal to the ascending limb of discards from SEDAR 73, and so, first, I had to convert the ages to length, which I used the mean growth function for that.

Then I fitted the catch selectivity, and so, on these plots here, the top one is recreational, and the bottom one is commercial. The little blue circles are the values that came out of SEDAR 73, and then I fitted the blue line for the catch selectivity, assuming logistic selectivity for the catch, to those data.

Then I developed a retention function that I just set equal to the ratio from SEDAR 73 of the landings F to the total F, and so you can see, in recreational, that the retention, that straight line, is somewhat low, and that's because these are retained fish, and so a small proportion of the fish that are caught are retained, and then, if you apply that retention function to the catch, then you can distinguish the discard selectivity from the landings selectivity, and those are also shown on the plot, and the same for the commercial, except the commercial had a much higher landings F to total F, because, in that assessment, the discards were much lower for the commercial. This is really just a way, ultimately, to get at the landings selectivity and the discard selectivity that then get applied in the model.

We had to define areas, and we wanted to get discards by depth, but, before that, we had to define what we meant by shallow and deep water, and so we chose here thirty-five meters, to distinguish shallow from deep water, with the idea that barotrauma might be more prevalent in deeper water, and I should mention that this is not specific to red snapper, and so, when we eventually add species, these area designations will stay the same, but, for now, for red snapper, that choice of thirty-five meters was sort of based on several things.

One, we asked Jeff Buckel, who is our leading regional expert on barotrauma, and he suggested that we do see some barotrauma at the shallower depths, eighty to ninety feet, but we see a lot of barotrauma at depths greater than 120 feet, and so thirty-five meters sort of lined up with that, and we also looked at some publications and working papers, and Bev Sauls had a working paper for SEDAR 52, and it's for the Gulf, but it also had Atlantic information that showed increasing discard mortality with depth, but then a saturation around thirty to forty meters.

Then we also looked at the Bohaboy paper, also from the Gulf of Mexico, that suggested a break point in discard mortality at around thirty-nine meters, and that was sort of from our own analysis, where we digitized her data and did a sort of change point analysis on that information, and so that's what we found in our own analysis, although I did want to mention that, when they analyzed their own data, they did not find a depth effect for the red snapper discard mortality by depth.

Putting this together, we used the information that was used in SEDAR 73, and so you might remember this figure on the right from your July 2021 review, where Julia presented her working paper on descending device usage and the effect on red snapper, and so, in SEDAR 73, we used the black line, the 75 percent descender device usage, in the assessment, and they proposed the discard mortality that was basically that curve, with values that were weighted by effort by depth, and so we did something similar here, except we divided the depths up.

One of their depth bins, the thirty to thirty-nine meters, our break point was right in the middle of that, and so we divided those trips up evenly between shallow and depth, from that bin, to do the weighting, but the results were that the shallow discard mortality rate was about 0.23, and the deep water was about 0.25, and that was for the recreational sector. To get to the commercial sector discard mortality rate by depth, I just applied that same ratio from the Vecchio study, the 0.25 to 0.23, and applied that to the discard mortality rate from SEDAR 73 for the commercial, which was 0.32, to get 0.35.

I did want to mention that it's interesting that there is -- There doesn't seem to be much depth effect on red snapper for discard morality rate, which I think indicates that there is maybe a lack of barotrauma, for red snapper specifically, and so it does maybe call into question how effective descender devices will be at mitigating barotrauma, if there isn't much barotrauma, and most of the discard mortality is likely coming from other factors, and maybe you can see that on the Vecchio plot on the right. As you go from shallow to depth, there is not a -- There is a little bit of a slope, but it's not a severe slope.

Also, as you go from zero percent descending device to 100 percent, there is not a big effect there either, but, again, we're setting this model up to be for multiple species, and so, even if we didn't see a big change in discard mortality by depth for red snapper, I suspect, for some other species, especially the groupers, we might see that to be more important.

One of the most challenges pieces to get is relative abundance by area, but, fortunately, Jie has been working on this, and using VAST to estimate just that, and so Jie graciously provided us with output from VAST for red snapper. Now, his output has a much finer spatial resolution than what we actually needed, and so we had to pool his results by area, and then, because we had a depth break, we had to assign depths to the VAST locations that we were able to do, using NOAA bathymetry data, and so, in the end, this is what the relative abundance of red snapper looks like by our areas, and so these are the six areas that I had mentioned on this map, that we had decided on, and, if anybody on the SSC wants to question this, or has other suggestions, that's fine, and that's certainly open for discussion.

For red snapper, the relative abundance is -- Well, I show it on the slide here, but it's mostly off of this Area 2 and Area 5, off of north Florida and Georgia, which isn't a surprise, and we also -- We found that about 93 percent of the population is in that area, but, also, by depth, about 82 percent of the population is in the shallow region of less than thirty-five meters deep, and so that

result, I think, is kind of interesting, the depth result, and I wasn't aware that such a high proportion of the population was in the shallower depths.

I mentioned that we don't yet have the effort information that we need for the recreational and commercial fleets, but that doesn't stop us from doing some simulations, and we have to make some assumptions though, and so what I've done to set the model up, until we get that information, is to assume that each sector has an effort equal to one, and so it's just scaled to one, and then, if we want to look at changes in effort, then we can just say --

If we want to say effort is increased or decreased, then we can scale it up or down from one, but then we have to set the catchability so that it's in the ballpark of what we wanted to see from SEDAR 73, and so we did that just by taking a mean of recent years, and this is the plot here on the right, and this is the F from the stock assessment, and we have recreational F, and that's landings and discard F, and then also the commercial F, landings and discards, and so we set Q equal, to give us -- When we multiply that times effort, which is one, to give us the F that we're interested in, and so, ultimately, it's just a product of effort and catchability that is important for the model.

We're getting Fs in the ballpark of where we want by doing this way, and it doesn't mean that we actually believe that the catchability, or efficiency, of the recreational fleet is more than ten-times that of the commercial fleet, and it's just a way to scale our effort that we're assuming equals one. I think that might be a good place to pause, and that's the end of my description of the model itself, and see if there are questions or comments.

DR. BUCKEL: Are there questions for Kyle? Marcel.

DR. REICHERT: Kyle, thank you for that, and Scott. The discards specifics for the for-hire and general rec may be different, and so can you tell us a little bit about why you combined those, other than the model complexity, and have you considered splitting them out?

DR. SHERTZER: Are you asking about this specific slide?

DR. REICHERT: No, and, earlier, you mentioned that you have two sectors, the commercial and the recreational.

DR. SHERTZER: Yes.

DR. REICHERT: I was just wondering whether you guys have considered splitting the recreational out into the for-hire and general rec.

DR. SHERTZER: I mean, we did discuss fleet structure for this model, and we actually started with a single fleet, just for simplicity, and we decided that we should at least have recreational and commercial fleets. I mean, it's really -- They're just pooled here for just the two fleets, more for simplicity and tractability.

DR. REICHERT: Okay. I understand. Thanks.

DR. BUCKEL: Are there other questions for Kyle? Nothing online, and I have one, Kyle. I know you don't want to complicate the model too much, and the assumption about the effort being shared equally among all the species, and some of those species, the way fishers target them differ, and so the amberjacks and the groupers may be larger hooks and larger baits, and less likely to catch the smaller species, like black sea bass and red porgy and triggerfish, where they're using maybe multiple smaller hooks, and so did the group talk about that at all and the implications of -- If I'm following right that the effort is assumed to be equal amongst all the species.

DR. SHERTZER: No, you heard right, and I guess we were thinking of it -- It is a complicated -- It's way more complicated than this model acknowledges, and the way we were thinking of it is the effort should sort of represent an average effort, in that we would use the catchability aspect to scale that average effort to the fishing rate, and I think we can -- Like what's shown on this slide, I think we can do something similar, using output from the stock assessment, and it's just that effort wouldn't be equal to one, and it would be equal to, I don't know, however many trips took place in a year by the fleets, or whatever measure of effort we use, and then we would use regression or something to try to estimate what the actual catchability is from that common effort, and so I think it gets accounted for by the catchability, but it's also -- Yes, right now, it's a detailed reality that is not in our model.

DR. BUCKEL: Thanks, Kyle. Other questions? All right, Kyle. No hands here or online, and so you can continue on, please.

DR. SHERTZER: Okay, and so I wanted to walk through -- The motivation for this is discard reduction, or converting discards to landings. The way we've configured it, it's a lot more general than that, and it could be used for examining other types of output that might be of interest, such as increases in spawning biomass or abundance or changes in the age structure or whatever other types of output might be of interest, and I think we can use this model to examine that, but I wanted to walk through just a few examples of management scenarios that the model could be used to look into.

This first one is the recreational gear modifications, and we are mostly focused on recreational, although I guess we could do any of this for commercial, for the commercial fleet, as well, but we're mostly focused on recreational right now, because of the red snapper questions, and so recreational gear modifications, and so the automatic reel ban that's been discussed, or, yesterday, you had the presentation of efficiency of single-hook rigs versus double-hook rigs, or rigs with two different hooks, and how that reduces catchability, and that would be implemented as a reduction in catchability, and so we could look into something like, for red snapper, how much does catchability need to be reduced in order to drop dead discards by 65 percent, and 65 percent is the number that's been -- That's been thrown around, because that's the output from the actual forecasts that were done for red snapper.

We could look at a reduction in discard mortality rate, for example if there is more mitigation on discard mortality, and we could implement size limits, and I know that's not something that's being discussed for red snapper specifically, but it's something that is really easy to examine in this model by changing the retention function. We could look at recreational effort reductions, temporal closures, and so there's a couple of ways that could play out, and we could have just say a red snapper moratorium, and, if that's the case, then it affects retention, but it doesn't affect effort, and so that's the case where you get more discards, but no landings.

Then you could also have a case where we have a seasonal opening that allows for full retention of everything that's caught, but bottom fishing is closed for the rest of the year, and so say summer is open for snapper grouper fishing, and everything that you catch can go into the boat, but, the rest of the year, there is no snappers or groupers. We're not suggesting any of these as being a preferred method, but we're just putting out ideas of things that could be examined if there is interest in looking into them.

We could look at area closures, and so, for example, it could be a depth closure, say where, if we closed the deeper water, there might be shifting -- You would have effort shifting to the shallow water, and it probably wouldn't prevent people from going fishing, and they would just fish in the shallower water, instead of the deeper water. We could have area closures by latitude, and an example is we could close areas in the northern or middle or southern areas, or some combination of spatial or temporal closures, and we imagined would be a rolling area closure.

For example, every say third year, an area is open, or every third year an area is closed, by latitude, and so that's not really very interesting for red snapper, but, when there's multiple species considered, where abundances are greater in different areas, and red snapper has high abundance off of Florida and Georgia, but maybe some other species, like grouper, might be more abundant off of the Carolinas, where these rolling area closures might be more interesting to look into.

I was going to show preliminary results from just three of those example scenarios, and I think there is some simulations that are from each of them in the extra slides, but it wasn't really worth walking through each of them in the presentation, and I should mention this is -- When Cassidy was giving her presentation on MSE, where she described the different categories of MSE, the full MSE, the medium effort, to the lighter MSE, this is certainly in the box of non-MSE, and this is really -- This is just simulation models, and so, like I said before, we simulate the model for a certain number of years, and we run it.

In this case, we're going to run it for twenty-one years, and then we implement some management modification, and then we can compare the new equilibrium to the old equilibrium, based on the management measure, and so the three examples here would be a gear modification, where we reduce catchability, a seasonal opening to recreational bottom fishing, with full retention, and then an area closure in the middle latitudes, where the red snapper are.

This is the gear modification, and the way it is implemented is a straight reduction in recreational catchability. In these slides, the Fleet 1, that is on the left panel, represents the recreational fleet, and Fleet 2, on the right, is the commercial fleet, and so here, the way this was configured, was we're going to ask that question of what reduction would we need in recreational fishing efficiency, or catchability, to achieve a 65 percent reduction in dead discards, and it turned out it was about 75 percent reduction in Q would lead to the 65 percent reduction in dead discards.

Each panel -- That top-left panel is the recreational fleet landings, and the middle-left panel are the dead discards, and so the ending point of that time series is a 65 percent reduction from the earlier part of the time series, by definition here, and then the bottom panel shows the total number of killed fish, which is just the sum of the landings and dead discards.

The right panels show the commercial fleet, and so, in this case, there was not a reduction in catchability there, and we did not implement any change in Q, and so there's no reduction, and, in fact, the commercial fleet benefits from there being more fish in the water, and so they have higher landings, almost twice as high landings, a little bit more discards, and that's, again, just because there is more fish in the water, because of the reduced recreational catchability.

This example is the seasonal opening to recreational bottom fishing, with full retention, and so this is the one where you actually convert all the dead discards to landings, and, because everything can be caught or there's no fishing, and it's those two extreme alternatives. In this case, again, the fleet on the left, when there is the change implemented in year-twenty-one, you can see that landings increases, and dead discards goes to zero, and then the total number of killed fish is a little bit less than it was originally, but not terribly different, because of shifting all the dead discards into landings. Then, again, on the right, the commercial fleet is really along for the ride and just sort of benefits from having more fish in the water. There was no change to their fishing practice, and that still occurred all-year-round.

Then you can look at, on the right, the change to abundance, and there's a little bit of an increase in abundance, and there's a little bit of a larger increase in spawning biomass, and that's the middle panel. The bottom panel shows recruitment, which, again, that was flat, and we've configured it to imitate the mean recruitment model, and so it's just flat.

Then this is a recreational area closure in the middle latitudes, and so, in that case, the recreational landings, on the left, drops quite a lot, and so do the dead discards, because there is no fishing in the areas where most of the red snapper are, and it doesn't drop to zero, because there is still fishing in the other areas, and there are some red snapper there, but just most are in these areas that are closed. Then, again, the commercial fleet, which isn't affected by the area closure, fishes all-year-round, and their landings are increased by a lot.

On the right-hand graph, we can see how the abundance increases, and the spawning biomass more than doubles, and then you can look at also like the average age structure that changes from a mean of somewhere just less than four years old to somewhere that approaches just under seven years old, is the mean age. That's the bottom-right panel.

Just to summarize, this model is a spatial model that we set up to explore various management approaches and how they affect landings, discards, abundance, spawning biomass, age structure, or any other output that we might be interested in. It is currently parameterized for red snapper, but it does have the capability for multiple species, and I did want to emphasize that it's really designed to compare relative effectiveness of management approaches, and it's not the type of model that is designed for providing ABC.

Just to focus, I guess, on what we're hoping to get out of this, and, one, is this worth pursuing? Does it have any potential utility for the SSC to help guide the council in their decision-making, and, also, are there any recommendations for how to configure the model for further development, any recommendations for output that would be useful, and management scenarios that would be useful to explore. I think that's it.

DR. BUCKEL: Thanks, Kyle, and thanks, Scott. Thanks for queuing up these questions, and these are the action items that we have as well, and so, Judd, I don't know, as we address these, if you want to fill in text as we go along.

DR. CURTIS: Jeff, do you want to open up for more questions and answers first, and then we need to take public comment, before we move into action items.

DR. BUCKEL: Yes, and just in case there were some specific comments to these questions, as they were captured, and we don't have to reinvent the wheel when we go back to the action items, and so, yes, there can be general comments on the presentation, for either Scott's part or Kyle's part, or if you wanted to help the group with answers to these questions, and so both are fair game. Fred.

DR. SCHARF: Kyle, I was just wondering, and does the model, right now, have the capability to account for effort displacement, when you have time and area closures?

DR. SHERTZER: Area closures, yes. We could -- Yes, it has that capability, and we would have to figure out how to define it. I mean, I did do a simulation already that sort of does that with the deepwater closure, and I assumed that all that effort would shift to the shallow water, and I think that was probably in the extra slides. The time closure, it does, but it's not explicit, and it would be implicit, in the sense that, if -- Say half of the year was closed, and then we would have to assume that effort didn't decrease by 50 percent, and it decreased by something less than that, assuming that there would be some effort shifting.

I think the amount of effort shifting would really depend. In a temporal sense, it would really depend on how the time closures were implemented. As an extreme example, if you just closed every other day during the year, it might not have any effect at all, but, if you closed January through June, then it would probably have a much larger effect.

DR. BUCKEL: Other comments or questions or answers to these questions? Chris Dumas, please go ahead.

DR. DUMAS: Hi, folks. Fred, that's funny, and I had just written down a question to ask myself related -- Just before you asked your question, and that was to be a suggestion to my own team members, to Kyle perhaps, that we would need to -- It would be good if we could add a time season effort substitution coefficient matrix, and so, basically, it would be a matrix of number of areas across the top, and twelve months are the rows, and it would show, if a given area and month were closed down, how would that -- What proportion of the effort that had been there would transfer to other areas or months, and we could initially, you know, fill that matrix in with zeroes, assuming zero effort shifting, but, as we got additional information about how things might shift, we could plug in different coefficients in that matrix, and we could even do what-ifs with that matrix.

You know, what if sort of different proportions of the effort shifted around, and so that might be a way that we could look at that, and, if we have data on that -- I wanted to look back through the economics and sort of behavioral sociology literature, to see what information we have on effort shifting due to closures, both area and time closures, but I think people have looked into that, and so we could see -- You know, maybe get some ballpark estimates from that, just to try to fill in the matrix, but then, also, we could just do some what-ifs, what if the substitution for certain

proportions to different areas and times and what would we get, what results would we get, and so I think that's interesting. It might be possible to add to the model, but I will defer to Kyle. Thanks.

DR. SHERTZER: Right now, there is not -- The time-step is a year, and so the effort that we're feeding in is an annual effort, and we don't have say months or weeks or seasons as part of the model, but I think we could do something like what Chris was just saying, that we have -- We are trying to get actual effort information by month, and so we could examine what would -- If there's a certain number of trips in a month, and those months were closed, then we would have an idea of what the overall effort reduction would be, but we would have to make some assumptions about how it might get displaced into other time periods.

DR. BUCKEL: Thanks, Kyle. Dewey, please go ahead.

MR. HEMILRIGHT: Thank you. I find this quite interesting, and, having experienced closed areas in numerous fisheries personally, it makes me want to ask -- You don't even know your effort for these areas, and you don't know where the folks are going to shift to, if they're able to, and so how do you kind of rectify, when you don't even know your universe of fishers and your effort?

On the commercial side, you can get effort. On the recreational side, it's a hypothetical, but, yet, you don't know where the shift could go. When we had closures for 17B closures, back in 2010 or 2011, we didn't have nowhere else to go fish but north, because, in our area of location, we didn't have nothing else inshore to fish, and so you have a lot more -- When you looked at your areas here, where you have sampled them out 1, 2, 3, 4, 5, and 6, you're going to have to have a lot more of discrete areas, and you might even have ten areas that you're looking at, because, in some of them areas, folks don't have the opportunity to go fish for something else, if there's a closure, and, also, in some areas, there is no other species but maybe one species to fish for, and so probably I would say there's going to be a lot of hypotheticals, a lot of assumptions, and a lot of what-ifs, and I don't know how all that passes the muster with the scientific part of it, but if you could answer the question about the effort part, given that there is very limited knowledge of exactly where people fish at recreationally, and I would be interested in hearing your thoughts on that. Thank you.

DR. SHERTZER: We've actually made some progress, and maybe Erik could speak more about it, but some good progress on recreational effort by latitude. The part that we haven't -- Well, a couple of parts that we are still working on is, one, how to define effort for the snapper grouper complex as a whole, and it's not easy to do from MRIP data, but we do have some information, or quite a bit of information, on recreational effort by latitude.

The other part that we still need to work on is recreational effort by depth, and, yes, so those are the two pieces for recreational that we're still missing, and one of the, I guess, benefits of using the larger-scale areas that we have is that the effort displacement would probably be somewhat minimal, at least latitudinally. If you're in the middle of one of those areas, it's -- You're probably not going to drive up to North Carolina very often to go fishing, if you're say in Florida, and we weren't proposing those areas as necessarily as areas that managers might choose, and it was just a way to get the model off the ground and investigate the concept for them to propose specific areas that the council might consider.

MR. HEMILRIGHT: One other thing is it might be helpful, with the new increased observer coverage that is happening this year, and that could help you to identify a little bit of the fishing areas, and I talk to numerous commercial fishermen up and down the coast, and they tell me, a lot of times, you know, they don't never go outside of forty fathoms, or thirty fathoms, and so maybe you all can look at groundtruth, or ground mine, the data on some of the commercial catch with the new increased observer coverage, and that might be helpful to give you some ideas, because it does appear that a lot of this is depth oriented, where you have, you know, 120 foot to 150 foot is a sweet spot, and then eighty foot to 120 foot, and then outside of that, and so it could be some more focus on that could help you drill down in a little bit better knowledge of the depth range, because it is very depth-oriented fishing up and down the coast, my belief is, and that could help you.

DR. SHERTZER: Thanks, Dewey. Thanks for that comment.

DR. BUCKEL: Next we have Mel. Go ahead, Mel.

MR. BELL: Thank you. I just wanted to weigh-in, and, first of all, I just wanted to thank Kyle and Scott and the Science Center for doing this. I think it's -- I appreciate the effort, and I think it is a good place to start, with red snapper, and I certainly see the utility beyond red snapper, as you move forward, and hopefully you can maintain funding to do that, but definitely, you know, for all the reasons, and we all understand that red snapper is a good place to start.

Also, I would just offer, from a state perspective, that, if you need any assistance, in terms of communicating with different sectors of the fishery and the states, I'm sure your state reps on the councils would be willing to help you with that, in terms of steering you towards folks, through staff of the different agencies, and I know some of the things that Dewey was talking about, in terms of groundtruthing, or kind of understanding the nuances of the fishery, and, if it would be helpful to have cooperators, or potential cooperators, identified in the different sectors for you, we would certainly be willing to help you with that, but we do appreciate what you're doing, and just keep it up. Thanks.

DR. BUCKEL: Thank you, Mel.

DR. CROSSON: Can I say something?

DR. BUCKEL: Go ahead, Scott.

DR. CROSSON: Thank you to Dewey and Mel for, you know, your comments. This is really valuable stuff, and one thing that I just wanted to point out, from my perspective, is that, as an economist, time and area closures are so blunt, and they're so -- They have such negative repercussions on so many different people that we're eventually -- This is something we can implement in the model right now, but, you know, if we were able to do something that would allow people more ability to fish, but they weren't able to fish every single day of the year, but then, when they did go, they were able to choose when to go, and it seems, to me, that that's something that's really potentially going to address a lot of those questions about effort shifting, if we were able to minimize it, but people would also, again, be able to retain the catch when they did go out.

That's something that I think would probably be a superior outcome, from some of the time and area closures, because I listened to the public hearing, during the last council meeting in South Carolina, and I heard what people are saying, and I don't doubt it at all, and so this is really something that we're trying to make sure that we're providing lots of different alternatives, even if they are somewhat difficult to implement, from a management perspective, but we're at least thinking about them.

DR. BUCKEL: Thanks, Scott. Mike Schmidtke.

DR. SCHMIDTKE: Thank you. Kyle, this is very interesting work, and I was wondering about the scenario that has the seasonal opening with full retention, and I was wondering -- How long, in I guess the preliminary example that you gave, how long was the opening, and how have you considered potential intra-annual factors, in terms of fishing effort changing by different times of year of when that opening would potentially be in place, and have you played around with putting it in different seasons when effort may be higher or lower throughout the year?

DR. SHERTZER: I think, in that example, it was a three-month opening, or just assumed to be a three-month opening, and, no, we don't have, right now -- Because effort was assumed to be one, then it basically just was a reduction of 75 percent, but I think, when we have the actual data to examine effort, the actual effort by month, then we could look at that more carefully, and then we can put into the model -- We'll have effort by area, rather than just, right now, it's just unform across areas, but we'll have effort by area, and so I think that will be meaningful, but then we could also have effort by month, as Chris was talking about, so that we could look at, well, if certain months were closed, what would we expect the reduction in effort to be, the effective effort to be.

DR. SCHMIDTKE: All right. Thanks, and then, just one question of if there might be the possibility of a derivative of that type of scenario, and have you all thought about modeling an aggregate bag limit scenario, and so it would be in a similar spirit of the full retention, but it would be full retention up to a point of whatever species you're catching, and then it's capped, and so aggregating across snapper grouper species.

DR. SHERTZER: That's an interesting one. Right now, we don't have -- The model doesn't operate by trip, explicitly, and so we can't really put in a bag limit by trip. We could try to model that implicitly, but adjusting the retention function, I think, but it would have to be thought of as an annual average, rather than sort of the by-trip approach that you just described.

DR. SCHMIDTKE: All right. Thanks.

DR. BUCKEL: Kyle, while we're on the seasonal opening, I just wanted to get clarification, based on Mike's comments, and so the season is open for three months, and then, the other nine months of the year, there's a complete closure, and that's how you get to the zero dead discards?

DR. SHERTZER: Yes, and that's how it worked in that example, and it was open for three months, so that the effort would be, I guess, 0.25, instead of one, and then it would be with full retention, and so the retention function equals one, and then, in the other part, it would just be no retention at all.

DR. BUCKEL: Thank you. Okay. Next up is Tim Griner.

MR. GRINER: Thank you. I think it would be useful if you modeled effort over length of opening, or length of the fishing season, regardless of what month it was open, but I think what you will see is that, the longer the season is open, whether it's three months, four months, or five months, you're going to see the effort start to drop, and I think it would be interesting to model -- To look at a drop in effort over the time that the season is open, because I truly feel that, the longer the season is open, you will see effort starting to drop.

I think, when the season first opens, I think you will see very high effort, and everybody is ready to go and hit the season opening running, but, the longer it actually stays open, you'll see a shift in effort, and you'll see a lot of backing off in effort, and I think you've seen that in the Gulf of Mexico. Once these seasons went from nine days to thirty-nine days, you saw a steep effort in the beginning, and then it plateaued and actually dropped, and so I do think it would be interesting to look at and to model effort over the length and to see if, the longer it was open, how that affected effort, which then would, of course, affect your discards. Thank you.

DR. BUCKEL: Thank you, Tim. Chris Dumas.

DR. DUMAS: I would just like to respond a little bit to Dewey and to Mike Schmidtke and to Tim's comments. We have discussed lots of other possible management measures other than season or area closures. You know, we wanted to start with season and area closures, sort of the basic types, because that's what a lot of people are familiar with, and just look at, you know, kind of what we can get with that, but we looked -- We talked about a lot of other management, potential management, options that we might want to look at, like an aggregate bag limit scenario over the full season, and how do we model that, and what would that look like, and, also, effort being able to change over the season, like Tim was just talking about, and, to Dewey, we do want to look at other possible -- We'll look at changes in gear and hook size, and single versus double hooks, and just lots of different things.

We're trying to build a model that we can use to kind of compare all these different possible management scenarios and look at the pros and cons of the different management scenarios, and, you know, everyone should keep in mind that the ultimate goal is that everyone thinks there's a lot of discards, and so, if we can reduce those discards, we can give some of those fish to recreational fishermen, some of those fish to commercial fishermen, and then maybe still leave some in the sea to grow the stock size, but, you know, right now, those discards -- It's just --

It's hurting everyone, and, I mean, no one gets to keep them, and they're not contributing to future population growth, and so we're trying to look at these different management possibilities, with the goal of, you know, which ones would help us reduce those discards and distribute those fish among the rec fishermen, commercial fishermen, and then also maybe leave some, you know, in the population, to grow the population faster and maybe have a more robust, or resilient, stock out there in the ocean.

We've talked about a lot of other possibilities. If there are any economists on the call, another thing I'm really interested in is looking at policy mechanism design, or incentive mechanism design, which is a method in economics, a regulatory method, to use in situations where there is a lot of uncertainty among those that you're regulating and trying to design methods that will take into account behavioral responses, like shifts in effort across time, or shifts in effort across areas,

to take those things into account and try to build a regulation that will make use of those things for the benefit of everyone involved.

I just wanted to say that, even though we're talking about time and area closures, sort of in this presentation, as an example, we've thought about a lot of other possibilities, and, if anyone out there has other ideas, like the aggregate bag limit or like looking at drop-off in effort over time, other ideas that we could try to consider in the model, please let us know, because we're trying to cast a wide net, with respect to potential policies. Thanks.

DR. BUCKEL: Thank you, Chris. Okay. I don't see any hands raised here. Any hands online? So that's the general comment time, and then I will just give another time for the public. We've had some public comment, but are there other folks from the public that are waiting for the public comment period? None? All right. No hands raised, and so we'll move into fleshing out the action items, and Judd has already been doing that, as Kyle had those action item questions on his presentation, and so we'll continue to address our action items for this.

I will go ahead and jump in on Number 1, does this modeling approach have potential utility, and, if you recall, from our April meeting, we addressed red snapper and our recommendations to the council. I presented those in June to the council, and, just to summarize those, they were more education or gear modifications are likely not going to have an impact on the council's large magnitude of the number of dead discards in the red snapper fishery, that those options were likely not going to be effective, and we recommended time and area closures.

The council has been grappling with next steps, and Amendment 35, right, doesn't have the time and area closure recommendations, and they are working on either gear modifications, like the single versus double hook, or education, and so these -- This modeling approach that Kyle and the team are working on will have definite -- It will be very helpful for us in going to the council and saying, you know, if you're going to do some gear modification, it's got to be, you know, reduce catchability by 65 percent, for example.

I know the results are preliminary, but that would be a substantial decrease in catchability, and I don't know what gear modifications are out there to get to that, and these are extremely helpful in us providing guidance to the council, and so thank you. I addressed this Action Item 1, and, if other folks want to add to that, or if they disagree, then please chime-in.

DR. SCHARF: I would add to that too, maybe that the ability to explore other options to reduce effort, outside of broad area and time closures, will be really valuable. In other words, this approach that can highlight some other potential ways to get at effort reduction, besides sort of the standard seasonal or spatial closures, is going to be really helpful, because it seems like that's going to be a path forward that really needs to be considered carefully.

DR. BUCKEL: That looks good. Dewey.

MR. HEMILRIGHT: I just have one question. Given the timeline of these different things here to explore, or looking at things outside of spatial or time and area closures, how much time does all that stuff take, because I'm under the assumption that there is limited time for something to be fixed, given the Magnuson-Stevens mandates, and I was curious of these different modeling approaches and utility of stuff, of how long is people talking about looking at doing this stuff, two

to three years, three to five years, or anything like that, because it's just my belief that the clock is running out, and something has to be done sooner rather than in the future.

DR. CROSSON: The project -- I'm aware of the timeline for Reg Amendment 35, and, you know, when I proposed this thing, it wasn't quite as -- I saw the need, because I've been watching this stuff going on, obviously, for the past fifteen years plus, but we got the funding, and it was a while before we got it, and then we started working on the process, and, immediately, there was this important need for addressing Reg Amendment 35, and I will let Kyle mention maybe to what degree we can address any of the issues that are in that amendment, but, I mean, we're not going to be finished the project for another year or year-and-a-half. This is a long-term project.

Especially for a lot of these different policy options, and there's no way we can design some of these novel ways of addressing discarding right now, under the timeline that Reg Amendment 35 is pushing for it, and that's my understanding, and I'm not General Counsel, and I'm certainly not part of the council itself, but I know that there's an immediate timeline, and I don't think we're going to be able to develop this entire thing before December, or March, or whenever it is that the deadline is coming up.

DR. BUCKEL: Thanks, Scott. Mike.

DR. SCHMIDTKE: Just a brief comment on the timeline of Reg Amendment 35, because it has been updated since the SSC last met, and so just letting you all know, and the council is supposed to be considering Reg Amendment 35, which considers changing the red snapper catch levels, prohibiting the use of electric or hydraulic-powered reels, in some fashion, and they need to figure out, in the next council meeting, what the extent of that prohibition would be, and then prohibiting the use of multi-hook rigs, and, again, they would need to define what the actual details of that prohibition would be.

The timeline has been shifted up, and so the council would be taking final action in March of 2023 on that, and so it doesn't necessarily line up with the timing of this project, but we still have, you know, known ongoing management efforts, and we do have the snapper grouper management strategy evaluation, and we are expecting to have significant management changes coming in an amendment that would follow the MSE, and the next red snapper assessment as well.

DR. CROSSON: Yes, and, again, one other thing to keep in mind is we are discussing red snapper right now, but the goal of this project is to address the fishery overall, because all of these different -- Catching all these different species, and, you know, everything is interactive, and it's a multispecies fishery, and so we're trying to address generally how the fishery is regulated, and there's a lot of species, beyond red snapper, that are in some distress, like red porgy, and I think gag and some of these other ones, and so we want to see if we can address all of these species with the project itself, and not just red snapper, but that's a long-term thing.

DR. BUCKEL: Thanks, Scott. All right. Judd, where are we on our action item? Do we have each -- Is there any other recommendations for model configuration or development? There was Tim Griner's recommendation of the decreasing effort, and I'm not sure if you had that somewhere else.

DR. CURTIS: Yes, and that's down below, underneath the additional management scenarios to consider.

DR. CROSSON: He mentioned what happened in the Gulf as the season extended, and so we might want to jot that in there.

DR. BUCKEL: How about the output, and so Kyle provided, for each fleet, recreational and commercial, how the landings and discards would look, as well as some of the population responses, in terms of abundance and spawning stock biomass, as I recall, and so anything else that folks would like to see, any output? We've got a slide up now, and so, for each fleet, it was landings, dead discards, total kills, and then for the population abundance, spawning stock biomass, and proportion average age. Amy.

DR. SCHUELLER: It sounds like the intention is to add additional species to this as you're moving forward, and so I guess -- I mean, I will just make a comment about the outputs from that, and I would assume there would be tradeoff plots between the different species, and what those would look like I suppose is yet to be determined, but, depending on how many species there are, they could take some form kind of like an altitude, or elevation, maps, or something like that, and so, I mean, just looking forward in this project, something that I would be interested in is some sort of tradeoff plots between species.

DR. BUCKEL: Thanks, Amy, and, as Kyle mentioned, this for the total area, and so is there any interest in seeing it by sub-region? Amy is nodding her head. Marcel.

DR. REICHERT: Well, I guess these are all a tradeoff between, you know, the model complexity and what can be done, and, ultimately, I think that would be really interesting, especially given the distribution of, for instance, red snapper, but there are other species that have a different distribution, and I forgot whether they are on there, but I'm thinking about red grouper and white grunt, for instance, and so, if possible, in the future, that would be good.

In a similar vein, I mentioned, earlier, this potential splitting of the for-hire and the rec sector, and, again, I completely understand that that adds considerable complexity to the model, but I can also imagine that the discard specifics between those fleets may be different, the area fished, methods of fishing, and distance from shore, how the fish are handled, and so, again, maybe not something immediately, but, if the model develops, perhaps that's something that can be explored.

DR. BUCKEL: Thanks, Marcel.

DR. SHERTZER: I've been thinking a lot about that too, Marcel, and it seems like there might be some benefit to splitting out the private rec, in part because -- Especially if say seasonal openings, or seasonal closures, are considered, that there be a commercial benefit to leaving the for-hire headboat sector open, because they want to have business throughout the year, even if there's a closure in the private rec.

DR. REICHERT: Thank you, Kyle, and I think that also -- As you indicated, that opens exploration of potentially additional management strategies.

DR. BUCKEL: Kyle, I have one other management scenario that would be helpful, I think, for the council, and so there is -- It's part of Amendment 35 to go from the two-hook to the single-hook rig, and, yesterday, we received a presentation on some -- Two presentations with results of the changes in catch from the two-hook versus single-hook, and so, when you looked at gear, you said, okay, what reduction in catchability would be required to get to 75, or 65, percent reduction in dead discards. The other way to do it, maybe, would be to ask the question of, given what's been found empirically on the water, what reduction in dead discards would that get you, if it's substantial or not.

DR. SHERTZER: Yes, and that's an easy one to run. If people are finding that there's an X percent reduction in catchability, based on going from two hooks to one, then it's easy to put that reduction and run the simulation and calculate the dead discards.

DR. BUCKEL: Great. Thank you.

DR. SHERTZER: I guess I will mention that you suggested abundance by area, or output by area, which we do have that by area, and it's just a matter of pulling it out and reporting it, and one of the -- I did report that, actually, in the extra slides, and there is the area closure simulation, where we closed the deep water and assumed all the effort would be in the shallower water, and that simulation reports abundance by area, and they sort of had counterintuitive effects, in the sense that, when you shift all the effort from deep water to area water, you actually get a decrease in abundance, because it puts more effort to the shallower water, where there's a lot more red snapper.

DR. BUCKEL: Interesting. Thanks, Kyle. George.

DR. SEDBERRY: Earlier this week, we heard about some hotspots for red snapper distribution, and there's probably hotspots for other species as well, and so it would be interesting to see what the effects of displacement of effort into those hotspots, or removal of effort from those hotspots, might be.

DR. BUCKEL: Thanks, George. Okay. Judd, maybe, if possible, if you could expand that to the large -- Are there other comments, before we leave this item? Anything online, Chip? Anyone online with hands raised? All right. Then I think we've got some good thoughts put down to address these questions, and some suggestions for the group. Kyle and Scott, thanks again for the presentation. Do you have any other questions for us, while we're together as a group?

DR. SHERTZER: I don't have any questions, but thank you all for the useful feedback.

DR. CROSSON: I will echo what Kyle said. It was really useful to come before the SSC, at this stage, and to get some feedback, and to especially also get some feedback from council members and the public.

DR. BUCKEL: Thanks to you both for the presentation and to all the members of the group for all the hard and quick work on this. It's definitely needed. All right. It is about five after ten, and let's take a fifteen-minute break, and then we will come back to Agenda Item Number 12. Thanks, everyone.

(Whereupon, a recess was taken.)

DR. BUCKEL: All right. Thanks, everyone, and so we're not letting Scott off the presentation hook just yet, and so the next agenda item is the -- Hold on, Scott and Amy, we're going to do -- Chip Collier is going to do Item Number 13, the SAFE Reports Review. Take it away, Chip.

SAFE REPORTS REVIEW

DR. COLLIER: Thank you. Council staff have been working with SERO staff, as well as getting information from the Science Center, in order to develop these SAFE reports. It's a requirement, and it's listed in National Standard 2, in order to develop these, and the contents that are supposed to be included -- It's supposed to be the condition of the stock, essential fish habitat, information on marine ecosystems, as well as the fishery.

One thing I did want to point out with these is just envision these as a start. In the past, SAFE reports have been developed, and they've been extremely thorough, but they have never continued, because they were such a heavy lift, and so I'm taking the opposite approach, taking baby steps, learning the data, making sure we can get the data put together efficiently, and then we can add additional information, as you guys see fit, or the council sees fit, in order to describe the fishery, or any other conditions that are in there.

What else did I want to point out? I mean, there's a couple of components that are supposed to be included in the SAFE reports. As I had mentioned just a second ago, it's catch specifications and the status determination criteria, source of mortality, bycatch of non-target species, EFH, and then information on economic, social, community, and the ecosystem, for assessing the impacts of management.

I just wanted to make sure that we went over all that, and these are web-accessible, as listed in National Standard 2, and so we do have both of them linked up here, and we will start off with essentially the more data-rich style of SAFE report, looking at the snapper grouper, and you can see that we have the index, over the left, and that is a requirement, surprisingly enough, and so we also provide the information that's included in the sources for the information, and so those are all provided as links.

I started off with some of the species that were experiencing overfishing, or overfished, depending on whether it was a stock assessment determination of that or whether it was by a NOAA Fisheries determination of that, and, generally, with a NOAA Fisheries determination, what that's coming from is tracking the landings relative to the OFL, and so you will see all that information in there, and then, once we get into it, we have individual species.

It stars off with a brief description of the species, the biology of the species, and this is consistent among data-rich and data-poor. Where it starts to vary is here at the second part, where it's assessment information. What we try to do is pull the information directly from the assessment over into this report, and so we're going to be providing information regarding that.

In the second part here, we're looking at stock status criteria and fishing level recommendations, and so all of that is included, and this is for blueline tilefish, and, obviously, it's going to vary by species, and then we have some of the recent or upcoming management changes for the snapper

grouper fishery. We talked, as staff, about how to best do this, and they talked about going just back five years, and so you will have management that was impacting this stock for the past five years, and, as you go through the different species, some of the management might be repeated.

Some of the management measures, or management changes, might be repeated by species, if it's like an overarching item, such as let's say a commercial reporting change, and that would be listed for all species, but, when it's looking at an ACL, or an ABC, for an individual species, that's only going to be listed for that species.

Then we get into fishery population trends. One of the things, the requirements of SAFE reports, is it's supposed to look at past, present, and future conditions, and so, for the data-rich species, we do have projections, and that's what we use for the future conditions, and that helps to really inform where the fishery is expected to be going.

We do provide landings and number of releases. Right now, we only have number of releases for the recreational fishery included in this, and we are hoping to get some information on commercial. As has been indicated by the Science Center in the past, there's been some issues with the logbook data for commercial discards, and so we're not presenting the information yet, and we're waiting until we get finalized results on how to best incorporate, or best represent, commercial discards.

For most species, we would be including a trend in abundance. For golden tilefish, there's not a recent trend in abundance. There are several trends in abundance that are included in the stock assessment, but I believe that they all ended around 2012, and so we don't have a trend in abundance for this species. If there is one that you all recommend that would be beneficial to maybe kind of give some indication of what's happening in the population, that is somewhat accessible. Like Wally was saying, that size information might be accessible for some species, and that's a little bit easier to get than an index of abundance.

We could definitely add that in. Don't think of this as just being boilerplate. We have to have this information, and it has to be static across species, and it does not, but what I would want to do is be consistent with a stock assessment. If a stock assessment is available and has an index of abundance, that's what we should be using, at least the best representation of that.

They also want information on sectors, and so, once again, we provide the recreational and the commercial information independently, and then we get into the economic trends. We don't have great information on economic trends, and this is what we had selected as potential indicators of the trends. One is directed trips for the recreational sector, and the other is the value in the commercial sector.

If there is additional recommendations, we can get to those at the end, and then, for social trends, this was a bit of a struggle for us. One of the things that we quite often hear from the fishermen is the impact of closures, and so we wanted to note whether or not there was recreational closures, and that can have a significant impact on the fishery, and then we also try to include the information, as reported by the fishermen in the fishery performance report, and so we include that information as a sub-bullet, if it's provided for the species.

Then we get into the additional information, and we include the links to the fishery performance report, and we also have the recent amendments that are listed in the table above describing the

management actions that have been taken recently, and then, finally, we have a link for essential fish habitat, and so I'm not going to go through the other snapper grouper species, and they're almost identical to this, and so we'll jump over into the data-poor.

This is where I struggled a bit more. Once again, we start off with the introduction, and so I'm data-poor, but I meant data-limited, and this is for dolphin wahoo. For stock status criteria and fishing level recommendations, there are some overfishing definitions that are out there, an overfished evaluation. However, those were based prior to the FES conversion, and so I'm not exactly certain what we should be putting down here for these quite yet. The council did come up with an optimum yield value, and so that is included, and that was based on the ABC value.

We do have it for wahoo, and, such this is a much simpler FMP, I did put the two species together in the first table. Then we do have the fishing level recommendations that came out from the SSC, and we have the dolphin and wahoo, and we have it for 2022. Similar to snapper grouper, we have a description of the individual species, and we did not have an assessment for this. We do describe recent or upcoming management changes. For this one, the staff lead recommended that we go basically back to the first amendment, trying to describe everything that has occurred in the dolphin wahoo fishery, just really trying to get the breadth of information that's in there.

Looking at the trends, for the ABC, we try not to go back beyond the 2020 time period, and the reason that I take it back to 2020 is just to get aligned there, because, when we changed from CHTS -- Or when the change occurred from CHTS to FES, it really changes the ABC for this species, and I did not want to give the picture that we were trying to manage to this previously, because I don't know what we were trying to manage to. We don't have a conversion, and so that information is just not on there.

Once again, we have the recreational releases, the sector trends, the economic trends, the social trends, and, for dolphin, we did include information on some of the environmental trends, and Mandy Karnauskas had given a presentation to the council, I think a couple of years ago, that indicated that sea surface temperature might be having an influence on the availability of dolphin, and maybe even on the population, and so we include that here, as some of the potential environmental trends, and then, going to the very end, and skipping over wahoo, and not that it's not important, but it's just very similar to dolphin, and then going to the very end, and we did provide some additional information on the fishery itself.

There was a socioecological model that was developed for dolphin wahoo, and we felt that was very important, and that had come out recently, and so we wanted to include that into this. This isn't going to stay in here forever, and it's probably just going to be in here for a few years, but it provides some context of the socioecological model that was developed just recently by Matt McPherson et al., and there's a link down at the bottom for that paper, and that is how we have developed our SAFE reports so far.

If you look at the questions that we have for this, if you look at the action items for this, I did divide it into what is needed and what is useful. I am envisioning that needed is going to get included in there very quickly, and what would be useful is something I can work on for the future, and what I would like to do is actually provide you guys maybe -- For snapper, just because it is a bit more complicated, every two years, and try to bring a SAFE report to you guys at the April meeting, hopefully including some of the trends from the trap index from the previous year, and

then, for the video index, it would have been the year before, and it just takes a lot more time to get that video index prepared, but we hopefully can provide those type of indexes in the SAFE report for some of the snapper grouper species.

For other species, I would like to do those every two years as well, and so maybe do snapper grouper one year and then maybe the other FMPs the other years. I know it's going to be a heavy lift, and so there's not a huge staff number working on this, and so, when we're thinking needed, what are your basic needs?

DR. BUCKEL: George.

DR. SEDBERRY: I think all the Science Centers are conducting climate vulnerability assessments for all these species, and it might be useful to include that under the additional information, at least a link to those reports, if not, you know, a blurb about the highlights from those vulnerability assessments.

DR. BUCKEL: Thanks, George. Chip, you mentioned ecosystem requirements for the SAFE reports, and so, similar to the climate vulnerability, Kevin Craig and others -- The ecosystem status report, and a link to that report, and then maybe some of the -- Like the sea surface temperature plot, to update that annually, or if there is other environmental variables that SSC members would like to see, but that would be one to keep an eye on. Thanks. Scott Crosson.

DR. CROSSON: From the economic perspective, price per pound might be very accessible, and so that might be something to add in there, and then -- They're relatively recent, but this committee has seen the estimates of economic profits from Dr. Chris Liese from our Science Center, and so he's producing his on an annual basis right now, and I know that 2016, 2017, and 2018 are done, and I'm not sure if 2019 is ready yet, but that information can be quickly grabbed from the existing reports, and that might be something to keep in mind as well.

DR. BUCKEL: Genny.

DR. NESSLAGE: Sorry, and you went through that fast, and so, if I missed this, I apologize, but it would be really helpful perhaps to have anticipated completion date of the next assessment as well, and I don't know if that's easily updatable from a table that you guys have for SEDAR, but, as people are interpreting this, and looking at the cool information you've got in here, it would be good to know like when that might be updated next.

DR. BUCKEL: Chip, Fred Serchuk mentioned earlier keeping a tab on the annual landings relative to the ACL, and I guess you have that plot, but I can't remember if the ACL was on there. I guess, for dolphin, you said you couldn't maybe put it on, because of the equivalence, but maybe you have that for some others.

DR. COLLIER: Yes, and so I'm sure that I bounced around in some of these on how I did it, and the reason for it is, if the council is currently taking action, changing from CHTS to FES values, that leads to a challenge. Most of these values are provided in FES values, and so putting an ACL on there for CHTS units isn't really all that informative, and so I drop them out when there's no change, but, as we get more information, and the ACL is actually enacted, that's when it's going to be plotted on there.

DR. BUCKEL: Excellent. Thanks, Chip. George.

DR. SEDBERRY: If there's, you know, a pre-recruit, or a recruitment index of abundance, something like the SEAMAP Spanish mackerel and the trawl survey, it would be really interesting to have that graph there, just to compare what the pre-recruitment index looked like years prior to the landings, or whatever other, you know, graphics you have available indicating abundance or catch.

DR. BUCKEL: Jennifer.

DR. SWEENEY-TOOKES: This is probably a big wish, but the socioecological model on the dolphin wahoo is amazing, and I realize that it was incredibly time-intensive and labor-intensive, and is there any hope of something like that for any of the other fisheries, any other species?

DR. COLLIER: Not that I'm aware of. We were very lucky to get that one for dolphin, and so hopefully Mandy and Matt can be working on other species as well, but it is a big lift, and we'll see.

DR. BUCKEL: Go ahead.

DR. COLLIER: The one thing -- I talked to Erik offline on this, but we might be able to -- From the stock assessments, they might be able to predict, based on what the projections say, what the index should be, and, if that is available, what we would like to do is incorporate that, and so you guys can look to see what the stock assessment model was saying relative to what the index is saying, and so I think that would be a great piece of information to help guide it, where it's available, and it might not come along soon, but I think that's going to be in the useful and not the needed part, as far as this.

DR. BUCKEL: That would be great. Thanks, Chip and Erik. Other suggestions on information needed or useful to include in the SAFE reports? Chip.

DR. COLLIER: In the case where we do not have an index of abundance that comes from a stock assessment, or is available from SERFS or SADL, is there any recommendation on what you would like to see, whether it's a size distribution of fish -- I don't think we're going to be able to get the age distribution, because, generally, ages are done for stock assessments, and so we would be limited to size, and would you want to see anything beyond total landings? Do you want to see information on number of permits, number of trips, anything like that?

DR. BUCKEL: Marcel.

DR. REICHERT: I think some of that information would be very useful, especially, and I am drawing a blank, looking at the information that we, or that the SSC, has used to set ABCs for those species with very limited information, and so I think we look at age compositions not necessarily as a direct way to set an ABC, but at least to look at what is potentially happening to the population, and so I think that would be useful.

DR. BUCKEL: Amy.

DR. SCHUELLER: In the case where an index isn't available, like blueline, right now, the box is just blank, and I think it would be good to keep the box blank, but then like put a note in there and just say that it's not available. I think, given the accessibility of this to the public, it's good for folks to see where we do not have information, just because there's a lot we do not know, and we need to make that transparent, and so I think it is still critical to have the box there and just indicate that like we didn't forget it, but it just doesn't exist.

DR. BUCKEL: Anyone online with hands raised? Marcel.

DR. REICHERT: I thought about, in more general terms, that we always come up with research recommendations, and this may be a little bit outside the scope of the SAFE reports, but what Amy mentioned made me think about that again, because, if there's no index, it would be good to have a fishery-independent or other index, but there may be other critical research recommendations that we, as an SSC, or others have made, over and over, and I'm not sure how to exactly incorporate that, but that may be something to consider.

DR. BUCKEL: To answer your question, Chip, the size distributions would be great, if those are available for the landed fish, or discards, if observers are getting those. Thanks. Anyone else with suggestions for Chip and the SAFE reports? Chip, do you have what you need?

DR. COLLIER: Yes. Thank you very much for taking the time to think about these, and, like I said, hopefully we're going to be providing these around April, and, that way, we can get it to the council in June. That way, everybody is going to be getting information on the stocks fairly -- On a much more regular basis, and so thank you, and don't think of these as a final product ever, and I think we can always add to them and change them, as needed, and, if there are certain papers like you feel like should be included for an individual species, don't hesitate to let me know, and, that way, we're getting the most recent information for an individual species or a fishery management plan included into the SAFE reports.

DR. BUCKEL: Thanks very much, Chip. That's a lot of work that you've put into that, and your team, and so we appreciate you getting all that information into one-stop shopping, and that's helpful for us, and, SSC members, if something comes to mind that we don't have here, we have another crack to add things, as you edit the final report, and so, if you have some other ideas, please add them at the final report edit stage. Thank you. Okay. We're going to go to national SSC next, and so, if you can scroll back to Item Number 12, which is the National SSC Meeting Summary, and that presentation is going to be given by Dr. Scott Crosson and Dr. Amy Schueller, and so I'm not sure who is going first, or are you tag-teaming?

NATIONAL SSC MEETING SUMMARY

DR. CROSSON: Yes, and you can contribute as well. You were there, and so was Judd. The four of us were up in Sitka, Alaska in the middle of August, and so this is a super short slideshow, and I'm trying to keep it brief, and so other folks please contribute. This was the big meeting room, if you're ever curious what it looked like.

These national SSC meetings, and this, whatever, the seventh or something like that, and it's the first one in a few years, and they're always trying to tackle different topics. The last one was in San Diego a few years ago, and that was dealing with management strategy evaluation. This adapting fisheries management with climate change, and so there were two main sections. The first was -- The way they did thing was that there are lots and lots of case studies that were presented, and so people from different councils, or people that are associated with different councils, give presentations for their regions and volunteer to do it, and not every council did a presentation for every topic, but the two main sections were on ecosystem presentations.

Brendan Runde from -- I guess he was at NC State and now he's with the Nature Conservancy, and Brendan gave a presentation on recruitment issues for reef fish in the South Atlantic region, and then, in the other section of it, which was how to handle shifting stocks, from a management perspective, I presented a case study on our tilefish negotiations for blueline tilefish with the Mid and the South Atlantic SSCs, a number of years ago, and both of those presentations were well received.

Ecosystem considerations, all I remember is that MICE are models of intermediate complexity, but, if Amy, or somebody else, wants to speak to this particular section, and so what would happen is that there would be a number of case studies that were presented, and then we would have breakout groups, where you were mixed with people from different SSCs, and then all the different breakout groups contributed to the writing that will be in the eventual report. If you all want to talk about this, please do.

DR. SCHUELLER: I can, and so there was a lot of discussion about how to include these types of considerations into assessments, and then the impact of that, and so the second part of this bullet just talks about some of the places that environmental, or ecosystem, considerations could be incorporated in things like growth, selectivity, natural mortality, catchability, and recruitment, and that, when that is incorporated, that leads to sort of changing parameters over time, impacts to the reference points, since the reference points are assumed to be equilibrium, in general, and then we had a keynote speaker talk about MICE models, which Scott is right that they're basically the middle-of-the-road type of model, and so not too simple, but not too complex, like sort of the Goldilocks thing, right, just right to address the question at-hand. The premise is that you have this focal set of species that you're interested in, and those are the species that are in the MICE model to address whatever questions and tradeoffs that you have.

DR. CROSSON: Unless Judd or Jeff want to contribute, we'll move to the next slide.

DR. BUCKEL: I will just add, just to follow-up, that there was concern, when you get some of the more complex ecosystem models, it's really hard to figure out what's going on, and so there definitely seemed to be a consensus from the group, at this meeting, that the MICE models were more tractable, the results, in figuring out what exactly was going on, and there were success stories from their use, which we have one on the east coast that Amy has been involved with, and Genny, I believe, with menhaden, but these examples were given from a couple of examples from Australia, where they have been very useful.

DR. CROSSON: The shifting stocks section actually was a bit shorter, I think, and there was a keynote speaker, and then there were two presentations, and, like I said, I gave the first one on looking at the question of how do you deal with it when stocks are shifting around between and

across management boundaries, and so I gave our presentation on what happened with blueline tilefish in the late teens, and how we had to form the working group after the SEDAR was completed, and how we eventually had to come up with a solution that both SSCs could sign-off on, and so it wasn't a technical scientific presentation, but it was just sort of just more of the actual nuts-and-bolts of how those negotiations proceeded.

Then, after I presented, Olaf Jensen, who is at the University of Wisconsin, and is also on the Mid-Atlantic SSC, a long-time member of the Mid-Atlantic SSC, he gave a presentation on a project that's being funded through the Lenfest group, that I am also a part of, and so that -- We are exploring different mathematical models for reallocating those stocks as they shift north, and so using several case studies -- Chris Dumas is on that as well, and so we were talking about, I guess, summer flounder and black sea bass, and so that presentation was given, and that article is hopefully under final review right now at a journal, and so there will be more articles coming in the future on that. I guess, if anybody else has any other questions, feel free to ask them.

We all did take opportunities to enjoy the natural wonders of Alaska the day before, fishing, and so there were several boats that managed to get out there on the water, and you can see several members of one of the boats that you all are familiar with.

DR. BUCKEL: Thanks, Scott, and thanks, Amy. Judd, did you have any additional --

DR. CURTIS: I will just add that what struck me, just kind of during the discussions and some of the presentations, from the case studies, is just the differences in the level of where we're at regionally, across from like the North Pacific to New England to the Caribbean to the South Atlantic to the Gulf, all across, and just the differences of data inputs that we're receiving, versus other people, and what the capabilities that we can do then are.

A couple -- I think maybe it was the first session, but one of the kind of topic questions was essentially like are we -- Can we move beyond integrating environmental indicators into our assessments, and we were like, well, we're not even there yet, and so that was very striking, to me, to see where we are compared to some of the other regions, and so, when we're trying to talk about some of these kind of global ideas, we need to definitely consider, regionally, what the capabilities of these different councils, surveys, data inputs and things are, and so I will just add that.

DR. BUCKEL: I will add that Sarah Gaichas gave a presentation on what the Mid-Atlantic Fishery Management Council is doing along the ecosystem lines, and I thought -- You know, in the Northeast, there is lots of Ecopath models, right, and so they probably have some multispecies model framework that is already being used, and she said they don't have any.

You know, there's no Ecopath model, and they don't have a multispecies model, that their approach has been doing ecosystem reports, compiling ecosystem indicators, and then presenting those to the SSC and the council, I think annually, and Genny is nodding annually, and so that's something that we may consider here, given that, to date, we haven't -- Or, as recently as five years ago, there hasn't been -- We haven't seen trends in temperature, for example, but, in the last five years, we're starting to see that, and so that's been happening a lot sooner up in the Mid-Atlantic region, but, in the South Atlantic, we're starting to see those trends, and we may want to have those temperature, and maybe some other ecosystem indicators, that are presented to us annually. Genny.

DR. NESSLAGE: The product that they have for those ecosystem reports is amazing. It's all automatically accessible in an R package, and it's really useful for everyone, and it could be something that you guys could pull from easily then into a SAFE report, to make your lives easier in that sense, and so, if there's any way that could be mimicked in the Southeast, it would be fantastic.

DR. BUCKEL: Yes, and that's why I brought it up, because Sarah actually said, well, you guys are ahead of us, ecosystem-wise, because you have an Ecopath model, and so, anyway, if council staff could take a look at the product that they're using in the Mid-Atlantic. Thanks. Chip.

DR. COLLIER: I don't think we ever reported on this to you guys, but we did get a reduced model for our Ecopath model, and it mainly focused on assessed species and a few other species that were a little bit different, triggerfish being one, given their different life history, and really interest in the fishery, and I think white grunt is in there as well, and so the reduced model has different life stages in it already established, and so I think each of them have three or four different life stages, focusing on the juvenile and then progressing up into adulthood, and so that information, or that model, has been developed, and it hasn't been tested, because there hasn't really been a question, but, if you guys have a question for a reduced model, that model is now available, and so it's great to hear that the national SSC is talking about some of these reduced models and how they could be beneficial.

DR. BUCKEL: Great. Thanks, Chip. Other questions for Scott, Amy, Judd, or me?

DR. CROSSON: There was a discussion about when the next one would be, perhaps in a couple of years, but there wasn't any consensus about what topic that would be, nor did any particular council jump up and volunteer. People were kind of pressuring the New England Council, since they haven't hosted one yet, but I haven't heard any word beyond that.

DR. BUCKEL: Yes, and so, if you have suggestions, I think they were taking input on the topic for the next national SSC meeting. All right. I think we have a public comment for this item, and so does anyone in the public have any questions for folks that attended the national SSC meeting? All right, and we have no action items, no actions needed, for that, and so we'll on to Item Number 14, the Fishery Management Plan Amendment Update, and the presentation is going to be given by Dr. Mike Schmidtke.

FISHERY MANAGEMENT PLAN AMENDMENT UPDATES

DR. SCHMIDTKE: All right. Thank you. This will be probably a fairly brief update, and these are all snapper grouper or snapper-grouper-relevant amendments, and I just wanted to highlight a few of these. Some of the progress is just, you know, kind of going through the next steps of the amendment process, but I wanted to highlight ones that have hit kind of significant thresholds.

Greater amberjack, that one was approved for formal review by the council in September, and so that's going to be going through the NMFS rulemaking process, once we can get that submitted, but the summary of actions that the council has selected -- They selected to set the ACLs equal to the recommended ABCs, and then they selected a tweak to the allocation scenario. It's kind of a

middle-ground in between, totally rerunning the allocation equation, using the FES data, and what the previous allocations were under the MRFSS data, and so they kind of did a little bit more of a middle-ground approach there.

They lowered the commercial minimum size limit for greater amberjack, and they increased the season to commercial trip limit, and they revised the April spawning closure. Previously, there was a closure in April for the commercial fishery, and the recreational fishery was able to stay open, and commercial fishermen were able to fish using their permits, but they were only able to keep the recreational limit. The council revised that, so it's a full closure of both sectors during April, and then, finally, they removed recreational annual catch targets from the Snapper Grouper FMP. Those were not being used in management, and they can always be added back into the FMP, on a case-by-case basis, in places where the Snapper Grouper Committee and the council deems necessary.

I am going to next skip down past some of these other amendments. Snowy grouper, which is Amendment 51, and Amendment 52, addressing golden tilefish and blueline tilefish, those are both going to be considered for final council approval at the December meeting, and we, obviously, have talked quite a bit about Regulatory Amendment 35, and I just want to reiterate the adjusted timing that has happened since the SSC last met, and the council bumped up the end date for that, and so they will be considering that for their final approval in March of 2023.

Work has continued on the recreational permitting amendment, and yellowtail snapper, Amendment 44, has been reinitiated, after the completion of the interim analysis that followed SEDAR 64, and then, finally, the one that is probably most relevant to the SSC is the Comprehensive ABC Control Rule Amendment, and we have continued going through the process for that, and the council will be considering that for their final approval in December, and so that's coming up, and we are almost done with that, and we're very excited to get that put into place, and so that's all I had. If anyone has any questions, please let me know.

DR. BUCKEL: Thanks, Mike. Are there questions for Mike? Mike, on the permit, the private recreational permits and reporting, has that -- What has the feedback been? Have you done scoping for that, or gotten feedback from stakeholders?

DR. SCHMIDTKE: I guess we've gotten feedback from stakeholders prior to that really being fully reinitiated, but we haven't done scoping. The feedback has been informal, folks saying this is necessary, but we have not done scoping yet, and so that should be -- That should be coming up, and I can't remember if the council would be approving for scoping in December or not, but that would be within the next council meeting or two that they would consider it for scoping.

DR. BUCKEL: Thank you. Other questions or comments for Mike? All right. It looks like there is none for SSC members.

DR. SCHMIDTKE: Kind of the rationale for just providing these updates is -- As it said in the overview, I think we just kind of wanted to close that information loop, from where you guys are reviewing assessments, making ABC recommendations, and then what has happened to those recommendations along the council process and timeline, and so I'm hoping to do these maybe annually, or as needed, depending on what's coming down the line, so you guys are aware and in the loop and can see what those recommendations have led to. Thanks.

DR. BUCKEL: Thank you, and it's helpful to see where things stand, what is the latest, and I appreciate you putting this together, Mike. I think we have -- There is public comment for this item, and so, if anybody is online, please raise your hand if you have any questions for Mike. All right. Judd sees no hands, and so we will continue to move on. We do not have any action items for that, and so I think we're on to Other Business. Is that correct, Judd, or am I missing an item?

DR. CURTIS: We have covered all our fourteen major agenda items, and we have Other Business, if anyone has any other business, and I do not, currently.

OTHER BUSINESS

DR. BUCKEL: Is there other business from anyone? Anne.

MS. LANGE: The unassessed workgroup, is that -- We were supposed to have something between now and the end of the year, I thought.

DR. CURTIS: Are you referring to kind of the joint workgroup that was formed with the Gulf to look at goliath grouper stocks or a different one?

MS. LANGE: There was one that was originally set up just with the South Atlantic SSC, a workgroup, and then, at the August meeting, it was merged, but my understanding was that something would be going out to the members, so they could get an idea of what exactly is -- You know, how that changed and whether people still want to be participating on it. Amy, am I wrong on that?

DR. SCHUELLER: You're not wrong. I had the same question. There has been no movement on that, on either front, that I'm aware of.

MS. LANGE: I was looking for a copy of the report that you and Genny had sent out with the charge before, and I went through all my old stuff, and I can't find a copy of the report, and so at least that would be something to start with, where you guys ended.

DR. CURTIS: We've got a report from the old unassessed stocks workgroup that was charged with the previous task, but we do not have any terms of reference yet written for the new unassessed stocks workgroup that was formed, and that part of their task would be to look, jointly look, at goliath grouper, with the Gulf of Mexico SSC members as well, and so I will look at that group and send an email out and just to contact you guys, and we'll kind of see what we need to do to move forward from that.

MS. LANGE: To start would be -- A good start would be getting a copy of that last report, so we can refresh our memories on what we were looking, at least, because, again, it wasn't just goliath grouper, from our SSC, and it was how to handle unassessed stocks in general.

DR. NESSLAGE: I think Kai volunteered to chair that group, and so, if it's still amenable to the Gulf, you could probably ping him to draft a statement of work, and, given that he was new to the

committee since then, if one of us who was on the previous ABC Control Rule for data-limited species wants to help with that, ping us, and we're happy to help him.

DR. BUCKEL: Judd, just to clarify, there is going to be -- The joint committee will just handle goliath, and then, once the goliath is handled, then, for the South Atlantic's species, that is not going to be the joint, and so there's two different -- Is that correct?

DR. CURTIS: I think that needs to be hammered out in the TORs specifically, and so, as Anne stated, there was already some tasks that this unassessed stocks workgroup was going to tackle, and then the joint aspect of it was really just to tackle the goliath grouper issue, and so we'll draft that explicitly into the TORs, and I will have to probably circulate that to the Gulf joint members and staff for approval, but we'll go from there.

DR. BUCKEL: Go ahead, Chip.

DR. COLLIER: At least in my thoughts for this, it was going to go beyond goliath grouper and just think, for species in general, how to get away from an ABC of zero, because I think that will alleviate some of the political issues that are associated with goliath grouper and maybe -- Because we have speckled hind and warsaw grouper on our side that -- I'm not saying that the ABC shouldn't be zero, but what I'm saying is we need techniques on how to evaluate whether it should continue to be zero.

DR. BUCKEL: Any other items for the other business? Thanks, Anne, for bringing that up. Okay. Seeing no other hands raised for Other Business, we will move on to public comment, and so this is -- For those online from the public, this is your final opportunity to comment on the SSC recommendations and agenda items that we have dealt with over the last three days. Please raise your hand online. All right. Chip says no hands raised, and so now we can move to Item 17, and we'll pull up our text that we've been working on over the last two-and-a-half days, and we have an opportunity to review our statements and recommendations now, but then you will have another shot at it on your own time to edit, but now is your chance to provide input while we're still together as a group. Judd, are you going to start at the top?

CONSENSUS STATEMENT AND RECOMMENDATIONS

DR. CURTIS: Yes, and so we'll start at the top with the Science Center's interim analysis strategy and any additional comments or feedback or recommendations that the SSC would like to provide under these action items, or not on these action items. Also, these were emailed to SSC members yesterday evening, after the meeting, and so they should be in your inbox, if you want to pull up a copy on your desktop.

DR. BUCKEL: Go ahead, Fred.

DR. SCHARF: Under that bullet that says to what degree should the interim analysis replace current stock assessments and/or reduce the frequency of full stock assessments, I wondered, on that first day, when we were done with that, if we might start with a statement, a more generic statement, and I feel like, to me, right now, in terms of interim analyses, that the interim analyses -- That the initial focus should be to fill information gaps, or data gaps, between assessments and

not be focused on replacing, or reducing, frequency yet, until we can determine if the interim analyses are robust. Just a statement of sort of conservatism, so to speak, but that's -- We don't have to keep that, and that was just my thought.

It just seemed, to me, that the Gulf SSC was a bit further down the road in implementing interim analyses, and we've just sort of stepped off the dock, so to speak, and so maybe we should evaluate how -- You know, get comfortable with them first, so to speak.

DR. BUCKEL: Genny.

DR. NESSLAGE: I hear what you're saying, Fred, but the whole point of this exercise was to reduce assessment frequency, but still allow us to keep tabs on the stocks and make sure we're not needing to change the ABCs. We have so many stocks, and some of them have been kicked down the road, and was it white grunt, infinitely, and it would be really nice if we stopped beating the dead horse of some of these stocks, because we're not getting new information. Do these interim analyses and focus on improving the assessments of our data-limited stocks and some of the ones that could be converted to proper stock assessments.

I guess I disagree, and the whole point of the simulation study, if it's completed, is to give us some confidence in that, but you're right that I think we need to monitor its performance as it goes along, and, if we find out that we use these interim analyses, and they blow up in our face, every time we do the actual assessment, as in it has led us in the wrong direction, when the rubber hits the road, and maybe -- I would be supportive of language along those lines, of something of reevaluate, after the first few have been done, and then after the subsequent next assessment, something along those lines, but maybe I'm the only one.

DR. BUCKEL: Erik.

DR. WILLIAMS: I wouldn't presume anything about how these are going to fit in. I think the way to think of this is this is a new tool in the toolbox of management advice that can be provided as part of our whole scientific advice portfolio, and the question is how to best integrate it, given all the constraints, which includes staff resources at the Science Center, as well as data turnaround times, as well as management's ability to digest and react to the information we're providing. It's complex, and so this is just a new tool, and I wouldn't presume how it's going to fit in yet, in any way, shape, or form, and you're going to see the first one of these -- Just to remind you, we're going to give you the first one next year, for vermilion snapper, and so there's time. We're not rushing this. This is just a new tool in the toolbox, I think is the best way to think of it.

DR. BUCKEL: So maybe this question asked about IAs replacing, or reducing frequency, of stock assessments, replacing assessments or reducing frequency, and so I get the sense that the hope of the SSC is that the IAs will reduce the frequency of full stock assessments, or at least initially that's -- We're definitely not ready to say they're going to replace. Fill data gaps between assessments and reduce the frequency of full stock assessments. Maybe add that, "and reduce frequency of full stock assessments" after "between assessments". Great. Thanks, Fred. We needed a sentence there, and hopefully you're okay with --

DR. SCHARF: Yes, I'm fine, and I apologize. I didn't mean to open a big can of worms. It was just the way that that was phrased. You know, I felt like it was a little precocious to say to what

degree can and should these analyses replace current stock assessments, when we're not really sure what they look like yet, and that was really it, was just let's see what they look like, and then I don't know that we can make a definitive statement about to what degree can they do these things, and that was all.

DR. BUCKEL: Marcel.

DR. REICHERT: I think that the next statement also kind of hangs in the air, and it's like, okay, what are we trying to say with that, and so -- I am not sure how to solve that.

DR. BUCKEL: Genny.

DR. NESSLAGE: I think that stemmed from some of my comments, and I guess -- I don't know if you all would feel comfortable saying something along the lines of the preliminary results from the simulation study/MSE indicate, for many -- For several species, projections maybe be unnecessary, and that would get at the argument that Amy and I had of, maybe not all, but for many, they probably are unnecessary, and just to prime the pump that we may consider, in the future, after seeing the final version of this MSE, exploring different options.

DR. BUCKEL: Judd, just "MSE simulation study", so we remember what simulation studies. Genny.

DR. NESSLAGE: Don't hate me, but, going back to Fred's statement, I don't know that -- They will fill data gaps between assessments, and, that phrase, I'm really hung up on. What do you mean by that?

DR. BUCKEL: How about --

DR. SCHARF: How about just saying, "the focus should be to reduce the frequency of full assessments", and leave it at that? That's fine.

DR. BUCKEL: Marcel.

DR. REICHERT: The next one, the one that Genny mentioned, add "if interim analyses are available", or "when they are available".

DR. BUCKEL: Amy, did you have something, or did we take care of it? Okay.

DR. CURTIS: The implementation error kind of statement, this was a focus point for a lot of discussion here, and does that fully capture the discussion that the SSC had regarding implementation error, those bullet points?

DR. BUCKEL: Genny.

DR. NESSLAGE: Are you open to all of this section? I think we can wordsmith that later, but it gets at the main points. I am on the next bullet point now, the implementation for different species, and this was the discussion we had and Amy had made points about how one of the species, in particularly vermilion I think it was, didn't perform the same way, and I think we came to the

conclusion that, ideally, you would do this for all species, but that's not realistic, and so we asked them to consider a few more -- Running this for a few more critical species, with different fisheries and life histories, to see whether it's just those one or two that are anomalous in their response to different -- Amy is going to fill me in here.

DR. BUCKEL: Amy.

DR. SCHUELLER: I was just going to say, maybe the fourth bullet down, it says, "with more simulation analyses, identify common traits among species that make the interim analysis approach more suitable and successful", and so, in my mind, I felt like there were four species, and vermilion was clearly an outlier, and maybe black sea bass even was a bit dissimilar, and so that was half of them, and so I think where we landed was we can't do this for every single species, but that maybe we need to add a couple of species in and maybe make some more general statements about which types of species this works well for and which types of species we'll need to be a bit more careful, and so I don't know if you just want to move that piece, and I don't know where it fits best. Maybe it's just best to move that implementation bullet down with the other one, because it's under the question about replacing assessments, and it probably is just better under the section of advice for next steps.

DR. BUCKEL: Nikolai.

DR. KLIBANSKY: Just a quick comment, and I just wanted to clarify that the analysis that I had presented doesn't really evaluate interim analysis as a replacement for full stock assessments, because it really compared management procedures that did update catch advice, based on interim analyses, between assessments, and it compared those with management procedures that just had fixed TACs between assessments, and so, in a sense, there may be more work to do to evaluate let's say a management procedure where we have fixed TACs most of the time between assessments, but let's say do an interim adjustment to the TAC at like year-five or something like that, and I just wanted to clarify that.

DR. BUCKEL: Thank you. Amy.

DR. SCHUELLER: I am going to jump down to the last sentence in blue in this section, and it says, "SERFS trap and video index track closely for many species", and then it says, "look at the video-only data would expedite", and I think it's supposed to say, "look at the trap-only data, in order to expedite".

DR. BUCKEL: That is correct. All right. I think we can scroll down, moving on to Item Number 4, the snapper grouper MSE that was presented by Blue Matter Science. We have a pretty good list there. Anyone have additions or edits to what is present? Okay, and so we can scroll down, Judd. Marcel.

DR. REICHERT: Maybe move the "compile research recommendations" together, because I don't think that's a primary concern, and that was more like a general recommendation, and so I'm not sure where to move that to, but --

DR. CURTIS: Which bullet?

DR. REICHERT: The research recommendations, to see what has been addressed and what has not, and that was kind of more of a general recommendation, rather than a concern of ours.

DR. BUCKEL: We had two bullets, right, and so what are the main data sources, and then what are the primary concerns with the data sources, and we've kind of --

DR. CURTIS: Marcel, do you want to move that up to the previous question, or the previous bullet point, or leave it --

DR. REICHERT: Yes, and I don't know where it would fit best, in terms of a general comment as something that would help these analyses, or improve from.

DR. BUCKEL: Anne.

MS. LANGE: I think that was my comment, regarding all the work that we've done and all of our assessments and recommendations that we've included, that there are so many research suggestions, or recommendations, that haven't been addressed, and I think some of those might be worth -- It's a general comment, and it's not specific to this, but it's like prep for this, I guess.

DR. BUCKEL: But I think it could fall under the important uncertainties, because we list those as research recommendations because we want information, and we're uncertain about those, and so it could go under that first bullet, if you want to, Judd. Thanks. We've listed data sources that can be used to evaluate the state of the fishery here, and then I don't know if we -- Any primary concerns with them, and I think some of those are mentioned like -- I don't know if anybody wants to add specifics. Marcel.

DR. REICHERT: I don't remember the very last point, the difference between simulations, and was it a concern, or -- I am not sure where that was -- I don't remember exactly where that was coming from.

DR. BUCKEL: Anne.

MS. LANGE: That was from Chris, after my comment about we're already doing, or the Center is already doing, assessments, and how does this fit in, and he was saying the Center, in the assessments, already does simulations, to see, you know, changing -- Sensitivity analysis, and so I think that was what -- The question is what's the difference between the simulations they're doing and the sensitivity analysis that the Center already does, or how do those relate.

DR. BUCKEL: Genny.

DR. NESSLAGE: To turn that into more of a recommendation, I think they could look at the range of sensitivity analyses that are done in the assessment, to look at what the major uncertainties are and the ranges of the values to inform the different -- However they configure their MSE model, and is that kind of what you're saying, Anne? Yes.

DR. REICHERT: Yes, and that would make that statement a lot more real, and, I mean, it -- Not real, but more usable.

DR. BUCKEL: So recommend looking at the range of values used in the stock assessment sensitivity analysis. Okay. Configuration of uncertainties in the MSE simulations, or -- All right. I think we've got the idea. Thanks, Judd, for -- Thanks, Anne, for the comment, the original comment. Okay. We can scroll down, I think. Are folks okay with that, moving on? All right. I think we can take out the text on the collapsing, correct? Look at other methods that remove data points or collapsing, and maybe not -- Let's see. I think or collapsing frames to -- I guess that's a more general.

DR. CURTIS: Do you want to move that, pull that out as its own bullet?

DR. BUCKEL: We discussed it, and I guess that's still an option for species in the future, but this was discussed in relation to Spanish mackerel, but the uncertainty was -- The PSEs were all 0.3 or lower, and so these techniques were not used for Spanish mackerel. Marcel.

DR. REICHERT: Maybe that's good to add, and so at least it indicates that we discussed that, but then the data indicated that it probably wasn't going to provide any additional information, or it wouldn't solve the issue that we discussed earlier.

DR. BUCKEL: Thanks, Marcel. Genny, did you --

DR. CURTIS: Okay, and so that's been moved down here.

DR. BUCKEL: I think we just wanted to capture the looking at individual points or collapsing was discussed for Spanish mackerel, but it was determined not to be necessary, because of annual PSE values.

MS. LANGE: Reasonable?

DR. BUCKEL: Yes. Thanks, Anne. Reasonable PSE values. All right. I think we can scroll down.

DR. CURTIS: This first one here was kind of one of the recommendations that came out of the August meeting, and I think, based on some of the discussions we had during this meeting, it may not qualify anymore, and so I don't know what the group thinks about that.

DR. BUCKEL: I think we need a statement that says the SSC recommends moving forward with the revised operational assessment, with the following -- Okay. Do we have that already? Great. Genny.

DR. NESSLAGE: What is that bullet of model increased uncertainty in catch? Can we get rid of that? I have no idea what that even means.

DR. BUCKEL: I think that Jie -- Jie, do you want to comment on that?

DR. CAO: I think that's a point that I raised yesterday regarding the specification of MRIP CVs in assessment models, which I think is important, and it's not something just specific to Spanish mackerel, and it's for many more species. I think my concern is that, when you have a low CV, like 0.05, in the assessment model, you basically put more weight on the MRIP dataset and force

the model to precisely fit to those data points, which we know they may have higher uncertainty than we assumed, and so I understand what Erik explained yesterday, but I'm not sure that I totally agree with that, and, also, I went back to look at an assessment report last night, and I think the value of CV used in an MCBE analysis also was 0.05, and so I don't think -- Basically, when you bootstrap the data using a CV, like using a 5 percent CV, I don't think it's going to capture, you know, the uncertainty suggested by the PSE of 30 percent, and so I think at least we should consider increasing the CV in the MCBE analysis, at least.

DR. BUCKEL: Thank you, Jie. We can be more explicit there, which Judd is capturing

DR. CURTIS: Jie, can you say that again for me there?

DR. CAO: Increase the CV in an MCBE analysis. I think, if we wanted to be more specific, a CV for the MRIP.

DR. BUCKEL: Do you have any modifications, Jie?

DR. CAO: It looks good to me.

DR. BUCKEL: Go ahead, Marcel.

DR. REICHERT: Do have a recommendation to what to increase that, or --

DR. CAO: Like 30 percent, which is suggested by the PSE. I mean, at least larger than 0.5, which is 5 percent, and that's pretty precise.

DR. BUCKEL: Judd, if you could put "around 30 percent, as suggested by the PSEs". Then I think we had Fred Serchuk next, and then Genny. Go ahead, Fred Serchuk.

DR. SERCHUK: I have a comment on the first recommendation. Are we there yet, Chair? If not, I will wait.

DR. BUCKEL: We're there. Go for it.

DR. SERCHUK: Okay. As I understand the process in the Southeast, most of the assessments that are done are done through SEDAR, and the operational assessment that we had was a SEDAR assessment, but I think what we're talking about, with the revised operational assessment, is that that would be conducted by staff in the Southeast Fisheries Science Center, or at least that's what I thought, and I think, if that's the case, we need to identify that, so people don't get confused that research assessments and operational assessments are only conducted through a SEDAR process, and does that make sense, Chair?

DR. BUCKEL: Yes, it does, and so you want language that's going to make it clear that this revised operational assessment run is outside of the SEDAR process.

DR. SERCHUK: Or that it will simply be conducted by staff of the Southeast Fisheries Science Center.

DR. BUCKEL: Okay. Judd, if you could capture that.

DR. SERCHUK: Can I make one correction on the paragraph before? Can we go up to -- It's a grammatical thing, Chair.

DR. BUCKEL: Yes, please.

DR. SERCHUK: Go right up to the very beginning of that section. I think that sentence should begin with "are", rather than "is", because we're talking about criteria rather than criterion. Sorry if I'm being picky about that. I apologize.

DR. BUCKEL: No. Thanks. I'm glad you caught it now. Thank you, Fred. Genny.

DR. NESSLAGE: I would really like to pull Jie's section down into the recommendations, and I think where I got hung up was in the word "model", and he's using it as a command and not a noun, and so I think, if we could add "recommend modeling increased uncertainty", and then bring it down to our recommendations.

The reason I'm saying that is because some of the things in this section I believe, but it would be good to get it on the record, are recommendations for the next assessment, like exploring age comps, max age plus group, and I think we need to be specific that those would be research recommendations for the next assessment, and so, yes, if you can pull that down to recommendations, unless people disagree, and then that bullet that -- For age comps, it would be explore research recommendations, and then label research recommendations, however you want, and we can massage the wording later.

DR. BUCKEL: Thanks, Genny. That's much better placement. Erik.

DR. WILLIAMS: Just one correction, and so we do use the PSEs in the MCBE process, the ones from -- We're using the 0.3 in 2020, and we're using 0.23 for discards, et cetera, et cetera. I think there's still a misunderstanding there.

DR. BUCKEL: So you just confirmed that, Erik? It sounded like Jie had gone back and looked.

DR. WILLIAMS: It's probably an unfortunate thing that it doesn't end up in -- Maybe it's just said in the report, but I just looked at the actual MCBE code that we ran, and, yes, I confirmed that those values are being used to generate random catch streams.

DR. BUCKEL: Okay. Thanks, Erik. Jie, if you have the text, there may be an error in the assessment report, where it's -- If you could provide that to the analyst, and they can let them know where that is, so it can be corrected. Thanks.

DR. CAO: I skimmed through the report last night, and I saw the text as 0.05, and so that's value used.

DR. WILLIAMS: Yes, and apologies. I mean, I think we found -- Amy has already pointed out some things too that we're missing in that report, and so I will apologize, and that report probably could have been done better and be more complete.

DR. BUCKEL: All right. Thanks, Erik, and thanks, Jie. I think, Judd, we can strike the "increase the CV", because that is already in the model. Okay. Did someone else have a hand raised on the recommendations for Spanish mackerel, the revised OA? Can you scroll down, Judd? We're coming into the subgroup timeline, and, Judd, are you going to be the one that -- So that's a fairly tightline, and it's already October 27, and so this group is going to meet by December 1? Is that -- Do you help --

DR. CURTIS: Yes, and I put that just as a placeholder. I mean, I think, or I know, how busy it gets around the holidays, and so we can use that as a target. If the subgroup has another target date in mind, I'm amenable to that, but, yes, I'm happy to take the reins on that one and organize the setup of those meetings.

DR. BUCKEL: Thank you, Judd. All right. Does that subgroup have any questions for the full SSC? Do you guys understand your charge, based on what's here? I am seeing nodding heads, and so thanks, and thank you for your service on that group. All right, Judd. I think we can -- All right. The next item are the two presentations we received on the single versus double-hook. Does anyone have edits to that? All right. Please scroll down, Judd. All right.

This is the action items on Mandy's presentation on the red snapper source sink dynamics. Did anyone think about other implications of those findings for the red snapper OA or fishing level recommendations? Seeing no hands, Judd, I think we can scroll on to Number 9. Okay. This should be fresh. This was the presentation that we received from Scott and Kyle this morning. Marcel.

DR. REICHERT: Under any recommendations for specific output, the current output -- Is that comment on what is currently output, or is that -- I think that was -- Correct?

DR. BUCKEL: I think the request is, is there additional output that they -- Those are the current output, the landings, dead discards, total kills, and if you want to add there "and population dynamics", because they had abundance and spawning stock biomass and size information, and then we -- That's the current, and then we added some other recommendations. Go ahead, Marcel.

DR. REICHERT: The potential splitting, I think that's more relevant with the additional model configurations, rather than outputs, and so we can move that up.

DR. CURTIS: I think I moved that up during our discussion already, and so it's under the model configurations right now.

DR. BUCKEL: I think it's still in both places, it looks like, Judd. You have it there as a third bullet.

DR. SCHARF: (Dr. Scharf's comment is not audible on the recording.)

DR. BUCKEL: All right. Judd, if you could scroll down, and I think we've covered that. What was the abundance by area management scenario? Amy.

DR. SCHUELLER: I think that was supposed to be under the specific output that would be useful. I think we sort of clumped all those comments together in one space, and maybe they didn't get sorted properly, but maybe I'm wrong.

DR. BUCKEL: That makes sense. Thanks, Amy.

DR. CURTIS: This statement that I highlighted here is one that they had -- Management standards they had already considered, and so I don't know if that's necessarily a recommendation or if there is other considerations to add to those existing scenarios that the SSC wants to comment on here.

DR. BUCKEL: I think that's the one I wanted to see, which was actually using the -- So the empirical studies that were done on the single versus double-hook would estimate the reduction in catchability, when you go from the double to the single-hook, and then use that as the input in that -- To see what the reduction in dead discards would be with that reduction in catchability, going from the double to the single-hook. What reduction in dead discards does this reduction in catchability provide? What reduction in dead discards do the reduction -- Results from the reduction in catchability. You can strike "do these management scenarios provide". What reduction in dead discards results from the reduction. Great. Any other management scenarios that may have come to mind since we talked about this earlier this morning? All right.

Seeing none, Judd, we'll continue down. All right, and so these are action items related to the greater amberjack project that Mark Albins presented. Wally, I just wanted to confirm that that's 150 meters and not 150 feet, and you guys are sampling --

DR. BUBLEY: It's all in meters, correct.

DR. BUCKEL: That deep, and so we're talking like 500 feet?

DR. BUBLEY: Yes, and the short bottom longline will go to 600 or 700 feet.

DR. BUCKEL: Okay. Thank you. I think, on that first bullet, under uncertainties, Anne made a good point about particularly as the pressure changes, and the bioacoustic fingerprinting is done at sea level, but how that changes as a function of pressure. Thanks, Judd. Are folks okay to scroll down? Okay. I think it looks pretty good. Do folks have any additions or edits? There was good discussion yesterday for that. All right.

Golden tilefish and blueline tilefish TORs, or golden tilefish TORs scheduled participants. I think that's fairly straightforward. Thank you, Wally and Marcel.

DR. CURTIS: A bit of verbiage here, and what is that region between Cape Hatteras and the Virginia-North Carolina border? I just put "slice" as a placeholder, but I don't think that's accurate.

MS. HOWINGTON: Unofficially, I think it's called the sliver. I got a nod from Mike Schmidtke, and so, yes, that's called the sliver.

DR. CURTIS: All right. We'll make that correction and refer to as the sliver.

DR. BUCKEL: All right. Thanks, Kathleen. Let's see. Thanks, Scott and George, for participating in blueline tilefish, and then the SADL workgroup, to review TORs, and thanks to George, Marcel, Wally, and Fred. I think you can scroll on down. There was no action item here, for the SAFE report review, and this should be very fresh. I think we can scroll on down, and folks can -- When you're editing this, if you come up with some other items. All right. Excellent.

NEXT MEETINGS

DR. CURTIS: All right. Thank you, and we'll circulate this document, when it's all cleaned up, for further edits, and just the last thing was the next meetings, Jeff. As emailed out, we're going to have a January 20 webinar, and so, currently, on that agenda, right now, we've added kind of the review of the Spanish mackerel subgroup recommendations to the Science Center, and that will be reviewed by the entire SSC, and we also have a review of the scamp operational assessment, and I think that's it right now, which should take up the bulk of the day, and so plan for a full-day meeting on January 20.

We'll have our April meeting, here in Charleston, in-person, April 18 to 20, 2023, and then October 24 to 26, 2023, also in Charleston, and possibly, and probably likely, some webinar in July or August, as we did this past year, when other council business issues might creep up.

DR. BUCKEL: Thanks, Judd. All right, and so the timing of the SSC report, and that is due to council staff for posting on November 18, is what I read, and does that sound about right, or it's due to you, maybe, or, at any rate, that's what we're going to shoot for, is Friday, November 18, and so if you can have comments back to me by Monday, November 14, and I will send -- We just went through it, obviously, and I will go through again and do a little wordsmithing, and look for grammar, and then get that out to you -- Today is Thursday, and so probably early next week, and then it will be due back to me by Monday, November 14.

Thanks, everyone, for a job well done. I want to thank Judd for organizing the meeting agenda, overview, and documents and taking notes. Thank you. That is so helpful for the final report, and, lastly, we appreciate the assistance and guidance from council staff, SEDAR staff, and members of the Southeast Fisheries Science Center that have helped out this week, and thanks, Erik, for being here in person, and Cassidy. All right. This meeting is adjourned.

(Whereupon, the meeting adjourned on October 27, 2022.)

- - -

Certified By _____ Date _____

Transcribed By
Amanda Thomas
November 14, 2022

SSC - 10/25/22

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Attendee Report: Scientific & Statistical Committee Meeting (October 25-27, 2022)

Report Generated:

10/26/2022 08:37 PM EDT

Webinar ID	Actual Start Date/Time	Duration
263-871-843	10/25/2022 07:46 AM EDT	9 hours 25 minutes

Attendee Details

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Yes	Belcher	Carolyn
Yes	Bell	00 Mel
Yes	Bianchi	Alan
Yes	Brouwer	Myra
Yes	Byrd	01Julia
Yes	Carruthers	Tom
Yes	Chaya	01 Cindy
Yes	Cheshire	Rob
Yes	Corbett	Ellie
Yes	Cox	Derek
Yes	Cross	Tiffanie
Yes	Crosson	Scott
Yes	Curtis	Judd
Yes	DeJohn	Frank
Yes	DeVictor	Rick
Yes	Evans	Joseph
Yes	Fitzpatrick	Eric
Yes	Foss	Kristin
Yes	Griner	00 Tim
Yes	Hadley	John
Yes	Hart	Hannah
Yes	Helies	Frank
Yes	Hemilright	Dewey
Yes	Heyman	William
Yes	Hiers	Homer
Yes	Hordyk	Adrian
Yes	Howington	Kathleen
Yes	Huynh	Quang
Yes	Iberle	Allie
Yes	Johnson	Eric

Yes	Kellison	Todd
Yes	Klasnick	01Kelly
Yes	Klibansky	Nikolai
Yes	Kolmos	Kevin
Yes	Laks	Ira
Yes	Long	Stephen
Yes	Marhefka	00Kerry
Yes	Mehta	Nikhil
Yes	Murphey	Trish
Yes	Neer	Julie
Yes	Newman	Thomas
Yes	Ni	Andy
Yes	OFarrell	Halie
Yes	Patten	Willow
Yes	Ponte	Marisa
Yes	Pugliese	01Roger
Yes	Ramsay	Chloe
Yes	Reding	Brandon
Yes	Rock	Jason
Yes	Sauls	Beverly
Yes	Schmidtke	01Michael
Yes	Sedberry	George
Yes	Serchuk	Fred
Yes	Shertzer	Kyle
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Yes	Spanik	Kevin
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Attendee Report: Scientific & Statistical Committee Meeting (October 25-27, 2022)

Report Generated:

10/26/2022 08:47 PM EDT

Webinar ID	Actual Start Date/Time	Duration
263-871-843	10/26/2022 06:49 AM EDT	10 hours 3 minutes

Attendee Details

Attended	Last Name	First Name
Yes	AYALA	OSCAR
Yes	Barbieri	Luiz
Yes	Belcher	Carolyn
Yes	Bell	00 Mel
Yes	Bianchi	Alan
Yes	Brouwer	Myra
Yes	Byrd	01Julia
Yes	Chaya	01 Cindy
Yes	Cheshire	Rob
Yes	Christiansen	Heather
Yes	Corbett	Ellie
Yes	Cross	Tiffanie
Yes	Crosson	Scott
Yes	Curtis	Judd
Yes	DeVictor	Rick
Yes	DeVictor	Rick
Yes	Evans	Joseph
Yes	Fifer	Jocelyn
Yes	Fitzpatrick	Eric
Yes	Foss	Kristin
Yes	Franke	Emilie
Yes	Gillingham	Lewis
Yes	Griner	00 Tim
Yes	Hadley	John
Yes	Helies	Frank
Yes	Hemilright	Dewey
Yes	Hiers	Homer
Yes	Hull	James
Yes	Iberle	Allie
Yes	Kappos	Maria
Yes	Karnauskas	Mandy
Yes	Klasnick	01Kelly

Yes	Klibansky	Nikolai
Yes	Laks	Ira
Yes	Larkin	Michael
Yes	Lazarre	Dominique
Yes	Long	Stephen
Yes	Marhefka	00Kerry
Yes	Matter	Vivian
Yes	Mehta	Nikhil
Yes	Murphey	Trish
Yes	Musante	Madeline
Yes	Neer	Julie
Yes	Newman	Thomas
Yes	OFarrell	Halie
Yes	Ponte	Marisa
Yes	Pugliese	01Roger
Yes	Ramsay	Chloe
Yes	Sauls	Beverly
Yes	Schmidtke	01Michael
Yes	Sedberry	George
Yes	Serchuk	Fred
Yes	Shertz	Kyle
Yes	Shertzer	Kyle
Yes	Siegfried	Katie
Yes	Sinkus	Wiley
Yes	Smart	Tracey
Yes	Smillie	Nick
Yes	Spanik	Kevin
Yes	Stemle	Adam
Yes	Vaz	Ana
Yes	Vecchio	Julie
Yes	Willis	Michelle
Yes	Wolfe	Wes
Yes	Wyanski	David
Yes	Zimney	Amy
Yes	thomas	suz
Yes	vara	mary

No	Carruthers	Tom
No	Chaya	01 Cindy
No	Cox	Derek
No	DeJohn	Frank
No	Finch	Margaret
No	Glazier	Ed
No	Hart	Hannah
No	Heyman	William
No	Hordyk	Adrian
No	Howington	Kathleen
No	Huynh	Quang
No	Johnson	Eric
No	Kellison	Todd
No	Kolmos	Kevin
No	Ni	Andy
No	Patten	Willow
No	Raslich	Eric
No	Reding	Brandon
No	Rock	Jason
No	Stewart	Mark
No	Travis	Michael
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Attendee Report: Scientific & Statistical Committee Meeting (October 25-27, 2022)

Report Generated:
10/28/2022 07:03 AM EDT

Webinar ID	Actual Start Date/Time	Duration
263-871-843	10/27/2022 08:06 AM EDT	4 hours 7 minutes

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Yes	Bubley	Walter
Yes	Byrd	01Julia
Yes	Byrd	Julia
Yes	Carmichael	john
Yes	Chaya	01 Cindy
Yes	Corbett	Ellie
Yes	Crosson	Scott
Yes	Curtis	Judd
Yes	DeVictor	Rick
Yes	Dukes	Amy
Yes	Dumas	Chris
Yes	Evans	Joseph
Yes	Finch	Margaret
Yes	Fitzpatrick	Eric
Yes	Foss	Kristin
Yes	Griner	00 Tim
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Yes	Vecchio	Julie
Yes	Wiegand	Christina
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Yes	Wyanski	David
Yes	thomas	suz
Yes	vara	mary