

GULF OF MEXICO FISHERY MANAGEMENT COUNCIL

MEETING OF THE STANDING & SPECIAL REEF FISH, SOCIOECONOMIC,  
ECOSYSTEM, & SHRIMP SCIENTIFIC AND STATISTICAL COMMITTEES

GMFMC Office

Tampa, Florida

MARCH 7-9, 2023

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6

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31

32 - - -  
33

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TABLE OF MOTIONS

PAGE 50: Motion to test, to the extent practicable, given currently available data, the assumptions underlying the analysis used to estimate fishing effort in offshore waters in the GOM Shrimp industry and those results be brought back to the SSC for consideration: 1)ELB devices are capturing all fishing activity; 2)There is no systematic bias in classification of effort from ELB devices; 3)CPUE of vessels with ELBs on board is representative of the total fleet; 4)Spatial distribution of ELB vessels is representative of the total fleet; 5)Reporting of landings is similar between ELB and non-ELB vessels. The motion carried on page 57.

PAGE 57: Motion that the SSC supports National Marine Fisheries Service's continued examination of new technology and its potential acceptance in the industry for passive spatial monitoring in the offshore Gulf of Mexico shrimp industry to aid in meeting the assumptions of the current methods of calculating effort. The motion carried on page 64.

PAGE 65: Motion that the SSC supports consideration of universal adoption among other levels of coverage of passive electronic monitoring systems for federally-permitted vessels in the Gulf of Mexico shrimp fishery. The motion carried on page 77.

PAGE 291: Motion that the SSC moves to accept the updated projections for the SEDAR 68 Gulf of Mexico Scamp and Yellowmouth Operational Assessment. Accordingly, the SSC recommends that catch level recommendations for OFL and ABC for the period 2024 through 2026 be set as the yield (million pounds gutted weight) at F 40 percent SPR and ABC as the yield (million pounds gutted weight) at 0.75 times F 40 percent SPR. The motion carried on page 297.

PAGE 442: Motion that the SSC reiterates their previous recommendation to the council that Gulf of Mexico wenchman be removed from the mid-water snapper complex. However, due to the commercial catch data confidentiality limits, and the near absence of recreational landings available to the SSC, the SSC currently cannot recommend catch advice for Gulf of Mexico wenchman. The motion carried on page 444.

- - -

1 The Meeting of the Gulf of Mexico Fishery Management Council  
2 Standing and Special Reef Fish, Special Socioeconomic, Special  
3 Ecosystem, and Special Shrimp Scientific and Statistical  
4 Committees convened on Tuesday, March 7, 2023, and was called to  
5 order by Chairman Jim Nance.

6  
7 **INTRODUCTIONS**

8 **ADOPTION OF AGENDA**

9 **APPROVAL OF VERBATIM MINUTES AND MEETING SUMMARY: JANUARY 10-12,**  
10 **2023 MEETING**

11 **SCOPE OF WORK**

12 **SELECTION OF SSC REPRESENTATIVE FOR THE APRIL 3-6, 2023 GULF**  
13 **COUNCIL MEETING IN BATON ROUGE, LOUISIANA**

14  
15 **CHAIRMAN JIM NANCE:** Good morning. My name is Jim Nance, and I am  
16 the chair of the Scientific and Statistical Committee for the Gulf  
17 of Mexico Fishery Management Council. We appreciate your  
18 attendance on this webinar and input in this meeting.  
19 Representing the council is Dr. Tom Frazer.

20  
21 Council Staff in attendance include Carrie Simmons, John  
22 Froeschke, Ryan Rindone, Jessica Matos, and Bernie Roy. Notice of  
23 this meeting was provided to the Federal Register, sent via email  
24 to subscribers of the council's press release email list, and was  
25 posted on the council's website.

26  
27 This week's meeting will include some the following topics: Review  
28 of Shrimp Effort Estimation, Review of Shrimp Assessment Models,  
29 Review of Royal Red Shrimp Index, SEDAR 87 Gulf Shrimp TORs, Review  
30 of the SEDAR Schedule and Planned Interim Analyses, Review of Red  
31 Grouper Operational Assessment TORs, Solicitation for Volunteers  
32 for the SEDAR 74 Red Snapper Research Track, Scamp and Updated  
33 Projections Within the Shallow-Water Grouper Complex,  
34 Incorporating Socioeconomic Data into Stock Assessments,  
35 Discussion of Decision Points for Evaluating Proxy MSYs,  
36 Discussion of Explicit Temporal Modeling, Recruitment Residuals in  
37 Stock Synthesis, and a Discussion of Evaluating Bottom Fishing  
38 Seasonal Closures in the Recreational Fishery, and also a  
39 Discussion on Greater Amberjack Discard Mortality and an Update on  
40 the Greater Amberjack Count.

41  
42 This webinar is open to the public and is being streamed live and  
43 recorded. A summary of the meeting and verbatim minutes will be  
44 produced and made available to the public via the council's  
45 website. For the purpose of voice identification, and to ensure  
46 that you are able to mute and unmute your line, please identify  
47 yourself by stating your full name when your name is called for  
48 attendance.

1  
2 Once you have identified yourself, please re-mute your line. For  
3 members of the SSC on the webinar, we will be using the raise-hand  
4 function, and I'll be able to see that when Jessica displays that.  
5 Jessica will type the names into the screen, so I'll be able to  
6 see those, and we'll keep track of the hands at the meeting, to be  
7 able to facilitate discussion. We'll go ahead, Jessica, for the  
8 purpose of identification, if you would please call the attendance.  
9

10 **MS. JESSICA MATOS:** Luiz Barbieri.

11  
12 **DR. LUIZ BARBIERI:** Luiz Barbieri.

13  
14 **MS. MATOS:** Harry Blanchet.

15  
16 **MR. HARRY BLANCHET:** Harry Blanchet.

17  
18 **MS. MATOS:** David Chagaris.

19  
20 **DR. DAVID CHAGARIS:** David Chagaris.

21  
22 **MS. MATOS:** Roy Crabtree.

23  
24 **DR. ROY CRABTREE:** Roy Crabtree.

25  
26 **MS. MATOS:** Benny Gallaway.

27  
28 **DR. BENNY GALLAWAY:** Benny Gallaway.

29  
30 **MS. MATOS:** Doug Gregory.

31  
32 **MR. DOUG GREGORY:** Doug Gregory.

33  
34 **MS. MATOS:** David Griffith.

35  
36 **DR. DAVID GRIFFITH:** David Griffith.

37  
38 **MS. MATOS:** Paul Mickle.

39  
40 **DR. PAUL MICKLE:** Paul Mickle.

41  
42 **MS. MATOS:** Trevor Moncrief.

43  
44 **MR. TREVOR MONCRIEF:** Trevor Moncrief.

45  
46 **MS. MATOS:** Jim Nance.

47  
48 **CHAIRMAN NANCE:** Jim Nance.

1  
2 **MS. MATOS:** Will Patterson. Sean Powers.  
3  
4 **DR. SEAN POWERS:** Sean Powers.  
5  
6 **MS. MATOS:** Steven Scyphers.  
7  
8 **DR. STEVEN SCYPHERS:** Steven Scyphers.  
9  
10 **MS. MATOS:** Jim Tolan.  
11  
12 **DR. JIM TOLAN:** Jim Tolan.  
13  
14 **MS. MATOS:** Rich Woodward.  
15  
16 **DR. RICHARD WOODWARD:** Rich Woodward.  
17  
18 **MS. MATOS:** Jason Adriance.  
19  
20 **MR. JASON ADRIANCE:** Jason Adriance.  
21  
22 **MS. MATOS:** Mike Allen.  
23  
24 **DR. MICHAEL ALLEN:** Mike Allen.  
25  
26 **MS. MATOS:** John Mareska.  
27  
28 **MR. JOHN MARESKA:** John Mareska.  
29  
30 **MS. MATOS:** Luke Fairbanks.  
31  
32 **DR. LUKE FAIRBANKS:** Luke Fairbanks.  
33  
34 **MS. MATOS:** Cindy Grace-McCaskey.  
35  
36 **DR. CYNTHIA GRACE-MCCASKEY:** Cindy Grace-McCaskey.  
37  
38 **MS. MATOS:** Jack Isaacs.  
39  
40 **DR. JACK ISAACS:** Jack Isaacs.  
41  
42 **MS. MATOS:** Mandy Karnauskas.  
43  
44 **DR. MANDY KARNAUSKAS:** Mandy Karnauskas.  
45  
46 **MS. MATOS:** Josh Kilborn.  
47  
48 **DR. JOSH KILBORN:** Josh Kilborn.

1  
2 **MS. MATOS:** Steven Saul.  
3  
4 **DR. STEVEN SAUL:** Steven Saul.  
5  
6 **MS. MATOS:** Tom Frazer.  
7  
8 **DR. TOM FRAZER:** Tom Frazer.  
9  
10 **MS. MATOS:** Peyton Cagle.  
11  
12 **MR. PEYTON CAGLE:** Peyton Cagle.  
13  
14 **MS. MATOS:** Jason Saucier.  
15  
16 **MR. JASON SAUCIER:** Jason Saucier.  
17  
18 **MS. MATOS:** Don Behringer.  
19  
20 **MR. DON BEHRINGER:** Don Behringer.  
21  
22 **MS. MATOS:** Okay.  
23  
24 **CHAIRMAN NANCE:** Thank you, Jessica. We will go ahead, and  
25 everyone has an opportunity to look over the agenda. Are there  
26 any changes or modifications for the agenda? Seeing no changes,  
27 is there any opposition to adopting the agenda as written? Okay.  
28 It looks like no opposition to adoption of the agenda.  
29  
30 You've had the opportunity to, I guess, look at the verbatim  
31 minutes, if anybody ever does that, but look at the minutes, and  
32 then a summary of the meeting, and are there any changes to those  
33 two items that we would like to present now? Seeing and hearing  
34 none, is there any opposition to approval of the minutes from the  
35 last meeting and the meeting summary? Okay, and so those are both  
36 approved.  
37  
38 As far as for the Gulf Council meeting in Gulfport, I will be able  
39 to attend that, and so I'll be going to represent the SSC at that  
40 meeting in Gulfport, Mississippi.  
41  
42 A couple of other items, before we get into the agenda, and Dr.  
43 Lee Anderson is not able to be with us as an SSC member. We have  
44 -- As you've probably seen, there's been an announcement for  
45 individuals that would like to come onto the SSC, and so we're  
46 looking for an economist, basically, to be able to replace Dr.  
47 Anderson, and so, if you know of anybody, and feel like they would  
48 be able to do that, just have them be able to do that, and they

1 would be in the same situation as the other SSC members, and, in  
2 other words, next year, we all reapply, and so they would not be  
3 four years starting when they come in, but they would be in that  
4 same rotation cycle.

5  
6 The other thing that I want to talk about is we have two -- We  
7 have four special SSCs with us today, and just the Socioeconomic  
8 SSC and the Ecosystem SSC are really at every meeting, and they  
9 are able to vote on any items that are presented, and so that's  
10 the same as it has been.

11  
12 For Reef Fish and Shrimp, for the shrimp items, anybody on Reef  
13 Fish or Shrimp can ask questions and discuss, but, for any voting  
14 on shrimp items, we're just going to have the Shrimp SSC members  
15 vote on that, with the Standing SSC, and, for reef fish, tomorrow  
16 and the next day, if there are any Shrimp SSC members here, you're  
17 certainly able to ask questions and things like that, but not vote  
18 on any motions that are presented. Any questions on that? Okay.  
19 It's rare that we have all the SSCs here, but, anyway, I just  
20 wanted to reiterate, and that's the way we've done it in the past,  
21 and I think it works effectively. Okay.

22  
23 We will go ahead and move to Item Number V, which is Review of  
24 Shrimp Effort Estimation, and, Ryan, would you give us the scope  
25 of work for that item, please?

#### 26 27 **REVIEW OF SHRIMP EFFORT ESTIMATION**

28  
29 **DR. MATT FREEMAN:** For this agenda item, we've got Kyle Dettloff  
30 with the Southeast Fisheries Science Center. He will present  
31 information regarding the discussion of the recently-held shrimp  
32 effort estimation workshop, and that was about two weeks ago. This  
33 will include proposed modifications to the shrimp effort  
34 estimation model, and the SSC should consider the information  
35 presented and then make recommendations, as appropriate.

36  
37 **CHAIRMAN NANCE:** Thank you, Matt, and, Kyle, it's good to have  
38 you. I'm glad you're here. Thank you for being here, and so we'll  
39 go ahead and turn the time over to you.

40  
41 **MR. KYLE DETTLOFF:** All right. Good morning, everyone. I'm Kyle  
42 Dettloff, and I'm a statistician at the Southeast Fisheries Science  
43 Center, and, as Matt mentioned, I'm going to present an overview  
44 of the shrimp effort estimation workshop that we held here just a  
45 couple of weeks ago regarding changes to the effort estimation  
46 methodology.

47  
48 Just some overview about how the data collection has worked for

1 this project in the Gulf. In early 2014, 500 federally-permitted  
2 vessels were chosen to carry a cELB, cellular electronic logbook  
3 device, which is essentially a position tracking system that  
4 records a latitude and longitude at ten-minute intervals, and,  
5 when that device comes within range of a cellular tower, the data  
6 are stored and transmitted to a database in Galveston.

7  
8 Then the distance and time between those points are calculated to  
9 come up with a speed footprint to indicate whether that vessel was  
10 exhibiting fishing activity, steaming, or stopped, and that  
11 results in millions and millions of pings each year worth of data  
12 for these 500 or so -- The number has slowly fallen over the years,  
13 but four-hundred-and-some vessels then are carrying these devices.

14  
15 The goals, with this new effort estimation methodology, is we aim  
16 to just simplify the assumptions, increase the transparency of the  
17 code, modernize the code, since the original algorithm was written  
18 back in 2004, and it involved a combination of different programs  
19 and languages and steps to go through, and so we wanted to just  
20 get this process all into a single script in R that can be easily  
21 run, inputting the year and letting the thing go.

22  
23 Another goal was more complete use of the effort data, because  
24 this original algorithm relied on a trip-matching approach that  
25 was only successful in matching about 60 percent of trips, and,  
26 that way, you're dropping about 40 percent of those pings, of  
27 effort data, and we wanted to preserve that complete effort  
28 distribution in this new method, and so how we did that is through  
29 an aggregate approach, rather than matching on a trip-by-trip  
30 basis, and we calculate the total landings in a time/area cell,  
31 and I will explain what those cells are a few slides later, and so  
32 it's landings from all vessels in a particular area/time cell over  
33 the landings of ELB vessels in an area/time cell to calculate a  
34 scalar to scale-up effort to the total fleet from those carrying  
35 and ELB. Those landings come from trip tickets.

36  
37 Just a brief overview of the process, and, first, we'll pull and  
38 QC those raw ELB track data, those pings at the ten-minute  
39 intervals, and we'll look at the distribution of the speeds in  
40 that data that typically arise in two very clear distributions,  
41 one of fishing and one of vessels moving, or steaming, and  
42 determine an optimal cut point at which to classify fishing versus  
43 steaming activity, and then a pass, after that, to keep only  
44 activity that fits the profile of a shrimp tow, and so effort that  
45 has occurred in a long enough consecutive period of time to filter  
46 out any false positives.

47  
48 Then that effort is spatially joined to the Gulf of Mexico stat

1 and depth zones, the depth zones being zero to ten fathoms, ten to  
2 thirty fathoms, and thirty-plus fathoms, and the stat zones being  
3 the 1 to 22 statistical areas reported on the trip tickets. After  
4 that effort is assigned at spatial levels, the total fleet effort,  
5 according to the aggregated landings at the time/area level, is  
6 matched by vessel ID, and so there's a vessel ID associated with  
7 trip ticket landings, and, in that way, those landings can be  
8 identified as either coming from an ELB or a non-ELB vessel.

10 Then, after the effort is scaled, and so the scaling-up can occur  
11 at the assigned time/area levels, and then effort can be allocated  
12 back to any area of interest, according to the raw original  
13 observed effort distribution.

15 An overview of the assumptions here, and, first and foremost, we're  
16 assuming that these devices are on at all times, capturing all  
17 fishing activity. We're assuming there is no systematic bias in  
18 the classification algorithm of effort, and so we're not, in any  
19 one direction, classifying false positives, or false negatives,  
20 and we're assuming those biases cancel out, and the effort we may  
21 not be classifying as effort and the non-effort that we may be  
22 classifying as effort is happening in equal proportions.

24 We're assuming that the CPUE of vessels with ELBs onboard is  
25 representative of that of the total fleet, and we're assuming the  
26 spatial distribution of fishing activity of ELB vessels is  
27 representative of the fleet as a whole, and there is some support  
28 for those assumptions, based on the original stratified random  
29 selection of those that were selected to carry a box.

31 Finally, for the landings scalar, we're assuming that the reporting  
32 of landings, both in terms of completeness of reporting and  
33 accuracy of reporting, is similar between those reporting landings  
34 from the ELB-selected vessels and the non-ELB selected vessels.

36 A brief summary of changes from the original program through this  
37 new method, just a few improvements have been added, with advances  
38 in R and additional packages and functionality that's now available  
39 that may not have been originally, back in the early 2000s, when  
40 this was developed. The distances between points are now  
41 calculated taking the curvature of the Earth into account, rather  
42 than using a Euclidean metric with rough fixed parameters, and  
43 that's not something that is going to have a major difference in  
44 any kind of calculation, when it's just a more accurate way to do  
45 it.

47 We also now have a step that filters out any data that may be  
48 classified as effort at depths that are known to be too deep for

1   shrimping activity, and so the maximum biological range of royal  
2   red shrimp. We can take that number and, any pings that come up  
3   as effort in depths deeper than that, we know is not shrimping  
4   activity, and so that's not anything that's going to have a major  
5   impact either, but it's going to make some of those maps look a  
6   little nicer, with points way out there that we know are not true  
7   effort.

8  
9   We have an updated shape file with higher resolution ten and  
10  thirty-fathom lines, and it now encompasses the entire Gulf EEZ,  
11  rather than being cut off at a certain point, and we now have the  
12  upper speed threshold is calculated using a mixture model, rather  
13  than just fixed numbers, for any changes in fishing activity that  
14  may occur over time if speeds increase. If towing speeds were to  
15  increase or decrease, it's a way of having that accounted for,  
16  rather than fixing and hard-coding the numbers.

17  
18  All those changes are, you know, minimal things that are going to  
19  have a minimal impact on the result, and it's really the scaling  
20  step that diverges more from what was originally done, and, as I  
21  mentioned, that is now done at an aggregate level, to ensure that  
22  100 percent of the ELB-recorded effort is used in the calculation,  
23  rather than only the 50 to 60 percent of trips that are able to be  
24  matched to landings on trip tickets, and that takes the focus of  
25  the calculation and focuses it on the actual effort, rather than  
26  relying on calculating a CPUE and converting that back to an effort  
27  estimate.

28  
29  The code is substantially simplified and modernized, and it's all  
30  done in a single R script, and it's very easy to run in an R  
31  markdown interface, and you just enter a given year, and it will  
32  produce a PDF report with the final results and figures, and all  
33  the decisions are -- Any decision made is transparent as a function  
34  argument for that script, and so any thresholds, or cutoffs, are  
35  all very clear in the front, in the very top, of that code, and it  
36  can be changed by the user, but all the defaults have been informed  
37  and tested thoroughly against observer data and examination of how  
38  the resulting distributions come out.

39  
40  There's also no randomized components to this new code, where, as  
41  in the previous version, you would have to set the seed to get a  
42  consistent result each time, because there were some randomized  
43  steps.

44  
45  The figure on the left shows the resulting distributions from the  
46  classification of the vessel speeds from the raw ten-minute  
47  interval ping data, and you can see the distribution falling  
48  between the two and four-knot range, as essentially the footprint

1 of fishing activity, and then there's another normal distribution  
2 of activity when those vessels are transiting between areas, and,  
3 in order to objectively kind of classify a cutoff between those,  
4 that's where the mixture model comes in and fits the maximum  
5 likelihood distribution of -- If there are any two normal  
6 distributions in the data, it will find the optimal locations of  
7 those, and that results in a cutoff of about 3.8 knots for the  
8 initial pass of the upper threshold of fishing activity and about  
9 1.9 knots for the lower bound.

10  
11 What you don't see in that figure is it's cut off to the left  
12 initially, but there is also a massive point mass at around zero,  
13 for when these things are stopped and not moving.

14  
15 The figure on the right shows the classification of effort, in  
16 terms of percentiles, to identify hotspots, where you have the red  
17 representing the top 50 percent of effort, and the smallest area,  
18 and the combination of the red and blue is representing the top 95  
19 percent of effort, and encompassing the smallest area, and that is  
20 for the year 2020, with the two lines offshore denoting the ten to  
21 thirty-fathom zone, and you can see it's typically concentrated in  
22 what is defined in the western Gulf, Stat Zones 10 through 21, and  
23 then with another spot down around the Tortugas, for pink shrimp.

24  
25 I am going to explain the classification, or the definitions, of  
26 the time/area strata here and how we decided on those. The times  
27 are classified as in the original algorithm, what are known as --  
28 What were originally called trimesters, and here I am calling them  
29 quadrimesters, because they're four-month intervals, but those are  
30 January through April, May through August, and September through  
31 December, are the times.

32  
33 The areas were classified according to a hierarchical clustering  
34 algorithm of the spatial extent of trips, and so each trip would  
35 -- Trips would be your rows. If you have a zero or one, the extent  
36 of that trip fell into a given trip ticket area on the 1 through  
37 21 grid, just to identify the correlation of which broader areas,  
38 if you're going to aggregate, are encompassing complete trips.

39  
40 You perform that clustering, and then, if you cut it at the four-  
41 branch mark, with that red horizontal line at the top, the dashed  
42 line that falls out into Areas 1 through 8, 9 through 14, 15  
43 through 18, and 19 through 21, and that aggregation is kind of  
44 necessary, because these trips are so long and expand over -- They  
45 can extend over multiple zones on a single trip, and so, when  
46 you're just getting a single area reported on a trip ticket, that's  
47 not really encompassing of an entire trip, and you're needing to  
48 broaden what you define as an area to encompass the complete extent

1 of a trip.

2  
3 Those four times three categories are combined to get your twelve  
4 strata for the year, and then landings are aggregated within each  
5 of those cells, your total landings from the fleet, and your ELB  
6 landings, to calculate your scalar and then the ELB-defined effort,  
7 or denoted effort, in each of those cells, as scaled up by those  
8 factors, to get your total. Yes.

9  
10 **DR. GRIFFITH:** Thank you. That major break between 17 and 14, is  
11 that -- Are those guys going to different ports or something,  
12 because you can see there is two big clusters, and they are broken  
13 between 17 and 14, and do you see what I'm talking about? The two  
14 top clusters, and so all of those. From 21 to 17, they're all in  
15 one big cluster, and then 14 to 4 is another big cluster.

16  
17 **MR. DETTLOFF:** Right.

18  
19 **DR. GRIFFITH:** What differentiates those?

20  
21 **MR. DETTLOFF:** Right, and so all of this is really a function of  
22 different ports, and so, if you were to define -- If you were to  
23 break the areas into two zones, you would split it there, but, if  
24 you're wanting to break it into four, the optimal combination is  
25 those four listed there, and so it's really just a determination  
26 that four areas is your -- You know, you can get a kind of finer-  
27 scale weighting factor at that level, rather than the two, but, if  
28 you were going to split it into any two, that's the initial break.

29  
30 **CHAIRMAN NANCE:** I wanted to say something too, and it's also --  
31 You have the stat area map up on -- 13 west, that's where the  
32 Mississippi River is, okay, just to give you some guidance there,  
33 and so what they're saying there, and I appreciate what Kyle is  
34 going over, is that somebody that fishes east of the river, for  
35 example let's say Stat Areas 10 and 11, have a tendency to also  
36 swing around there and fish 13 and 14, which makes sense, and so  
37 we used to always divide it at 13, but this is just looking at  
38 where the vessels are going, and so, in principle, a lot of those  
39 guys that are fishing north, over in Alabama and Mississippi, may  
40 come over into 13 and 14, over in Louisiana.

41  
42 The Louisiana guys, or the western Louisiana, will go down to  
43 probably about Galveston, which is 18, and so 19, that area, and  
44 then they're fishing lower Texas, and so Brownsville and Port  
45 Isabel, and that's 20 and 21, and so I think this gives a pretty  
46 good representation of where these vessels are moving and being  
47 able to fish. I don't know if that helps. Josh.

1 **DR. KILBORN:** Thank you, Mr. Chair. I have some questions about  
2 the clustering results and the methodology, and so my first  
3 question is what are the response variables that you're using to  
4 cluster here? Is it the fishing and the vessel speed that you has  
5 on the previous slide, on Slide Number 8, or is it something else?  
6

7 **MR. DETTLOFF:** That's just a binary zero and one, if that trip  
8 happened to occur -- If effort from that trip happened to occur in  
9 an area, and so it's just a matrix of --  
10

11 **DR. KILBORN:** Okay, and so then the clustering is a representation  
12 of the actual effort taking place in each of those zones and not  
13 necessarily related back to a specific fisherman, correct?  
14

15 **MR. DETTLOFF:** It's at the trip level, yes.  
16

17 **DR. KILBORN:** So are you saying that like the cluster on the right-  
18 hand side, with 1 through 8 -- Are those fishing zones that have  
19 the same relative effort or the same relative fishermen?  
20

21 **MR. DETTLOFF:** Neither really, and it's just the spatial extent of  
22 a trip, and so trips in general, and it's not -- It's not a  
23 representation of total effort. It's just a representation of  
24 spatial extent of trips, and so each row is a trip, and your  
25 columns are the 1 through 21, and it's saying, if you're going to  
26 divide areas into where you encompass the most complete trips,  
27 into four areas, what's the optimal way to do that, and so it's  
28 really just --  
29

30 **DR. KILBORN:** So it's the number of trips, basically, in a zone,  
31 over a specific time period, and so it's the -- Go ahead.  
32

33 **MR. DETTLOFF:** It's just an indication of, if a single trip  
34 occurred in that zone, according to ELB effort -- It's just an  
35 indication of a single trip, which zones did a single trip span.  
36

37 **DR. KILBORN:** Right, and so it's the effort within a zone?  
38

39 **CHAIRMAN NANCE:** For example, Josh, if you look at that plot, 4,  
40 5, and 6 are together. If someone fishes in 4, they have a pretty  
41 good chance of fishing in 4 and 5 also, and so it's looking at a  
42 trip, and he fished in 4, and he fished in 4 and 5, you know, that  
43 type of thing, where most of that trip clustered. If he fishes in  
44 13, he's probably going to fish in 12 and 14 also, those types of  
45 things. Does that make sense?  
46

47 **DR. KILBORN:** Sure. Then the next question is why did you select  
48 four as your cutoff for the number of clusters that you wanted?

1 Is there a specific reason for four, because, you know, you could  
2 have made five, or you could have made two, just depending on the  
3 level of dissimilarity that you're most interested in, and so why  
4 did you choose four?

5  
6 **MR. DETTLOFF:** One reason is just that's how it was historically  
7 done. It's been divided into four areas and three quadrimesters,  
8 and so this was aiming to kind of just be an update to the original  
9 four areas, just to put a little more statistical rigor behind how  
10 those four were defined, and it came out with a pretty clear break  
11 at the four, and we just felt that that was a good compromise  
12 between, you know, having a fine enough scale of resolution, over  
13 doing something like two, with also encompassing the most complete  
14 trips.

15  
16 **DR. KILBORN** Okay, and so one -- My only recommendation here is  
17 that you may want to examine resemblance profiles, or similarity  
18 profiles, as a means of deciding where the groupings are more  
19 numerically defensible, because then you can avoid that arbitrary  
20 selection of those four zones, and you can see kind of where, you  
21 know, the mathematics show that the groups are clustering more  
22 naturally.

23  
24 A lot of times, you'll get a fairly fine-scale resolution that you  
25 can then super-set in the way that you have, but you will have a  
26 lot more, you know, statistical rigor behind it, to say, okay,  
27 these four zones are numerically defensible and not just four zones  
28 that we picked, right, because I could pick five and feel good  
29 about that as well, if you just moved that red line down just a  
30 tiny bit, right, and so I do think that you should look into that,  
31 and I think that would really improve the results of the  
32 clustering. Thank you very much. I appreciate the time.

33  
34 **MR. DETTLOFF:** Thank you. Okay, and so here we have just an  
35 examination of the final results and what's known as the red  
36 snapper restricted zone, Western Gulf Zones 10 through 21, ten  
37 through thirty fathoms, a comparison of the total estimates for  
38 the new algorithm versus the LGL algorithm in 2014 through 2020,  
39 and we see it's a pretty comparable result through time, and  
40 there's no systematic bias in one direction or another between the  
41 new and old approaches.

42  
43 Just examining the 2020 estimates within the red snapper restricted  
44 area and the total Gulf, we estimated 18,898 nominal tow days,  
45 twenty-four-hour tow days, and 56,918 effort days Gulf-wide, and  
46 landings proportion, accordingly, between the two zones, and so  
47 that represents a 77.2 percent decrease from baseline, which is  
48 below the threshold, as denoted by the dashed line in the previous

1 figure.

2  
3 The time series of landings, this is just a figure that's been  
4 historically presented, and nothing new has been recalculated,  
5 except for the 2020 estimate appended, and you can see that it  
6 comes out similar in trajectory to the profile of the historical  
7 series.

8  
9 As I mentioned, we held a workshop here, just a couple of weeks  
10 ago, represented by the Gulf Shrimp AP in November, and it brought  
11 together reps from SERO, Southeast Fisheries Science Center, the  
12 Gulf Council, Shrimp AP reps, and SSC reps, and we had a review of  
13 the history of effort estimation in the Gulf, a thorough  
14 examination of the proposed new method, a comparison of the results  
15 against the previous method, and there was a general agreement in  
16 the validity of the new approach, with some suggestions for further  
17 examination, primarily of the input data sources, to make sure  
18 we're meeting assumptions.

19  
20 The next steps, we will explore the issues raised at the shrimp  
21 effort estimation workshop and suggest adoption of the revised  
22 method for effort estimates, beginning with the year 2020, and I  
23 would like to acknowledge the Gulf of Mexico shrimp fishing  
24 industry, the Gulf of Mexico Fishery Management Council and SSC  
25 and Shrimp AP, commercial shrimp fishermen, and then our internal  
26 Southeast Fisheries Science Center shrimp bycatch and effort  
27 workgroup that I've been a part of for the last year-and-a-half,  
28 or two years, that resulted in this work, and so I would like to  
29 thank all these people for being able to generate these estimates,  
30 and, with that, I will take questions.

31  
32 **CHAIRMAN NANCE:** Okay. Thank you, Kyle. I appreciate that  
33 presentation. One question on the Graphic Number 9, I think, and  
34 was that just one year, or was that the five years?

35  
36 **MR. DETTLOFF:** So this profile came out pretty consistently over  
37 the 2014 through 2020 period, and this is just a representation of  
38 2020.

39  
40 **CHAIRMAN NANCE:** Okay, and so this is just 2020, but it was not  
41 dissimilar for all the other years?

42  
43 **MR. DETTLOFF:** No, and it was very similar.

44  
45 **CHAIRMAN NANCE:** Okay. Thank you. Matt.

46  
47 **DR. FREEMAN:** Thank you, Mr. Chair. Just to provide a little bit  
48 of timeline as well, going forward for the SSC, I did want to note

1 that the Shrimp AP will also be receiving a presentation on this  
2 next week, and then the council will be receiving a similar  
3 presentation in April as well, and so we're looking for any  
4 guidance that the SSC has for the council, and that would be  
5 appreciated, and, likewise, any feedback from the SSC, I will make  
6 sure it gets relayed to the Shrimp AP next week as well.

7  
8 **CHAIRMAN NANCE:** At the meeting we had two weeks ago, Dr. Gallaway  
9 and I were in attendance at that for the SSC, and we had three  
10 members of the Shrimp AP there with us, and we had -- We went over  
11 this, what Kyle just presented, and we took two days to be able to  
12 go over it in great detail, and Dr. Gallaway and I, as probably a  
13 lot of you know, we did the shrimp stuff when I was working at  
14 National Marine Fisheries Service, and Dr. Gallaway was at LGL,  
15 and still is, and so we wanted to see the new code, and Kyle  
16 presented that in detail, and he presented the R code, and so we  
17 had a really good meeting, I thought, and we went over each of the  
18 different things that changed.

19  
20 One of the major things that changed is in the shrimp files, and  
21 we used to have depth in the landings files, and so we were able  
22 to categorize it by those different factions, and depth is no  
23 longer in those files, and so that's one of the reasons why we're  
24 having to move from what was done from the 1960s, and we've really  
25 used the same algorithm from 1960 through pretty far in history,  
26 and, with depth no longer being collected in those files, we had  
27 -- There is a new methodology that had to be kind of come up with,  
28 and this looks like it comes up with very similar results, which  
29 is very good, and I don't have any issue with what Kyle is  
30 presenting here.

31  
32 We really want to look at this, as SSC, and are there any issues  
33 that we want to bring up, anything that we need to do different,  
34 those types of things, and be able to make our recommendations of  
35 the validity of this to the council, and so that really is what  
36 we're trying to get at today. Tom.

37  
38 **DR. TOM FRAZER:** On Slide 10, where you have the two approaches to  
39 calculate the effort, there is no apparent systematic bias, but  
40 then you go down to Slide 12, and you have the landings data, and  
41 is that using the more recent approach or -- You don't show  
42 landings using both of the effort calculations.

43  
44 **MR. DETTLOFF:** The 2020 landings here are using the most recent  
45 approach. Everything else is just as it's been presented and  
46 calculated in the past.

47  
48 **DR. FRAZER:** I guess I would be interested in looking at the

1 landings using both of those approaches, right, to make sure there  
2 is no bias there either.

3  
4 **MR. DETTLOFF:** Well, I should actually -- So the current approach  
5 is only available in 2014 through 2020, with the cELB effort files  
6 beginning then, and the trip ticket landings, and so this year --  
7 This is actually not a result of the effort algorithm in any way,  
8 and this is just a straight pull of the total Gulf offshore  
9 landings, and I guess the only -- Just from trip tickets.

10  
11 **CHAIRMAN NANCE:** David.

12  
13 **DR. GRIFFITH:** Thank you, Mr. Chair. You mentioned that a number  
14 of fishermen have dropped out of the program, and did they just  
15 age out, or, I mean, was there any reason that they dropped out,  
16 and then, also, I was wondering, and are there any incentives for  
17 them to try and prevent transfer of data from these ELB devices?  
18 Thanks.

19  
20 **MR. DETTLOFF:** I think it's just a function of vessels leaving the  
21 fleet through time, and I don't have specific reasons for that,  
22 but it started with maybe 500, and then, as of the year 2020, or  
23 2019, we had 449 active vessels with an ELB.

24  
25 In 2020, that dropped to 363, which may have been a function of  
26 COVID, but the current issue in 2021 is that 3G died-out at the  
27 end of 2020, and so there's no longer automatic transmission, and  
28 we're relying on chip mailing, and that has resulted in a  
29 substantial reduction in the amount of effort data we're actually  
30 getting back, to the point where there are only 257 active vessels,  
31 or vessels we received data from, in 2021, even though the landings  
32 in 2021 increased over the 2020 number, and so there's something  
33 going on there, in terms of data completeness and quality, that's  
34 arisen from going back to the mailing of chips.

35  
36 **CHAIRMAN NANCE:** Josh.

37  
38 **DR. KILBORN:** Thank you. This conversation around 2020 is one of  
39 the questions that I had, and, specifically, whether or not you  
40 were worried about a COVID effect on the effort, and it sounds  
41 like there may be one, and so I'm wondering, and is it possible to  
42 do this exercise either over an aggregated time period, before  
43 2019, using that 2014 through 2019 data, or have you done this for  
44 every year and checked to see if there's differences from year to  
45 year to year, and so I'm just wondering if 2020 is actually a good  
46 representation of effort to use as the major -- As the major  
47 decision point here, and so that's one question, and I have another  
48 question, but I can wait for the response to that one.

1  
2 **MR. DETTLOFF:** This approach has been done in 2014 through 2020,  
3 and, if I could go back to -- These are the results from 2014  
4 through 2020, comparing the old and the current.

5  
6 **DR. KILBORN:** Right. Okay, and so, I mean, it does look like  
7 there's been a shift in the -- There's a trend here, and so I'm  
8 worried about a 2020 effect of COVID, and so that's something that  
9 I think needs to be, I guess, looked into.

10  
11 The other question that I had was more an ecological question about  
12 the shrimp, and you had a depth-filtering step in your data  
13 processing, and you said there is a maximum depth, and I think it  
14 was about 1,000 meters, that you used as a cutoff, and, admittedly,  
15 that's pretty deep, and I'm not terribly worried about it, but are  
16 you considering the idea that, you know, there might be a range  
17 shift, as time goes on, given temperature changes in the water and  
18 things like that, and is a thousand meters going to be looked at  
19 again in the future, or is that just a fixed parameter that will  
20 never change? How are you accounting for the possibility of that  
21 not being the correct depth in the future, or is that just a  
22 ridiculous question, given the biology of this animal? Thank you.

23  
24 **MR. DETTLOFF:** It's a very conservative depth, and it's really  
25 just to filter out any erroneous points that may be occurring well  
26 off where we know these shrimp to be, but, like all the others, it  
27 is a tweakable parameter in the algorithm, and it's something that,  
28 if need be, you could just enter a new value, and, right now, the  
29 default is a thousand meters, but it's something that could be  
30 changed, and it's something that --

31  
32 **DR. KILBORN:** Right, and I understand that it can be changed, and  
33 I guess my question is anybody paying attention to whether or not  
34 it should be changed?

35  
36 **MR. DETTLOFF:** I don't have an answer to that, and that's a good  
37 question.

38  
39 **DR. KILBORN:** Very good. Thank you.

40  
41 **CHAIRMAN NANCE:** Typically, penaeids are going to be less than a  
42 hundred meters.

43  
44 **DR. KILBORN:** Like I said, I don't think it's actually going to be  
45 a problem, kind of functionally, but I just wanted to make sure  
46 that it's on people's radar.

47  
48 **CHAIRMAN NANCE:** Yes, and I think from the standpoint of -- I am

1 sure, from the standpoint of the agency, looking at that would be  
2 something that they would do, for sure. Don.

3  
4 **MR. BEHRINGER:** Thank you, Chair, and so that I think is a really  
5 good point, about the depth, and it's something that just need to  
6 be considered in the future. My question is about those  
7 corrections that are used for depth, and so, if you are -- The  
8 vessel is at a depth that you're getting a report that they are -  
9 - You would suggest that they were fishing, right, and so you can  
10 correct to that data, because they are not at a depth where they  
11 could be fishing, and how do you then also correct, if they are  
12 perhaps not fishing at a shallower depth, where they could be, you  
13 know, how do you control for that?

14  
15 So you're able to remove those potentially erroneous reports of  
16 fishing, if they're going slow enough to where they could be  
17 potentially fishing, and so you're removing that, but what if  
18 they're also going that speed in a fishable depth? Is there any  
19 way to account for that?

20  
21 **MR. DETTLOFF:** That just gets back to the assumptions about we're  
22 assuming there is no bias in one end or another, because the only  
23 information we have are these times and speeds, and so, with that,  
24 you're just trying to find that central distribution, the optimal  
25 cutoff, and there's going to be some periods of fishing that you're  
26 not going to classify as fishing, and there's going to be some  
27 periods of non-fishing that you are going to classify as fishing,  
28 and that's just the nature of how it's going to be classified with  
29 the information available, and so it's just everything here, all  
30 the parameters set, just aimed at minimizing that bias in either  
31 direction, so that it doesn't sway the estimate in one direction  
32 or another.

33  
34 **MR. BEHRINGER:** So you have all of your comparisons are between  
35 sort of the normal reporting that occurs on vessel that doesn't  
36 have one of these electronic logbooks, versus one that does, and  
37 do you have any -- I mean, are there any sort of ride-alongs, or  
38 any groundtruthing, on those ELB vessels? Have you done any of  
39 that type of data collection, to see just those types of things,  
40 how often it is correctly assessing fishing or not?

41  
42 **MR. DETTLOFF:** Yes, we have done some comparison against vessels  
43 both with an ELB onboard and an observer onboard, and classifying  
44 the total towing time according to the observer and total towing  
45 time according to the ELB, and we're fairly pleased with what we  
46 see. It's a distribution around zero, but, in some cases, there  
47 are times where the ELB is not transmitting, and there's a little  
48 bit of left tail that may bias these estimates down a bit, if

1 that's consistently occurring, and it's not extremely common, but,  
2 in general, it's centered around zero in that comparison, which  
3 was pleasing to us.

4  
5 **MR. BEHRINGER:** Got you. One last quick sort of follow-up  
6 question, and is this completely a voluntary exercise for the  
7 fishermen, or are they incentivized in some way to have one of  
8 these onboard?

9  
10 **MR. DETTLOFF:** The original -- I don't have a great answer to that,  
11 going back to the original selection in 2014, and I know there was  
12 some randomization component to it, and so I don't think it was  
13 completely voluntary, but Jim would have a better answer to that.

14  
15 **CHAIRMAN NANCE:** There is no incentive, but they are required by  
16 law to carry it, if selected. It's part of the permit. All the  
17 vessels that fish offshore have a fishery permit, and, if you're  
18 selected for an observer, or if you're selected for an electronic  
19 logbook, then you have to have one of those on your vessel.

20  
21 **MR. BEHRINGER:** Got you. Thank you.

22  
23 **CHAIRMAN NANCE:** Roy.

24  
25 **DR. CRABTREE:** That was what I was going to ask about, and, when  
26 the vessels -- You select a different set of vessels every year,  
27 and move these around, or it still the 2014 draw?

28  
29 **MR. DETTLOFF:** It's still the static 2014 draw, and so the --

30  
31 **DR. CRABTREE:** It seems like that would, over time, potentially  
32 become a problem, and are there any plans to change the vessels  
33 that are selected, or change how that's done?

34  
35 **MR. DETTLOFF:** I agree with that, and we're assuming that the  
36 spatial representation has stayed constant over time, and I don't  
37 know if, at this point, there are plans to make a new selection,  
38 and I know there's talk of maybe a universal VMS system, where  
39 those concerns would no longer be an issue, if you have complete  
40 coverage of the fleet, but the way we are trying to account for  
41 that is at least in the landings of the total fleet versus the ELB  
42 fleet, just so that we're scaling appropriately, based on that  
43 information that we do have a census of over time.

44  
45 **DR. CRABTREE:** How many vessels are in the total fleet, federally-  
46 permitted?

47  
48 **MR. DETTLOFF:** There were about 500 with an ELB onboard, and that

1 represents roughly half of the fleet, and so I don't have a --

2  
3 **DR. CRABTREE:** I am pretty sure, Jim, there's a royal red shrimp  
4 permit, right, and is there any looking at that independently,  
5 because it's just a small number of vessels fishing, or you just  
6 apply the overall effort to royal red shrimp?

7  
8 **CHAIRMAN NANCE:** Typically -- Well, the royal red vessels, and I  
9 am going to speak in my old -- I was there in 2017, and how that's,  
10 and it may have changed, but I don't know, and the royal red  
11 vessels have both a royal red permit and an offshore permit. Some  
12 of those royal red vessels have an ELB on them, because we can see  
13 royal red tracks being taken. Dave, go ahead and address that,  
14 please.

15  
16 **DR. DAVID GLOECKNER:** I was going to address the question that Roy  
17 had about whether or not we were thinking about doing a different  
18 selection every year, updating the selection, and I think, at this  
19 point, we haven't moved forward with that discussion yet, because  
20 we still have to figure out what kind of unit we're going to  
21 replace the old ELBs with, but we have been discussing either a  
22 random sample every year, that we update, or moving to full  
23 coverage, and so those are both, I think, in play, at least at the  
24 agency, and we are still discussing that, but I think the primary  
25 focus, at this point, is what we can we replace the ELBs with at  
26 this point, and so that's why we haven't probably moved forward  
27 yet, and we've got a lot of fish to fry.

28  
29 **DR. CRABTREE:** Okay. Thank you.

30  
31 **CHAIRMAN NANCE:** Thank you. On the other question, Roy, for royal  
32 red, I mean, it's -- They're not selected, but there are -- They  
33 are randomly selected with their offshore permit, and some of those  
34 vessels have an ELB on them. Harry, please.

35  
36 **MR. BLANCHET:** Thank you, Mr. Chair. This goes kind of a follow-  
37 up to what some of the other folks have been talking about, and it  
38 kind of becomes more pertinent when we start talking about post-  
39 2020. The initial selection of the vessels that carry the ELB was  
40 a random draw, and has there been any testing to see if the current  
41 reports of ELBs, even prior to 2020 -- You know, has that remained  
42 consistent with the active fleet, or has there been some bias, in  
43 terms of who is still reporting, either by port, by vessel size,  
44 by fishery, and, I mean, I can think of several different things  
45 that might influence who would be reporting now, versus what was  
46 in that original draw, and has the fleet itself changed, and I  
47 don't think it has, and I think the existence of the permit has  
48 kind of, I would say, locked-in the structure of the fleet more

1 than would be normal in an open fishery, but that was the main  
2 concern, and it was do we currently have something that's  
3 representative of the fleet, and is there a way to test that?  
4 Thank you.

5  
6 **MR. DETTLOFF:** Yes, and so we have not done any analysis by port,  
7 or anything at that level, and what we have looked at is just  
8 coverage proportion in each of those twelve strata through time,  
9 and what we see there is reassuring that there is a fairly  
10 consistent coverage proportion in each of those twelve time/area  
11 strata, that we know we're at least getting sufficient coverage in  
12 each of those, and that relaxes the assumption a bit, to the point  
13 where you only need to have a representative spatial coverage  
14 within each of those strata, rather than Gulf-wide, doing it in a  
15 stratified manner like that, but that's the extent to which we've  
16 looked into it, and we haven't done any more formal analysis, in  
17 terms of homeport, but, at those broad four-times-three time/area  
18 levels, it appears there is fairly consistent coverage through  
19 those.

20  
21 **MR. BLANCHET:** So it's actually not looking at the structure of  
22 the vessels, or the age of the vessels, or age of the captains, or  
23 any of those other considerations that might be influencing the  
24 efforts relative to the fleets.

25  
26 **MR. DETTLOFF:** No, we have not looked at that. The one thing we  
27 have looked at is number of nets per vessel, and that has remained  
28 very constant, at about an average of 3.3 nets per vessel over  
29 time.

30  
31 **CHAIRMAN NANCE:** Thank you, Harry. Jason, please.

32  
33 **MR. SAUCIER:** I think Harry pretty much asked the same question,  
34 but, on the assumption slide, Slide 5, you mentioned that -- I was  
35 looking at Bullets 4 and 5 there, and spatial distribution and  
36 reported landings are representative, and how are you ensuring  
37 that they're still representative, and what percentage of the  
38 fleet, and you probably already mentioned that, of that active  
39 fleet, is the ELB now, compared to 2014?

40  
41 **MR. DETTLOFF:** In terms of landings, it's about 50 percent of the  
42 fleet. 50 percent of the landings are coming from ELB vessels.  
43 As far as the spatial representation, there is no way to completely  
44 verify that, and it's just an assumption that we have to make,  
45 based on that original selection, but the stratification approach  
46 attempts to relax that assumption a bit, so that you're scaling  
47 within those cells appropriately, and you're relaxing the  
48 assumption to the spatial distribution is representative within

1 the strata, rather than Gulf-wide, and so that's kind of the best  
2 we can do, given the information we have, is using those landings  
3 scalars within each of those strata.

4  
5 **MR. SAUCIER:** Thank you.

6  
7 **CHAIRMAN NANCE:** Rich, please.

8  
9 **DR. WOODWARD:** Just a follow-up on the last one, and you said there  
10 is ELB vessels and there is non-ELB vessels, but there is actually  
11 three groups. There is ELB-reporting vessels, ELB-non-reporting  
12 vessels, and non-ELB vessels, and your assumptions, in Slide 5,  
13 are all based on ELB versus non-ELB, and the assumption you need  
14 to be testing is ELB-reporting versus non-ELB, because now you're  
15 down to half of your ELB vessels are not reporting, or very close  
16 to that, and, with the having to mail in the chips -- I mean, all  
17 of the assumptions on Slide 5 are testable, and could be seriously  
18 biasing your results, and so I think it's really important to go  
19 through and test, you know, are the ones -- I mean, I have no  
20 reason to doubt that, in 2014, it was a nice random sample, and it  
21 was representative, but I have every reason to doubt that the  
22 current reporting vessels may be different, but, as I said, they're  
23 all testable assumptions.

24  
25 **MR. DETTLOFF:** It's an assumption that's hard to test, in terms of  
26 effort, because, obviously, we don't have an effort from the non-  
27 ELB vessels, and so that's why we took the landings approach, and  
28 we're looking at representation in terms of landings to scale, and  
29 there's also the non-ELB-non-reporting vessels, and so that's  
30 where Assumption 5 comes in. You're making the assumption that  
31 the reporting completeness of landings is similar between ELB and  
32 non-ELB vessels and that you're going to have non-ELB vessels that  
33 don't report, and you're going to have ELB vessels that don't  
34 report, but, if those are happening in similar proportions, that's  
35 factored out into that ratio.

36  
37 **DR. WOODWARD:** But you have historical effort from some of the  
38 vessels who are currently not reporting. Are those trending in  
39 the same direction as the ones that are reporting? I mean, if the  
40 upper end are the ones that are no longer sending in their chips,  
41 that could be problematic.

42  
43 I mean, you've got a distribution on that, and you can look at  
44 that distribution, based on historical landings, or the historical  
45 landings and historical effort both the ones that are currently  
46 reporting and the ones that are currently not reporting, for the  
47 ELB side. I mean, I understand that there's always going to be  
48 non-reporting among the non-ELB, but I am most concerned about the

1 possibly endogenous movement from reporting to non-reporting that  
2 could be biasing the results.

3  
4 **MR. DETTLOFF:** Yes, that certainly adds an additional complication,  
5 and it is something that we could look into, and so it's another  
6 assumption that we have to make now with this limited data  
7 selection, and it's something that we can look into.

8  
9 **CHAIRMAN NANCE:** Paul, please.

10  
11 **DR. MICKLE:** Thank you, Mr. Chair. Just to provide us a little  
12 bit more information to what's been talked about, it's really  
13 difficult, what has happened, from switching from the 3G  
14 technology, which is a private sector, right, move, and it was  
15 really interesting. With the Northern Gulf Institute, we work  
16 with NESDIS and NCEI very closely, and this popped up on our radar,  
17 and I want to make a couple of clarifications.

18  
19 It's a really difficult thing that happened. Switching from 3G to  
20 the 5G LTE, there is no bridge to build there, and it really was  
21 a difficult switchover. The terrestrial, like the trucking and  
22 all those things, they're on cellular networks, and so they could  
23 switch very easily. The offshore, it just brings in this perfect  
24 nightmare, which is nobody's fault, but it's just really hard to  
25 really tackle.

26  
27 I have computer scientists, and developers, that are on my staff,  
28 and they're amazing and terrifying, what they can write and do,  
29 and we got in a room and tried everything we could to build a code  
30 bridge on being able to convert 3G to the 5G LTE, to try to assist  
31 with this without having to buy new hardware and everything for  
32 the fleet, and it just couldn't be done, and it was just -- I  
33 wanted to share that, and it's not an easy thing to do, but, from  
34 2020 on, this is obviously a major issue, mailing things in, and  
35 I just wanted to provide clarity that it's really a difficult thing  
36 that happened, and, when the private sectors do these type of  
37 technology changes, it really blindsides everybody, and it's a  
38 difficult thing that's happened.

39  
40 Also, on Slide 2, your diagram, things have shifted, and the server  
41 is no longer located at NGI, at Stennis Space Center, and it's  
42 actually at Ashville, and this is a move that NMFS did, and all of  
43 NOAA is doing, for cloud migration, and so it's just a process,  
44 but you might want to update this, for your accuracy of the  
45 presentation here, and things like that, but understanding what is  
46 happening, moving forward, and the concerns of having actually  
47 three categories for acquiring statistical uncertainty is  
48 certainly something that needs to be addressed, because of this.

1  
2 Now my last -- I actually have a question. When you're entering  
3 into year-three of mailing chips, how is it going, and I know you  
4 have compliance, and things like that, ratios, but is there  
5 trending, and is it getting better, of mailing chips in, and is  
6 there any plans on tackling this, so we can stop having to mail  
7 chips in? Thank you.

8  
9 **MR. DETTLOFF:** That's a question that maybe Dave or Becky would be  
10 better able to answer, online, and I don't have a great answer to  
11 that.

12  
13 **CHAIRMAN NANCE:** Do you have that, Molly, here -- I know we had a  
14 presentation on it at the meeting, but maybe Alan, and we don't -  
15 - I know it was kind of dropping off, Paul, and I think there was  
16 around two-hundred-and-something that we were receiving, and so  
17 it's not up to where it should be.

18  
19 I did want to just say though, Paul, that I appreciate you saying  
20 that about -- Because, when we were developing this in 3G, the  
21 most difficult hurdle was allowing non-government phones to be  
22 able to access federal computers, and, in Stennis, we were able to  
23 have that server set up where we were able to get this data in,  
24 and it was -- Without that, this would have never happened, and I  
25 think, with that switch from 3G to 5G, it just has created a  
26 nightmare, in some areas, trying to work through that, and so I  
27 think part of what we're doing here is we're trying to figure out  
28 how to be able to collect this data in a new way, with new systems,  
29 and keep on going with where we've gone. Alan, I see your hand  
30 up.

31  
32 **DR. ALAN LOWTHER:** Thank you, Mr. Chair. I was just going to  
33 address the mail-out issue, and so we've been doing this for about  
34 two years, where I haven't really seen a big change, in terms of  
35 how many we're getting back, and it seems to be pretty consistent  
36 that around 60 percent of the cards are coming back, and that's  
37 with, you know, multiple reminders and some, you know, different  
38 letters reminding people of their responsibilities to participate  
39 in this data collection, and so I would say it's typically been  
40 about 60 percent.

41  
42 I think we haven't looked yet at is it the same 60 percent, and  
43 that might be something that's interesting, or are we getting, you  
44 know, people dropping off and coming back in, and that might be  
45 something to look at, but, you know, it's not -- This is not a  
46 sustainable way to collect this data, and so we're, you know,  
47 hoping that we can do something that's more passive. Thank you.

1 **MR. DETTLOFF:** I want to just mention, in terms of affecting the  
2 algorithm, the bigger issue, with the non-receipt of data is, if  
3 a vessel is completely missing, that can be handled, because then  
4 it will show up in the numerator of that landing scaler. The  
5 bigger issue is you have vessels that are only partially reporting,  
6 and you have no idea how much of their actual effort you got, and  
7 so, if it's completely missing, that can be handled, but it's the  
8 partial reporting that's really going to affect the result of that  
9 algorithm.

10  
11 **CHAIRMAN NANCE:** Thank you. Matt.

12  
13 **DR. FREEMAN:** Sure, and so a couple of comments, based off of  
14 questions from the SSC, and, regarding the return rate, I did want  
15 to note, as well, that I believe it was last August that the  
16 council had its Outreach and Education Technical Committee  
17 convened, and they reviewed that, and the council provided a letter  
18 of recommendations from that technical committee, in terms of how  
19 to improve that return rate.

20  
21 In the meantime, the council does have, in front of it, a draft  
22 framework action, given that the cELB units are not transmitting,  
23 and have not been transmitting for the past two years, and so, as  
24 the discussion has mentioned, folks have been having to mail in SD  
25 cards.

26  
27 At the upcoming April meeting, the council will be receiving  
28 presentations, with final results of research studies, comparing  
29 where vessels have had the cELB units onboard, as well as various  
30 cellular VMS devices and other potential units, and so the council  
31 will be getting an update in April on that data comparison, to  
32 hopefully have a better idea of a path forward, in terms of  
33 replacing those current cELB units.

34  
35 **CHAIRMAN NANCE:** Thank you, Matt. Don.

36  
37 **MR. BEHRINGER:** Thank you, Mr. Chairman, and so is the endgame  
38 ultimately to always have some fraction of the vessels have ELBs  
39 and some not, or is this a period of time where we're trying to  
40 make sure that the data being collected with these is how that  
41 compares to historic data patterns, with the ultimate goal of  
42 having all vessels have ELBs, and is that the sort of endgame, and  
43 then, at that point in time, going in the future, it will just be  
44 updates in technology and dealing with passive versus active data  
45 submission and that sort of thing, and what's the sort of endgame?

46  
47 **MR. DETTLOFF:** There's been -- I know there's talk about universal  
48 selection, and that would be great, from my standpoint, and most

1 of these assumptions would go out the window with that, but, as  
2 far as actually implementing that, maybe somebody could better  
3 speak to that.

4  
5 **CHAIRMAN NANCE:** I will speak, just because, from a fisheries  
6 standpoint, I know that there are groups within the shrimp fishery  
7 that would like to move into all vessels have electronic logbooks,  
8 so there's not this issue with trying to calculate effort and those  
9 types of things, but I think, from the fishery point, they're  
10 trying to move into that, talking about that, and I'm not sure  
11 what the agency's -- But Dr. Gloeckner is on, and so we'll hear  
12 from the agency, as far as what they're thinking about doing.  
13 David, please.

14  
15 **DR. GLOECKNER:** I think Jim kind of hit the nail on the head, and  
16 I think, optimally, we would like to have a universal selection,  
17 but, even if we discuss changing the selection every year, based  
18 on some weighting metric, you're still talking about rotating the  
19 vessels that are selected, and the new vessels will have to go buy  
20 those VMS units, if that's what we end up selecting as the  
21 reporting tool, and so, eventually, you're probably going to have  
22 all the vessels required to, at some point, purchase a VMS unit,  
23 and so I think that's where I'm coming down on this, is we might  
24 as well require everybody to go ahead and do the universal  
25 selection, because, eventually, they're probably going to have to  
26 have a VMS anyway, and so I think that's where I'm headed with  
27 this, is we're going to have to discuss some way to improve the  
28 way that we select the vessels, and that will probably end up with  
29 all vessels eventually having to have these units, and so I think  
30 that's my reasoning, at this point, and that's the argument I would  
31 like to make once we get to this discussion at the council. Does  
32 that satisfy your question?

33  
34 **MR. BEHRINGER:** Yes. Thank you.

35  
36 **CHAIRMAN NANCE:** Thank you. Jason, please.

37  
38 **MR. SAUCIER:** Matt sort of answered my question, and I just was  
39 curious about, on the council level, you know, what's the path  
40 forward, and when are they going to make a decision on something.  
41 I will say, to what Dave was mentioning, that's one of the thoughts  
42 that I had, was, if we are going to rotate random selection, with  
43 any of these new programs that we do on a state level, there is a  
44 grace period that you have to build into these programs.

45  
46 You can't expect fishermen to be able to install and have things  
47 running correctly on a one-year cycle, and expect to get reliable  
48 data or participation, because there's always going to be glitches

1 that they have to overcome, and so that was just my two-cents of,  
2 you know, an annual change might bring up some other issues.

3  
4 **CHAIRMAN NANCE:** Thank you. Matt, please.

5  
6 **DR. FREEMAN:** So that's a great question, in terms of when the  
7 council might make a decision on how to replace the cELB units,  
8 and I will certainly be looking to the council for guidance, in  
9 terms of further developing that draft framework action, at the  
10 April meeting.

11  
12 I will note too that the council certainly recognizes that, even  
13 when they do take final action on a document, once they've decided  
14 on something, you know, there will still be a period for when that  
15 new device, whether it's cellular VMS or whatever, would be in  
16 place on new vessels, and so they're cognizant of the fact that  
17 the mailing of SD cards is still going to take, you know, a little  
18 more time into the future, and so recognizing that is a piece of  
19 this larger puzzle, in terms of effort estimation and other issues  
20 that have come up, and the council is aware of the importance of  
21 that data, and we discussed this at the workshop the other week.

22  
23 You know, most recently, the role that the effort estimates play  
24 in other issues, such as proposed expansion of the Florida Keys  
25 Sanctuary to sites for wind energy, offshore aquaculture, et  
26 cetera, and, you know, it is a useful tool for the shrimp industry,  
27 in terms of larger management outside of sort of direct shrimp  
28 management.

29  
30 **CHAIRMAN NANCE:** Thank you, Matt. Tom, please.

31  
32 **DR. FRAZER:** Thanks, Jim, and so I just want to go back to the  
33 question that Don had, and then Rich weighed-in as well, with  
34 regard to observer coverage, and so I'm thinking about this a  
35 little bit, and so, the way that the effort was laid out in one of  
36 your earlier slides, there was like -- I can't remember what it  
37 is, 20,000 to 30,000, twenty-four-hour fishing days, right, and  
38 then so now we recognize that there are three kind of discrete  
39 pools of folks out there, ELBs, you know, with those that are  
40 reporting and those that are not, and then you've got half of the  
41 fleet that has none of that, but so what's the overall observer  
42 coverage look like in the shrimp fleet for those thousand vessels,  
43 approximately a thousand vessels, and then how is that broken up  
44 proportionately amongst those kind of three component parts?

45  
46 **CHAIRMAN NANCE:** I don't know the exact number, and it's never  
47 been -- Usually 1 to 2 percent of the vessels are covered with the  
48 offshore observers, and I'm not sure how that's changed since I've

1   been gone.

2  
3   **DR. FRAZER:** I think it gets to Rich's question, right, and so, if  
4   you're trying to evaluate whether or not you're representatively  
5   capturing the effort in the entire fishery, you have observer  
6   coverage that is proportioned, you know, equally, or not, and I  
7   don't have the answer to that, and I'm just trying to learn  
8   something about the observer coverage right now.

9  
10   **CHAIRMAN NANCE:** Matt.

11  
12   **DR. FREEMAN:** You covered it, and I was going to just simply  
13   respond that observer coverage is roughly 1 to 2 percent each year.

14  
15   **CHAIRMAN NANCE:** Thank you. Okay. I think we're at a point where  
16   we'll go ahead and take a break, and here's what I want you to  
17   think about. There's a couple of things that we need to really  
18   focus on, is shrimp effort, the calculation, and is this new  
19   methodology -- Do we have issues with that? If so, what those  
20   are, and how do we move forward on that, and certainly the  
21   placement of units, and do we have any recommendations on that,  
22   and those types of things, and so I think there's two discrete  
23   things that we need to talk about, the units themselves, and how  
24   we get those on the vessels, and then the data, and how do we  
25   calculate effort.

26  
27   Just a reminder, and probably one of the most impactful data  
28   streams in the Southeast is the shrimp effort, and it's used in  
29   most of the assessments for all the reef fish species, and it's  
30   used for calculation of turtle capture, and it's used in the sea  
31   turtle bi-ops, red snapper offshore, and there's a lot of data  
32   streams that use this effort data, and so it's a critical  
33   component.

34  
35   It has been -- The algorithm to estimate effort really is the same  
36   way since 1960 on, and the data that goes into that has changed a  
37   little bit, and it was port agents, and, if you remember -- Most  
38   of you are too young, but, in the 1980s, the 1990s, those types of  
39   things, we had really good port agent coverage. All the major  
40   ports in the United States, the Gulf of Mexico and that type of  
41   thing, had port agents and collected this data, and we had a good  
42   inflow.

43  
44   As we've gone to trip tickets, we're collecting that more  
45   electronically now, and we've lost that ability to have individuals  
46   there to be able to collect data, and so we've lost a little bit  
47   of that, and so, while the data that's coming in is a little  
48   different, the algorithms that are used to collect effort have

1 remained the same, and so we want to talk about effort, and is the  
2 algorithms that are being used, or proposed to be used -- Do we  
3 have any issues scientifically with those, and then do we have any  
4 recommendations for moving forward with electronic logbooks, how  
5 do we want to see the sampling going and those types of things,  
6 and so those are the things that I want you to be able to think  
7 about and be able to come back and discuss after our break. We'll  
8 go ahead and come back at 10:10. Thank you.

9  
10 (Whereupon, a brief recess was taken.)  
11

12 **CHAIRMAN NANCE:** We'll go ahead and reconvene. Let's dive into -  
13 - There was the part of calculating effort, and I guess there's  
14 two different parts. There's the algorithm that is used to  
15 calculate it, that Kyle has gone over, and there's also the data  
16 that feeds in, and I think a lot of the questions that were  
17 happening are the data that's being utilized, those types of  
18 things, and how representative is that of the fleet, those types  
19 of things, and so it's the actual calculation methodology, that we  
20 can discuss, the data streams coming in, and then being able to  
21 talk about the -- I said electronic logbooks, and whether that's  
22 VMS or electronic logbooks, those types of things, and how should  
23 those be -- Do we have any scientific recommendations on how those  
24 should be distributed into the fishery, how often, those types of  
25 things, and so we'll go ahead and start with the algorithm used to  
26 calculate effort. Any issues, concerns, or questions? We have  
27 Kyle here right now, and he's probably the most knowledgeable in  
28 that. Peyton, please.

29  
30 **MR. CAGLE:** Thank you, Mr. Chair. One of the questions I wanted  
31 to bring up, which was brought up at the workshop, was how not to  
32 get duplicate effort, meaning, if vessels that are required from  
33 another fishery using VMS are operating, and you're using 100  
34 percent of the VMS data, the ELB data now, how are you not going  
35 to capture those trips, if they're not tied to a trip ticket,  
36 meaning that they were out there shrimping?

37  
38 **MR. DETTLOFF:** The first stage is the data are filtered down to  
39 those vessels with an ELB onboard, with a -- An active ELB is step-  
40 one. Now, getting deeper into that, if say a vessel with an ELB  
41 onboard is doing some kind of other fishing activity that shows up  
42 exactly as the profile of a shrimp tow, there's no way to remove  
43 that without additional information about -- If that vessel is  
44 reporting both shrimp landings and landings of another species,  
45 there is no way to take any individual tow like that and say that  
46 it was non-shrimping activity.

47  
48 **MR. CAGLE:** From your presentation, it stated that you were going

1 to use 100 percent of the ELB data and not the 50 to 60 percent  
2 that had a trip ticket, and so how would you know if it had  
3 associated shrimping landings, or reef fish, if you're using 100  
4 percent of it?

5  
6 **MR. DETTLOFF:** That's 100 percent of the ELB-classified effort,  
7 what we believe is shrimping activity, and then the landings are  
8 used, which is a census, as a scalar, and that's only including  
9 shrimp landings, and so it's total shrimp landings of the fleet as  
10 a whole, versus non-ELB shrimp landings, and it's not considering  
11 landings from any other fishery in that scalar, and so it's just  
12 a way of scaling up what's been identified as shrimping effort, to  
13 the best of our ability, given the information with the position  
14 tracking system and nothing further to complement that, along with  
15 the census of landings we have for the fleet versus the ELB fleet.

16  
17 **CHAIRMAN NANCE:** Peyton, are you talking about someone, for  
18 example, that has a shrimp permit and a reef fish permit?

19  
20 **MR. CAGLE:** Yes.

21  
22 **CHAIRMAN NANCE:** So sometimes in the year they're reef fishing,  
23 and sometimes in the year they're shrimping, and I think, in our  
24 discussion, while the ELB is certainly calculating -- It's on all  
25 the time, and looking at that, a reef fish signature probably is  
26 going to be very different than a trawling signature. Typically,  
27 for a lot of those vessels, if they're using bandit reels, for  
28 example, they're going to be running fast, stopping, that type of  
29 thing, deploying their gear, and then moving on, and so that, from  
30 the shrimp algorithm, wouldn't be classified as trawling.

31  
32 I'm not sure if any of them set longline, but, if they were setting  
33 longline, that may show up as a signature of trawling, and I'm not  
34 sure, but I think most of those vessels, in my mind, would be  
35 trawling for shrimp part of the time and then bandit reel fishing  
36 the other, and I think those two signatures wouldn't conflict with  
37 signatures of effort.

38  
39 **MR. CAGLE:** Well, any possible overlay would be minimal.

40  
41 **CHAIRMAN NANCE:** I think so, yes. Matt.

42  
43 **DR. FREEMAN:** Sure, and so, just to add a little context to your  
44 question, from our draft document, that was something -- Not for  
45 that purpose, but we had looked into, and so I did want to note  
46 that, from July 2021, when we saw that there were 1,360 vessels  
47 with valid or renewable permits in the shrimp industry, of those,  
48 465 had permits in other fisheries, and, of those 465, there were

1 an estimated 113 that had to comply with the VMS requirements in  
2 other fisheries, and so just, again, providing some numbers and  
3 context for you.

4  
5 **CHAIRMAN NANCE:** Thank you. Any other questions or discussion on  
6 the algorithm part? David, please.

7  
8 **DR. CHAGARIS:** Thank you, and so I don't have any like major issues  
9 with the algorithm, and I think Josh pointed out some things that,  
10 you know, could be done to take out some of the subjectivity in  
11 the clustering, and so there's probably, you know, some  
12 improvements that could be made. I wonder too if there's any  
13 machine learning techniques that could be applied to those data,  
14 potentially if you paired them with observer data, to, you know,  
15 create a training dataset, and how that might help identify  
16 shrimping versus non-shrimping, and so there definitely could be  
17 ways to move this to a more sophisticated approach, but I think,  
18 really, the bigger issues are the list of assumptions that you  
19 had, and I know that others raised issues as well.

20  
21 I think a lot of those are testable, or at least, you know,  
22 graphically, demonstrating that, you know, hey, this is a  
23 representative sample, and, you know, we're covering the entire  
24 Gulf of Mexico, across all these stat zones, and I think that would  
25 really help, moving forward, to see that information, and then,  
26 you know, whether or not you take this as kind of a stratified  
27 approach, or a randomized approach, where different vessels are  
28 going to be, you know, carrying the ELBs from year to year, and I  
29 think that's something that would probably be valuable, so you  
30 don't get, you know, stuck in a situation where the vessels that  
31 were initially assigned in 2014 are no longer as representative as  
32 they were at that time, but, also, just keeping track of those  
33 assumptions, and testing them regularly, I think would help this  
34 body a lot. I just have comments, and I didn't have a question  
35 there. Thank you.

36  
37 **CHAIRMAN NANCE:** Thank you, and I appreciate those. We did, at  
38 the workshop -- We went through the R code, almost line-by-line,  
39 I think, and, from my perspective, and John Cole was there, and he  
40 was at LGL. He worked for LGL for many, many years, and he wrote  
41 the code for when we put the electronic logbooks on the vessels,  
42 and so he was looking at that, and so, as far as the code goes, it  
43 looks like it's doing what it's supposed to be doing, as far as  
44 calculating effort.

45  
46 One concern I have, and I'm not sure how to address it, is that we  
47 have the ability to use this new calculation method, and it starts  
48 in about 2014, and the -- Some of the baseline data that are used

1 to -- Like, for example, in the red snapper zone, you have to  
2 reduce effort by a certain percentage, in order to be -- To not be  
3 in violation for red snapper capture, those types of things, and  
4 those baselines were created in 2001, 2002, and 2003, and those  
5 are the baseline years, and so I don't know about -- Do we need to  
6 recalculate those baselines, and, if so, how do we do that, because  
7 you can't really calculate them anymore, but how do we -- Are those  
8 baselines going to be used and then new calculation methods used  
9 up against those baselines? I guess how is that going to happen?

10  
11 **MR. DETTLOFF:** That's a great question, and another one that I  
12 don't have an easy answer to. That's something that Clay may have  
13 addressed a bit, when he was in our workshop last week. Given the  
14 tight overlap of the new method versus the old, we would assume  
15 that what was calculated at the time, under the old method, was  
16 the best available scientific advice at the time, and going forward  
17 with the new method, but I would be happy to let anybody else at  
18 the Center speak to that, if they would like.

19  
20 **CHAIRMAN NANCE:** Thank you. Jessica, could you bring up Slide 10,  
21 please? This is that comparison slide that Kyle was referring to,  
22 and you can see that blue is the new methodology, and the red is  
23 what was calculated with the old methodology, and they certainly  
24 are very similar, and they follow the same basic trends. There is  
25 a little difference, but so you're -- Basically, 2014 on would be  
26 using the blue line, and, post-2014, you would be using the red  
27 line, back to 1960, and so are there issues with that?

28  
29 I know it's -- From what I understand, you really can't calculate  
30 back using the new methodology, because ELBs weren't in existence,  
31 and so it's just something, from the SSC's standpoint, to think  
32 about. If there is no further discussion on effort itself, on the  
33 algorithm, David, I appreciate -- It's those assumptions that I  
34 think are the critical things, and so, as you move forward with -  
35 - Kyle, as you move forward with the estimation, it would be good  
36 to be able to look at those assumptions and see if any are in  
37 violation, those types of things, and I think that would give the  
38 SSC a better feeling of how close we are to the randomization of  
39 the data. Any recommendations on those assumptions and ways to  
40 look at them?

41  
42 I think Richard gave a good point too, is there are really three  
43 different groups now. There is those that don't have an ELB, those  
44 that have an ELB and have sent the data in, those that have an  
45 ELB, but haven't sent the data in for the last couple of years,  
46 and so how different are those, and, since we really only have  
47 data for one of those, trying to figure out how different the other  
48 ones are is a little bit of an issue, I think. Kyle.

1  
2 **MR. DETTLOFF:** You could add another category to that as well, and  
3 it's the really difficult category of those who have sent partial  
4 information, and that's really the assumption that's very hard to  
5 test, and the one that's going to have the biggest impact on the  
6 result, and so those that have not reported at all -- It's easier  
7 to account for that, but, those that you're getting partial  
8 information from, you have no idea how much of that partial  
9 information you're getting.

10  
11 **CHAIRMAN NANCE:** With the partial information though, you're not  
12 assuming they would do that the whole year, and you're just  
13 assuming that they would do that for the timeframe that you're  
14 looking at, and is that correct?

15  
16 **MR. DETTLOFF:** Well, so, when you're scaling up, if your numerator  
17 and denominator -- Your numerator is those that have not reported,  
18 or have not shown any ELB effort, and so, if a vessel is completely  
19 absent, in terms of ELB data, their landings are going to end up  
20 in the numerator, even if they have an ELB onboard, but they're  
21 not transmitting data, and you're going to scale them up as if  
22 they didn't have an ELB, according to landings, and so it's  
23 complicated when we do have a vessel that showed ELB effort for  
24 part of the year, but it may not have been the complete effort for  
25 that year, and so their landings are still going to end up in the  
26 denominator, because they did have an ELB effort at some point in  
27 the year, but you just don't know if you are getting complete  
28 effort from that device or not.

29  
30 **CHAIRMAN NANCE:** Thank you. Richard.

31  
32 **DR. WOODWARD:** So, when somebody sends in the SD card, I mean,  
33 does it not -- It doesn't capture the whole historical record, and  
34 is that what happens? I mean, it only captures a couple of months,  
35 or why is it so partial? Where are the holes appearing?

36  
37 **MR. DETTLOFF:** Yes, that's my understanding, and maybe Becky could  
38 have a better answer to that, but, from what we're seeing in 2021  
39 so far, just in terms of the ratio of number of pings to number of  
40 vessels with activity, it appears there is some kind of partial  
41 reporting going on, and I have not formally quantified that, or  
42 delved into it too deeply, but I think there is potential to be  
43 only getting partial data with these chips.

44  
45 **CHAIRMAN NANCE:** I think what would be happening -- Richard, what  
46 would be happening, I think, is the SD card would be capturing  
47 everything. If a unit is turned off, you may have a period of  
48 time when they're fishing, but the unit is off, and I think that

1 is what is being portrayed, is that the SD card is capturing  
2 whenever it's on, and it's going to capture everything, and it has  
3 the ability to store that data for years, but it's -- I think it's  
4 whether the unit was turned on or not while it was fishing, and  
5 that could be what is being portrayed, is that you've got a period  
6 that, in May, it's on, and a period in July that it's on, and,  
7 whether they fished in between those, we don't know, and I think  
8 that would be the issue. Matt.

9  
10 **DR. FREEMAN:** Sure, and so my understanding is that new SD cards  
11 get mailed every six months, and I think part of the rationale for  
12 doing that is, when you have the cELB devices that were  
13 transmitting continuously, the agency had a better sense if there  
14 was something wrong with the cELB units, because, from time-to-  
15 time, they had to be replaced. Currently, since they're not  
16 transmitting, they don't know if they're not functioning properly,  
17 and so, rather than wait for too long of a period to have folks  
18 send the SD cards back -- Like I said, I think there's multiple  
19 reasons, but I think that's one of them as well, so they can, you  
20 know, potentially see if there's problems with those units.

21  
22 **CHAIRMAN NANCE:** Thank you. John.

23  
24 **MR. MARESKA:** Matt, following up on that, just looking at the  
25 attrition rate, and so the number of cards that are being mailed  
26 out, is that what's going on there, and it's not that they're  
27 losing vessels, and it may that we're losing units, and so maybe  
28 the units aren't being replaced?

29  
30 **DR. FREEMAN:** So that's a great question, and it's actually  
31 something that I asked about during the workshop two weeks ago,  
32 was whether or not that -- The fact that the number of mailouts  
33 was slightly decreasing over time, if that was a function of people  
34 leaving the industry, or units not being replaced or whatever, and  
35 my understanding is, if there is a damaged unit, they are being  
36 replaced, and so I don't think we had a confirmed answer, but, if  
37 I were put on the spot, my assumption would be that it's likely  
38 that those folks have left the industry, and so, again, that could  
39 potentially play into as well, you know, are we getting a smaller  
40 number, is it representative of the entire industry, et cetera.

41  
42 **CHAIRMAN NANCE:** Okay. Thank you. Tom, anything from the council,  
43 as far as -- I know that the Shrimp AP will be looking at this,  
44 and then it looks like Alan -- Let me talk to Alan. Go ahead,  
45 Alan, on that subject, please.

46  
47 **DR. LOWTHER:** I was just going to point out that, while we've  
48 continued to mail antennas to people who have requested them, we

1 haven't been sending out new units, and so, if a unit has  
2 completely failed, haven't been replacing those since 2019, and so  
3 some of it is units failing and some of it is, you know, attrition  
4 in the fleet.

5  
6 We don't -- Since James Primrose left, we haven't had anybody who  
7 actually programs the units, and so we haven't been replacing them,  
8 and part of the reason, also, is that we didn't anticipate that  
9 this chip process would go on for so long, and so, you know, I  
10 think we're hoping to get away from this and move to something  
11 else.

12  
13 **CHAIRMAN NANCE:** I think, Alan, and I appreciate that. I know,  
14 when we started this, the chip process was going to be just a  
15 short-term deal, while we moved from one unit to another, and we've  
16 kind of dragged on for a little while here, and so we need to move  
17 forward on this, and I think that's what -- From the council's  
18 perspective, it's looking at the Shrimp AP will be able to look at  
19 it, and the council, so that we can move forward on -- While we  
20 have, I think, a good algorithm to be able to estimate effort,  
21 it's a matter of getting the data to be able to feed into that  
22 that people are comfortable with, both from a landings perspective  
23 and from an offshore unit VMS, for lack of a better word, where  
24 we're getting that data, to be able to feed in together to be able  
25 to calculate effort.

26  
27 **DR. FRAZER:** I mean, I think the council recognizes the importance  
28 of maintaining, right, some continuity in the effort data, right,  
29 and I think that's first and foremost in their mind, and I think  
30 you're right, Jim, that, originally, we thought there might be a  
31 short-term fix, but I think the goal is going to be to get the  
32 best effort data that you possibly can, not just because it  
33 characterizes the shrimp fishery, right, but because of all of the  
34 ancillary data that are needed, particularly the bycatch, and so  
35 I think what you'll see is, again, a recognition of the importance  
36 of implementing something that allows us to collect that data,  
37 regularly and reliably and representatively, like Dave was saying,  
38 but, also, you know, cost effectively, right, and that's part of  
39 the issue here. I think people are starting to see, you know,  
40 that we need to fix this problem, pretty quickly, and so that's  
41 where the effort will be.

42  
43 **CHAIRMAN NANCE:** Thank you, Tom. Josh, please.

44  
45 **DR. KILBORN:** Thank you. I am going backwards a little bit in the  
46 conversation here, but I was just curious, and someone put up some  
47 numbers, earlier, of cards that were mailed out and returned, and  
48 some of them had no data on them when they were returned, and so

1 I'm assuming that's different than missing data, and like so, if  
2 you look at a year, right, there was 314 received, and 280 had  
3 data on them, and so the other thirty-four -- Were those incomplete  
4 data, or just no data at all, and what does that mean for the  
5 vessel that those cards were received from?

6  
7 **CHAIRMAN NANCE:** Alan, I will give you an opportunity to hear what  
8 Becky has to say, and then -- Because, Josh, I don't know on that,  
9 but certainly the fishery group would know that, for sure, and so  
10 we'll give Alan a second to contact individuals, and then he'll be  
11 able to --

12  
13 **DR. KILBORN:** Thank you.

14  
15 **CHAIRMAN NANCE:** Alan, please.

16  
17 **DR. LOWTHER:** Thank you, Mr. Chairman. If we receive a chip back  
18 with no data on it, we don't really know what happened to it, and  
19 there's a couple of possibilities. They may have, you know, just  
20 mailed it back to us after they received it, and they could have  
21 not fished at all, or they could have put it in their unit, but  
22 the unit was defective, and didn't record locations, or they could  
23 have put it in the unit, but they didn't turn on the unit, and so  
24 there's -- That is something that we just can't really determine.

25  
26 **CHAIRMAN NANCE:** Josh, did that address --

27  
28 **DR. KILBORN:** So there's just no follow-up on them at all, and so  
29 there's no repercussions for the permit holder or anything like  
30 that?

31  
32 **DR. LOWTHER:** Because of the time lag, we haven't been, you know,  
33 trying to be tough, in terms of enforcement, and we're trying to  
34 bring everybody along gently, I would say, but we -- With the last  
35 mailing, we realized that we weren't getting -- You know, because  
36 it's such a slow process, we're not getting timely feedback from  
37 the shrimpers, and so the last mailing was sent with a feedback  
38 card, saying, you know, when you're returning this, did you fish,  
39 did you not fish, do you have equipment that's broken, and so we  
40 did realize that we needed to get some more information on that,  
41 and so we did --

42  
43 On this latest mailing, we received a lot of feedback, and so, you  
44 know, we haven't had a chance to act on that feedback yet, because  
45 we just received it with the last mailing, and then we've also --  
46 You know, in terms of the, you know, monitoring compliance, we  
47 have kind of started making the reminder letters a little stronger,  
48 pointing out their obligations to report, and I think that did

1 help with the returns a little bit. You know, again, we're still  
2 in that 60 percent you brought up.

3  
4 **DR. KILBORN:** Thank you.

5  
6 **CHAIRMAN NANCE:** Thanks, Alan. Don.

7  
8 **MR. BEHRINGER:** Thank you. It seems that everything we're talking  
9 about is about -- It all deals with these cards and these chips,  
10 and, I mean, does it go without saying that sort of the number-  
11 one priority should be figuring out getting back to a passive  
12 system, and, I mean, is that really -- Because that seems like  
13 number-one, because that will solve many of these problems.

14  
15 **CHAIRMAN NANCE:** That will solve all of them.

16  
17 **MR. BEHRINGER:** Right, and, secondly, I mean --

18  
19 **CHAIRMAN NANCE:** It's a matter, I think, of getting viable units  
20 on the vessels, and this was a -- This was put into place because  
21 we lost 3G, and there wasn't a unit that was on it, and so this  
22 was going to be like a few months, in theory, and this is dragging  
23 on, and now we're in --

24  
25 **MR. BEHRINGER:** So we're still in a bridge, and so we're actively  
26 looking for --

27  
28 **CHAIRMAN NANCE:** We need to get off the bridge and move into a  
29 whole new system.

30  
31 **MR. BEHRINGER:** Gotcha, and then, second, in my opinion, getting  
32 a unit on every single one of the vessels would solve a lot of  
33 these issues as well, if that's a possibility.

34  
35 **CHAIRMAN NANCE:** Don, thank you.

36  
37 **MR. BEHRINGER:** Sure.

38  
39 **CHAIRMAN NANCE:** David.

40  
41 **DR. GRIFFITH:** Thank you, Mr. Chair. I was just going to say that,  
42 given the uncertainty over why people are returning these chips  
43 that are empty, or, you know, why they're not participating at  
44 all, and I know that, when they've put electronic devices on  
45 vessels before, people will do things like put garbage cans over  
46 them, so they don't transmit, you know, information, and so I would  
47 suggest, as a social scientist, that maybe you guys could look  
48 into why people -- What the incentives are for these people to not

1 report, or what their biases are against, you know, this kind of  
2 government oversight and things like that.

3  
4 I mean, again, there's just so much uncertainty about why these  
5 people are not participating. I like the idea of putting these  
6 electronic devices on all vessels, but, again, I think people would  
7 figure out ways to get around them. Thanks.

8  
9 **CHAIRMAN NANCE:** Thank you, and, yes, you're right. There's no  
10 way to really know why somebody does what they're doing, but, if  
11 we had them on each of the vessels -- You're never going to get  
12 100 percent. Like you're saying, people will figure out ways to  
13 be able to avoid, but I know, from the standpoint of -- A lot of  
14 them -- I mean, when the vessels went on -- We didn't have a lot  
15 that were turned off when people used them, for sure. Jack.

16  
17 **DR. ISAACS:** I think it's just important to remember that these  
18 type of data problems, incomplete data, inaccurately-reported  
19 data, are also going to be present with any method. The trip  
20 ticket system, I'm sure, has the same, or a lot of similar,  
21 problems bedeviling them.

22  
23 **CHAIRMAN NANCE:** Perfect. Any recommendations from the SSC, going  
24 forward with this? I think we've got quite a few that we've  
25 mentioned, and I think two issues here is, from the effort  
26 calculation, it seems like we've got a pretty good mathematical  
27 model, and, right now, we've got some concerns with data, and we've  
28 got a chip system that is feeding into this. How reliable the  
29 data is from that, from this bridge, is questionable, and  
30 recommendations on what we would like to see in the future, and  
31 certainly having a unit on each vessel. Kind of like with reef  
32 fish, I think all the vessels have a unit, and so I think that --  
33 Certainly, from a scientific standpoint, that would be the best,  
34 in that you have every vessel with a unit, and that uncomplicates  
35 a lot of the scientific uncertainty around data coming in.

36  
37 It's just like landings data. In theory, 100 percent of the  
38 landings are supposed to go through the dealers. Now, whether 100  
39 percent do or don't, and you're always going to have some that are  
40 peddled, that don't go through a dealer, and it's probably a very  
41 small percentage, but you would -- There's not really any knowledge  
42 of that, but, anyway, we have what goes through the dealers. If  
43 we have these units on all the vessels, at least we have a -- We're  
44 fairly certain that we're getting a lot better representation of  
45 the effort. Richard, please.

46  
47 **DR. WOODWARD:** Thank you, and so I would say that I think it's  
48 important to test whether or not the assumptions that are inherent

1 in the model are still valid, and that should be presented  
2 alongside this compare historical effort and historical landings  
3 of those who were in the fishery, or in the program, and are not  
4 currently reporting, versus those that are currently reporting, to  
5 just sort of give a test of that hypothesis, and it sounds like  
6 perhaps there maybe be more technology, which there may be issues  
7 behind that, which would be probably much more random than my  
8 original concern, which is just sort of people not following  
9 through, but, anyway, as I said, that's a testable hypothesis.

10  
11 I also just looked at the -- Just looking at this figure, again,  
12 the confidence bounds on these estimates don't seem to be changing  
13 very much over time, and, yet, the sample that is being used to  
14 calculate that effort is falling by half, which would suggest that  
15 there should be -- The confidence bound should be growing, and so  
16 I'm just wondering, and is that -- Are you taking into account --  
17 In these estimates, does it take into account the fact that the  
18 number of observations of your effort are declining over time?

19  
20 **MR. DETTLOFF:** Yes, that comes in with the finite population  
21 correction to each of these, and that's based on the proportion of  
22 the ELB fleet over the total fleet that we're getting effort from.

23  
24 **DR. WOODWARD:** ELB reporting or ELB total?

25  
26 **MR. DETTLOFF:** ELB reporting, and so anything in the denominator,  
27 whether it had an ELB or not, must have reported ELB effort to be  
28 considered ELB fleet. That proportion, even though it has dropped  
29 off a bit through time, like I mentioned earlier, it's still --  
30 We're talking 50 percent coverage of the fleet, which is why some  
31 of these bounds are so narrow, and just keep in mind too that this  
32 is only quantifying the uncertainty due to the survey weighting,  
33 scaling the effort estimate up, and it's not accounting for any  
34 uncertainty at the effort level of what may or may not have been  
35 false positive or false negative effort. This is really just  
36 assuming we have -- We're getting an effort estimate that's true  
37 effort, and this uncertainty is just due to what we can quantify  
38 due to the survey scaling to the fleet.

39  
40 **CHAIRMAN NANCE:** Trevor.

41  
42 **MR. MONCRIEF:** I mean, I think -- It seems like we're kind of going  
43 down this road, and it's been said by a couple of different  
44 individuals at this point, that a recommendation is to have  
45 complete fleet coverage with all this. I think, in light of recent  
46 events, and thinking about some mandate that goes across the entire  
47 fishery -- I think, if that recommendation is something that the  
48 group wants to pursue, I certainly would support it.

1  
2 I think what David mentioned needs to be a prerequisite before  
3 that occurs. It's real easy to just say, if we had complete  
4 coverage, everything would be better, but complete coverage can  
5 also lend yourself to a lot more, you know, unknown issues that  
6 pop up when you try to bring in an entire fleet to do some mandatory  
7 program, and so, you know, I think that's a fair recommendation to  
8 make, but I think, if we do make it, let's go ahead and make sure  
9 that our Ts are crossed and the Is are dotted on the beforehand  
10 socioeconomic type surveys, to figure out people's motivations of  
11 why they don't want to participate and what motivates others to  
12 participate, because I think both of those questions are equally  
13 valid.

14  
15 **CHAIRMAN NANCE:** Thank you. Tom.

16  
17 **DR. FRAZER:** I am just trying to -- Again, I'm not sure that I can  
18 speak for the whole council right now, but, yes, I guess I am. I  
19 mean, so there are a couple of things here, as I said before, and  
20 I think there's a recognition that we've got a deteriorating data  
21 stream, right, and, regardless of the recommendation that might  
22 come from this group with regard to a longer-term fix, you know  
23 whether it's universal coverage or whatever, and there will  
24 certainly be problems with that, right, as we've seen in recent  
25 kind of legal issues with other sectors, but I think people have  
26 to recognize that, even if that's the recommendation, it will take  
27 years to implement something like that, and so we're in a situation  
28 now, with that deteriorating data stream -- Are we in a position,  
29 or is this group in a position, to make some recommendations that  
30 ensures that the integrity of the data that we collect, over the  
31 next several years, two or three or four years, is sufficient for  
32 us, right, to manage not only the shrimp fishery, but to gather  
33 the ancillary information that we need as it bears on the  
34 management of other fisheries, and so that, to me, is what we need  
35 to come from this body.

36  
37 **CHAIRMAN NANCE:** Luiz, please.

38  
39 **DR. BARBIERI:** Thank you, Mr. Chairman, and I don't disagree at  
40 all, Tom, and, I mean, I think that makes perfect sense. To me,  
41 and, you know, I'm kind of sitting back and observing here what's  
42 going on, and I think that the committee has looked at this  
43 methodology, has looked at the realities associated with data  
44 collection and equipment and otherwise reporting, et cetera, all  
45 the issues that exist, and, even accepting all of those, we do not  
46 have enough information in front of us to make a fair assessment  
47 on whether this methodology is acceptable or not, or the estimates  
48 are meeting the goals that were outlined to be met, in terms of

1 the program, until we can see some more information on the  
2 assumptions that are I guess in Slide 5, right, and so Richard  
3 articulated that, a while back, pretty well.

4  
5 Even if those cannot be formally tested, you know, as two  
6 hypotheses using data and processes to, you know, test hypotheses,  
7 at least give us some information on what are the issues there  
8 that make those assumptions potentially acceptable, and, if there  
9 are issues, problems, with those, does the agency have a plan to  
10 get those addressed or mitigate those problems, so we can have --  
11 You know, then we deal with the imperfections that we know, you  
12 know, exist in every assessment, because the data will be  
13 imperfect, and the analysis is not going to be satisfactory, in  
14 many cases, and we don't have power over that, right, and so we  
15 can accept those uncertainties as part of our analysis here, but  
16 I think there is more that we need to hear about those assumptions,  
17 right, for us to be able to move forward.

18  
19 **DR. FRAZER:** I think you're right. I mean, but, right now, I mean,  
20 under a best-case scenario, we're getting about -- Through the  
21 reporting, we're capturing 25 percent of the fishing effort in the  
22 total population, but it's deteriorating, or declining, over time,  
23 right, because of the quality of that data, and so a question is,  
24 two years from now, I mean, are you going to have an attrition  
25 rate where you're only getting 10 percent, and is that 10 percent  
26 still satisfying those five assumptions on your Slide 5, right,  
27 and, if that's the case, that's the best you can do, right, but,  
28 if you only have 10 percent of the fleet that's being sampled, and  
29 you have no confidence that the assumptions are valid, that's a  
30 bigger problem, okay?

31  
32 **DR. BARBIERI:** To that point, I agree completely, Tom, and so  
33 that's what I'm saying. It's not just a discussion of, you know,  
34 an intellectual discussion, right, of what these assumptions are,  
35 or what information will satisfy them, but it's also understanding  
36 that, most likely, not all of those are going to be satisfied, and  
37 how is the agency considering this, right, and what actions are  
38 being taken for this committee to have confidence that we're going  
39 to be able to provide some evaluation of the analysis that is  
40 trustworthy.

41  
42 **DR. FRAZER:** Part of the reason I was going back to the observers,  
43 right, is because I know that we can put observers on boats,  
44 regardless of what happens, right, and that's kind of a constant,  
45 and so thinking about some recommendations, and do you want to  
46 maintain some minimum observer presence that's representative of  
47 the fleet?

1 **CHAIRMAN NANCE:** Sean, please.

2  
3 **DR. POWERS:** So, I agree with this conversation that you all had,  
4 and the key thing is am I satisfied with 25 percent, or, if it  
5 goes to 10 percent, and, well, the confidence intervals are pretty  
6 tight, and so -- But, to Luiz's point, the key is, as long as we  
7 have some reason to believe that these assumptions hold, then,  
8 whether it's 10 or 25 percent doesn't bother me, because those  
9 confidence intervals are so tight, and so it really does -- It  
10 seems like the only way to assess those assumptions is to put  
11 observers on the boats, I mean on both, obviously, vessels with  
12 the system and vessels without the system. That's the only way to  
13 test those assumptions, and, if the assumptions look like they're  
14 supported, then, I mean, I think the confidence intervals tell us  
15 that we're capturing the trend correctly.

16  
17 **CHAIRMAN NANCE:** But I think the confidence intervals are based on  
18 -- If I'm hearing Kyle right, it's not overall confidence, and  
19 it's basically the data we're receiving only, as opposed to the  
20 whole -- You know, how confident we are within the whole dataset.

21  
22 **MR. DETTLOFF:** Yes, and they're really the confidence intervals  
23 given these assumptions are met, and so you're assuming -- The big  
24 thing is spatial representation, and that's something that -- You  
25 know, we're not assuming these because we want to, and we're  
26 assuming these because we have to, and the only way to get at that  
27 spatial representation is to have some kind of groundtruthing with  
28 observer coverage. We can soften the assumptions, you know,  
29 according to the landings scalar, if we're assuming that landings  
30 are highly correlated to effort, and we're scaling up in that way,  
31 but it's really the spatial component.

32  
33 We don't have, you know -- Of the non-ELB vessels, we have zero  
34 spatial information on that, in any given year, and so you're  
35 needing to put observers on both these ELB and non-ELB vessels to  
36 see if we have any way of groundtruthing that at all.

37  
38 **CHAIRMAN NANCE:** I am going to follow-up real quick, and John Cole  
39 reminded me why we came up with this term "electronic logbook".  
40 It's, during the development stage of these devices, we had three  
41 data collection streams on every vessel that we looked at. We had  
42 an observer that was taking effort, and we had captain's log that  
43 was taking the effort, and we had the electronic logbook that was  
44 there collecting effort, and so we had those three streams, to see  
45 how confident we were in the data that was being collected.

46  
47 Now, that was back in 2000, when we came up with this methodology,  
48 and so, certainly, as we go forth, and as we start to get a

1 representative sample, we need to figure out how representative  
2 that is of the fleet now. Katie.

3  
4 **DR. KATIE SIEGFRIED:** Thank you, Mr. Chair. I'm not a member of  
5 the committee, and so I appreciate being able to ask some  
6 questions, and so I think that the confidence intervals that were  
7 shown were before the degradation, that what we saw ended in 2020,  
8 and what Kyle has been talking about, you know, as far as, and  
9 what Becky showed us were degraded data streams from 2020 on,  
10 right? Okay, and so I don't think that it will always be that  
11 tight of a confidence interval.

12  
13 Also, as to the assumptions, sort of what Luiz had brought up,  
14 these are the same assumptions that have been made in the past  
15 with the LGL code, and so I don't know that it's necessarily, you  
16 know, what's being asked right now is are we meeting these  
17 assumptions, because the SSC has been implicitly saying sure, the  
18 whole time they've been using -- You know, we've been using the  
19 time series from LGL.

20  
21 The first part of what Kyle did here was try to match -- Try to  
22 figure out how to get the code so that more than one person at the  
23 agency could use it, and get it modernized and improved, anything  
24 that could be improved in the time series, and you see it's a  
25 pretty good job trying to replicate what was done from 2014 to  
26 2019.

27  
28 I think more -- I think a more useful thing right now to discuss  
29 is what should we do when we know the data will continue to degrade,  
30 and should we go through the statistical machinations of figuring  
31 out how to have Kyle tell us the minimum number of, you know, ELBs  
32 reporting that will work, or is there some other recommendation?

33  
34 I mean, putting more observers onboard could have other effects,  
35 like what David, or Rich, mentioned before, as far as the way that  
36 the industry feels they're being monitored. I'm not sure that  
37 more observers onboard is any better, for the way that they  
38 perceive that action, than VMS, and so I think those are some  
39 things to consider. We're not revisiting these assumptions for  
40 the LGL code, and I think we're talking more about how these are  
41 more violated than they ever have been, as the ELB data degrade.

42  
43 **CHAIRMAN NANCE:** Thank you, and that's absolutely right. Luke,  
44 please.

45  
46 **DR. FAIRBANKS:** Thank you. The conversation has moved a little  
47 bit past when I put my hand up, but I just wanted to address some  
48 of the comments earlier about issues of non-compliance, or non-

1 participation, and, I mean, it's obviously difficult to understand  
2 people's motivations for participating and complying with rules  
3 and programs like this, but I did want to point out that, you know,  
4 it's not impossible, and I think we often, you know, look to  
5 surveys, or observer programs, which provide, you know, useful  
6 information, but something like a survey could similarly -- You  
7 could see similar attrition rates, or fatigue, that you see from  
8 a program itself, and so, you know, I do think it's useful to keep  
9 in mind that there are other methods that might be useful to  
10 understand some of these issues of, you know, motivations of  
11 decision-making and behavior, whether it's interviews, focus  
12 groups, ethnographic research, to really understand why -- You  
13 know, why people are participating in ELB and why they're  
14 participating correctly or not correctly and why they're complying  
15 or not.

16  
17 It's not -- These things aren't necessarily easy, but the options  
18 do exist. You know, it requires effort, a different type of effort  
19 than we often apply, but it wouldn't necessarily be a substantial  
20 amount of funds, depending on how something like that was  
21 implemented, and so, you know, I just wanted to make -- You know,  
22 just remind ourselves that there are ways to get at, you know,  
23 underlying issues of motivations and things like that, even though  
24 it can be tricky to then reintegrate that information into -- You  
25 know, down the line, in terms of the data or stock assessment or  
26 whatever it may be. Thank you.

27  
28 **CHAIRMAN NANCE:** Thank you. If you think about -- If we are  
29 recommending that every vessel has an ELB, Assumptions 3, 4, and  
30 5 basically are gone, and, basically, if you're trying to look at  
31 Assumption Number 1, is that device capturing all fishing activity,  
32 having observers on the vessel with that ELB certainly is -- You  
33 can be able to look at that, that assumption, and then there's no  
34 systematic bias in classification of effort from the ELB, and I  
35 think an observer would be able to do those too, and so, basically,  
36 I think, if we move into a system where everybody has got an ELB,  
37 and 3, 4, and 5 are kind of -- We don't have to worry about that,  
38 and 2 and 3 can easily -- I won't say "easily", but can be looked  
39 at again.

40  
41 When we first put these on, we did look at those, and we felt  
42 comfortable with what was happening. Now, have things changed  
43 over those years? Possibly, but be able to relook at those. Kyle  
44 and then Richard.

45  
46 **MR. DETTLOFF:** Yes, that's exactly right, and, going back to 1 and  
47 2, we did, in fact, look at that for 2014 to 2020, as I mentioned  
48 earlier, and it appears there is no systematic bias. The

1 distribution is centered around zero, except for those few cases  
2 where the ELB device was not capturing activity, and there was an  
3 observer reporting effort, and so there's some possible issues  
4 with Number 1, but at least we can be confident in Number 2, that,  
5 even the 2014 through 2020 trips, there did not appear to be any  
6 systematic bias in the ELB calculation versus the observer  
7 reported.

8  
9 **CHAIRMAN NANCE:** Richard.

10  
11 **DR. WOODWARD:** Perhaps it's already being done, but I think one  
12 recommendation would be to use the observer program to  
13 intentionally test the assumptions on Slide Number 5, to go out  
14 and specifically say, given that our data stream is deteriorating,  
15 how can we use the observers to find out whether or not these  
16 assumptions are still valid.

17  
18 **CHAIRMAN NANCE:** Okay. Jim.

19  
20 **DR. TOLAN:** Thank you, Mr. Chairman. On Slide 10, where you show  
21 the two patterns, they pretty well match up, and it shows a drop  
22 in effort, and I appreciate -- You showed us the western Gulf,  
23 because that's where most of the effort takes place, but do you  
24 see a similar degradation of the data in the eastern Gulf, and,  
25 also, a good match to the pattern in the eastern Gulf, also?  
26 Thanks.

27  
28 **MR. DETTLOFF:** Yes, we do, and I'm sorry I don't have that slide  
29 in here, but, if you look at a Gulf-wide, it's essentially the  
30 same pattern, the same trajectory, and the same overlap.

31  
32 **CHAIRMAN NANCE:** This one was calculated because of the red snapper  
33 area, which was a critical piece of information, and how good does  
34 it represent that area, and that's why it was shown.

35  
36 **DR. TOLAN:** I was just thinking about the pink shrimp fishery, if  
37 you see the same sort of patterns.

38  
39 **CHAIRMAN NANCE:** Thank you. So do we have -- I will certainly  
40 entertain any motions. Richard, do you have a motion or anything?  
41 You know, it sounded like -- Because I think there's -- While we're  
42 looking forward to having -- Trying to get units on, right now,  
43 we've got a system of collecting data that seems to be -- Maybe  
44 it's going to be a couple more years of using it, and so are there  
45 recommendations from this body as to what, from the agency  
46 standpoint, we would like to see, to make sure that these  
47 assumptions are being maintained during this period of the bridge,  
48 while we're going from one system to another?

1  
2 **DR. WOODWARD:** I guess I had not thought about this, if there's a  
3 motion, but certainly the recommendation would be to, to the extent  
4 possible, test whether the assumptions underlying the code remain  
5 valid, and present those tests, in light of the fact that the data  
6 stream is going to be deteriorating for the foreseeable future, or  
7 is likely to be deteriorating for the foreseeable future, to  
8 determine at what point it doesn't make sense to -- Or expand the  
9 confidence bounds on our estimates, and that wasn't very clear.  
10 Sorry about that.

11  
12 **CHAIRMAN NANCE:** Okay. Are we putting that into a -- Okay.

13  
14 **DR. WOODWARD:** That's not possible.

15  
16 **CHAIRMAN NANCE:** We'll never know. Okay. Go ahead, Richard,  
17 please.

18  
19 **DR. WOODWARD:** All right. The motion is to test, to the extent  
20 possible, the assumptions underlying the analysis used to estimate  
21 fishing effort.

22  
23 **CHAIRMAN NANCE:** I think we need to add the five assumptions, and  
24 we could list those, used to estimate fishing effort in the Gulf  
25 of Mexico shrimp fishery. Then we could put those five  
26 assumptions. There we go. She's faster than I am. We need to  
27 add -- Somewhere we need -- Let's see. To the extent possible,  
28 test -- Used to estimate fishing effort in federal waters for the  
29 Gulf of Mexico, or in.

30  
31 **SSC MEMBER:** Would it be offshore waters?

32  
33 **CHAIRMAN NANCE:** I guess that's true. Put -- Well, let me ask  
34 this question, from the council perspective, and we estimate  
35 offshore, for federal vessels, and they fish state and federal  
36 waters, and so I think we always calculate effort as offshore, and  
37 not federal versus state, but I think more appropriate would be  
38 offshore waters. Thank you. Okay. Richard.

39  
40 **DR. WOODWARD:** It was suggested that I also say, "and this be  
41 brought back to the SSC for our consideration".

42  
43 **DR. FREEMAN:** Jess, can you put "and those results"?

44  
45 **CHAIRMAN NANCE:** We have a motion. Do we have a second?

46  
47 **DR. GRIFFITH:** I will second it.

1 **CHAIRMAN NANCE:** Okay. David Griffith seconds that motion.  
2 Discussion? Steve, please.

3  
4 **DR. SAUL:** Thank you, Mr. Chair. Are there pragmatic -- This makes  
5 sense, and I'm just wondering if there are pragmatic ways to  
6 actually test these different assumptions, given, again, that we  
7 don't have the same data collection system as we did in the past,  
8 and it sounds like we're going to have a different system in the  
9 future, and so, although this will be really useful, are there  
10 ways to address each of these five assumptions, or actually test  
11 them, because, if not, then the motion should be modified, and  
12 does my question make sense?

13  
14 **MR. DETTLOFF:** Yes, and so Assumptions 1 and 2 I believe are  
15 currently testable, and we've done work to do that. Assumptions  
16 3 and 4 I don't believe are testable without some kind of  
17 additional data from some kind of groundtruthing of a dedicated  
18 observer survey to be able to answer those, because we're  
19 completely, like I mentioned, lacking the non-ELB data, and,  
20 without some kind of groundtruthed survey with observers, 3 and 4  
21 are only testable with additional data. 5 I don't see as really  
22 testable in any way, because we're talking about non-reporting for  
23 ELBs and non-reporting for non-ELBs, and so it's two sources of  
24 information that we don't have anything for, and so that's just  
25 one that we're going to have to assume.

26  
27 **CHAIRMAN NANCE:** Richard.

28  
29 **DR. WOODWARD:** I would say that these are testable. Basically,  
30 the question that you're trying to ask is are the vessels that are  
31 entering that non-reporting group systematically different from  
32 those that are in the reporting group, and so -- You've got some  
33 historical data for those vessels that are in the non-reporting  
34 group, and were those vessels that systematically harvested more  
35 shrimp? Are they vessels that fished in different areas? You can  
36 look at those.

37  
38 The boats that are no longer sending their data in, are they  
39 different from the ones that are sending their data in, and that's  
40 the way I would test it, and I don't -- Obviously, there are  
41 assumptions, and I think, obviously, you're going to maintain the  
42 assumption that the original 500 was a representative sample, and  
43 that's a maintained assumption, and the question is not whether  
44 that assumption is valid, but the question is are the ones that  
45 are reporting now drawn from the same distribution as those that  
46 are not reporting now, and I think -- I think all of those  
47 assumptions could be tested in that way.

1 **CHAIRMAN NANCE:** Don.

2  
3 **MR. BEHRINGER:** I just would like to ask a point of clarification,  
4 based on something Steven said, and so the electronic logbooks  
5 were an additional mechanism to collect data, and are we no longer  
6 collecting data the way it historically was collected for decades  
7 prior to that, or is that data still being collected in exactly  
8 the same way, and now the ELB is stacked on top of that for a  
9 certain number of vessels?

10  
11 **CHAIRMAN NANCE:** In the past, we had port agents, and the port  
12 agents collected this data, and they did sampling of fishing  
13 vessels, interviews with the captains, and that data was used to,  
14 in the olden days, to be able to estimate effort within the fleet,  
15 and then we moved into the electronic logbook methodology, and so  
16 we did have an overlap period between port agents and the  
17 electronic logbook, and we were able to show the difference between  
18 those.

19  
20 Certainly electronic logbooks do a greater job of showing where  
21 effort occurs, as opposed to an interview from a captain that's  
22 been out for thirty days, and where did you fish, and he's trying  
23 to recall that, oh, yeah, we fished -- Those types of things.

24  
25 **MR. BEHRINGER:** Gotcha. Yes, I recall that you mentioned this  
26 earlier. Okay. Thanks.

27  
28 **CHAIRMAN NANCE:** You're very welcome. Paul.

29  
30 **DR. MICKLE:** We have moved on a little bit since I raised my hand.  
31 Thank you, Mr. Chair, and I just wanted to bring up a question,  
32 because I think, to Dr. Woodward's point, on Number 5, I just want  
33 to -- I'm trying to decide to support the motion or not.

34  
35 For Number 5, we have observers, and we have observers on non-ELB  
36 boats and ELB boats, and then some folks on the ELB boats are not  
37 mailing in their chips, and so that is enough data to calculate,  
38 or to test, Number 5, right, because we have data across the  
39 metrics here to create a statistical calculation, and am I missing  
40 something, and are observers not on the -- I would agree that all  
41 five are testable, but I would add, and I'm not talking about  
42 adding to the motion, but I would add that you can do a power  
43 analysis, because we have so much temporal data, to identify very  
44 precisely when these data are no longer informative to effort,  
45 because, once you have run a power analysis, you now have  
46 identified the end values, the number of samples that you -- If  
47 you're not reaching anymore, it's no longer valid, and that would  
48 help with still using this data right now, and justifying the power

1 analysis would give it some teeth here, saying this is still  
2 working, and it's meeting the assumptions.

3  
4 The other problem is, because you're not encapsulating the  
5 uncertainty, and you're just encapsulating the uncertainty within  
6 the data acquired, that's why the CVs, or the uncertainties, are  
7 staying so uniform throughout them.

8  
9 When your N goes down by half, every dataset increases, and this  
10 one isn't, and it's obvious why, and it's because the uncertainty  
11 is calculated in only the data that's being acquired, and so sorry  
12 that I touched three points there, but I don't have a big problem  
13 with this motion, because they're all testable, but I would think  
14 that I might make a motion after this suggesting, because this is  
15 what the SSC does, of looking at power analyses to identify when  
16 these are no longer informative, from a quantitative standpoint.  
17 Thank you.

18  
19 **MR. DETTLOFF:** I just wanted to reemphasize that everything  
20 presented, 2014 through 2020, that's before the drop-off, and so  
21 we're still -- There's an attrition in the fleet over time, and  
22 there's attrition in boxes over time, and we're still talking, up  
23 through 2020, 50 percent coverage, which is not -- As Sean  
24 mentioned, whether that's 50 percent coverage, 40 percent, 30  
25 percent, that's great, from a statistical standpoint, as long as  
26 it's spatially representative, and the spatial representation is  
27 something that you cannot really get at with a power analysis.

28  
29 In terms of making these spatial assumptions, by looking back in  
30 time, you're introducing a whole new suite of assumptions that  
31 these vessels would have otherwise maintained a constant spatial  
32 distribution over time, and so that's why I say that 3 and 4 are  
33 difficult to test without some kind of dedicated survey that's  
34 getting at that in the present time, without introducing a new  
35 suite of assumptions.

36  
37 **CHAIRMAN NANCE:** Josh.

38  
39 **DR. KILBORN:** Thank you. An alternative approach might be a  
40 simulation study, where you can actually model different, you know,  
41 potential non-ELB fleets, or eastern versus western differences in  
42 supposed effort across those things, and then determine how much  
43 effect that has on your actual calculation, or your estimation, of  
44 the final parameter, and I think that would be a useful exercise  
45 as well. Thank you.

46  
47 **CHAIRMAN NANCE:** Thank you, Josh. Mike Travis, please.

1 **DR. MIKE TRAVIS:** Hi, folks. I wanted to speak a little bit to  
2 the testing of these different hypotheses. One thing that you  
3 might want to look at, and so I know that people have been focusing  
4 on the spatial distribution of the vessels, but I don't think that  
5 that's the only issue at play here, from a -- You know, whether  
6 the current fleet that has units onboard is representative of the  
7 total fleet.

8  
9 If you -- Where I think we need to look is the permit data, and so  
10 I think Rich was talking about the nature of the vessels, which I  
11 think is important, because you can -- From the permit data, you  
12 can look at how the age of the vessels has changed over time, their  
13 freezer capability, the length of the vessels, horsepower, and  
14 then, from the vessel gear form, you can look at things like the  
15 nature of the gear, which, actually, you can probably get that  
16 from other data sources too, and whether they are owner-operated  
17 or hired-captain vessels.

18  
19 The reason I bring this up is because I already know, from previous  
20 analyses, that this fleet has changed with regard to some of those  
21 characteristics. The boats that are operating in the fishery now  
22 definitely have greater horsepower onboard, and more of the boats  
23 are freezer vessels, and we've lost a lot of the so-called ice  
24 boats over the years, and we have also started shifting towards a  
25 fleet that tends to be dominated by hired captains, as opposed to  
26 owner-operated vessels, and all those changes will affect how these  
27 boats operate.

28  
29 **CHAIRMAN NANCE:** Thank you, Mike. Matt.

30  
31 **DR. FREEMAN:** Sorry. I am trying to make notes and keep track of  
32 my thoughts.

33  
34 **CHAIRMAN NANCE:** The notes then will be perfect.

35  
36 **DR. FREEMAN:** Of course. You can ask Leann from the Shrimp AP,  
37 and I take impeccable notes. I guess I have two thoughts here.  
38 One is, if the motion passes, and, again, I'm sort of thinking out  
39 loud, on behalf of the SSC, how long it might take for this to  
40 come back to the SSC, and, along those lines, recognizing too that  
41 we have a SEDAR underway for shrimp, as well as for red snapper,  
42 and so, absent any direction on the current model, or, sorry, on  
43 the approach that Kyle presented on, I'm assuming that the current  
44 model would be used in those processes, and so just some food for  
45 thought.

46  
47 **CHAIRMAN NANCE:** I think the point is though, from the standpoint  
48 of this motion, is here's what we would like to see. I know we

1 have, and we're going to talk about this a little bit later, but  
2 we are moving into a research track for the shrimp fishery, for  
3 the assessment, and this is certainly part of that, and so this is  
4 -- I think what we're saying here is we need to -- Instead of just  
5 listing these as assumptions, do we have them looked at, that we  
6 want to be able to look at these and see how valid they are, and  
7 make corrections, if necessary, those types of things. Luiz and  
8 then Richard.

9  
10 **DR. BARBIERI:** Yes, exactly, Mr. Chairman, and, Matt, also, you  
11 know, the issue of us, you know, learning more, getting more  
12 information, on what's possible and what's not possible, and how  
13 do you mitigate with those things that are not possible for us to  
14 accomplish, but, still, we're going to need to account for this  
15 uncertainty in a way, right, that's more inclusive than what it is  
16 right now, and how are we mitigating that problem? How are we  
17 properly accounting for uncertainty in this shrimp effort, right,  
18 to make sure that, even if the accuracy -- You know, there's not  
19 too much we can do about it there, and the precision, you know, is  
20 more representative of what we would expect, in reality.

21  
22 **DR. FREEMAN:** Right, and so I wasn't knocking the motion at all or  
23 anything, and I guess I was just sort of thinking out loud, and  
24 like, again, I don't know if this will take the Science Center --  
25 If they will be able to bring this back to the SSC in August or  
26 not, or until the meeting after that, and I guess that was sort of  
27 why I was thinking out loud.

28  
29 **DR. BARBIERI:** Right, and, to that point, Mr. Chairman, please.  
30 Yes, Matt, and I think that your question was actually helpful,  
31 because, you know, this may be seen explicitly, you know, as  
32 something that is an insurmountable amount of work that is going  
33 to take years to accomplish, a whole lot of resources, and, you  
34 know, when -- If that's not possible -- I mean, if getting to the  
35 bottom of this, and that's my understanding, Richard, that is the  
36 idea here, and bring something back to help us better understand,  
37 right, how these assumptions are being met, or how have they  
38 satisfied the agency to be presented as a method that was  
39 acceptable, right, within their own internal review process, and  
40 that might be more informative for us.

41  
42 **CHAIRMAN NANCE:** Richard.

43  
44 **DR. WOODWARD:** I think -- First of all, it may make sense -- I  
45 said "to the extent possible", and I would add "to the extent  
46 possible, given currently-available data", so that we don't turn  
47 this into a major research project, but I also -- I mean, I don't  
48 think -- I think you can get 90 percent of the way with a very

1 little amount of work, and this should not be a massive research  
2 project, to say, okay, well, this should be the same for this group  
3 as this group, test it, and do they look the same, compare the  
4 distributions, and move forward, but I am probably underestimating  
5 the amount of work, or amount of time, that it's going to take,  
6 and I always do, but, if we added "to the extent possible, given  
7 currently-available data", that will at least truncate it, so that  
8 we're not turning it into a research project.

9  
10 **CHAIRMAN NANCE:** Jess, could you add that, please? I think it  
11 goes at the very end.

12  
13 **DR. WOODWARD:** To the extent possible -- **At the very beginning,**  
14 **"to the extent possible, given currently-available data".**

15  
16 **CHAIRMAN NANCE:** David, are you okay with that?

17  
18 **DR. GRIFFITH:** Yes.

19  
20 **CHAIRMAN NANCE:** Okay. Steven, please.

21  
22 **DR. SAUL:** Thanks, Mr. Chair. To that point, do we need -- What  
23 do we do in the interim, right? Do we need language that says,  
24 okay, we use -- Because I think this approach is, obviously,  
25 clearly an improvement on past efforts, and so, in the interim, do  
26 we recommend going forward with this approach, or do we continue  
27 kind of the old way of doing things? I think we should probably  
28 have some language that makes one or the other recommendation.

29  
30 **CHAIRMAN NANCE:** Okay. I am going to say there is no old way  
31 anymore. The old way is impossible to calculate, and so this is  
32 the only --

33  
34 **DR. SAUL:** It's the new way or the highway. Okay.

35  
36 **CHAIRMAN NANCE:** Yes. Kyle.

37  
38 **MR. DETTLOFF:** I also want to mention that these assumptions are  
39 a subset of the assumptions for the old approach, and it's not  
40 like these did not exist with the old approach. These have been  
41 assumed all along, and actually reduced a bit over the additional  
42 assumptions that you were making with the landings matching, and  
43 so these have been intrinsic to the estimation process the whole  
44 way along, and it's nothing new here.

45  
46 **CHAIRMAN NANCE:** That's absolutely right. Mandy.

47  
48 **DR. KARNAUSKAS:** Can I suggest a friendly amendment and say, "to

1 test the extent practical", because I think there's a big  
2 difference between "possible" and "practical", given time and  
3 staff constraints, and I think there's been a lot of good  
4 suggestions, like spatial power analyses and simulations, that I  
5 don't think we need to necessary go down.

6  
7 **CHAIRMAN NANCE:** That law degree helped you. Okay. I am going to  
8 read the motion. Motion to test, to the extent practicable, given  
9 currently-available data, the assumptions underlying the analysis  
10 used to estimate fishing effort in the offshore waters in the Gulf  
11 of Mexico shrimp industry and those be brought back to the SSC for  
12 consideration, and the five are listed below that. Is there any  
13 opposition to this motion? Any opposition online? Can they put  
14 their hands up, and any opposition in the room? Seeing none, the  
15 motion carries without opposition. Do we have any other motions?  
16 Paul.

17  
18 **DR. MICKLE:** I haven't thought about this a lot, but I would like  
19 to make a motion, or try to. The motion is to encourage -- The  
20 SSC suggests National Marine Fisheries Service look into new  
21 technologies into passive spatial monitoring within the shrimp  
22 industry.

23  
24 That probably needs a lot of work, but maybe some folks understand  
25 what I'm getting at here. Just step back from -- Technology, in  
26 my mind, can accomplish a lot of the hurdles here. There is so  
27 many new technologies out there, and there's a lot of work going  
28 on. Let's see. The video monitoring, it's very passive, and you  
29 don't have to run it all the time, but you just don't tell anybody  
30 when it's on or off, to save for data space, and these video data  
31 systems can now calculate landings on the deck, and they're even  
32 running speciation data from one versus another, the monitoring  
33 onboard, and observation can help with that, but these are new  
34 technologies.

35  
36 A lot of people don't know about them yet, what these AI, and these  
37 different things, can accomplish, and I think taking on all these  
38 issues that we're meeting, and we're battling with the assumptions  
39 here today, but, with all these things, it's really interesting to  
40 see where it could be in the future, and some of these high-dollar  
41 fisheries out west, in Alaska and things, they're utilizing these  
42 things, and in Iceland as well, and they're just doing really  
43 amazing things with the commercial fleets. They're actually not  
44 that expensive, and they're really meeting the assumptions needed  
45 for some of the analyses that we're, I guess, biding for, for here,  
46 and so --

47  
48 **CHAIRMAN NANCE:** Put offshore Gulf of Mexico shrimp industry.

1 Okay. Paul, does that satisfy what you're trying to --

2  
3 **DR. MICKLE:** Yes, and just a few more words. **To aid in meeting**  
4 **the assumptions of the current methods of calculating effort.** I  
5 am making it very pointed here, so that we don't go AWOL and just  
6 start doing technology that doesn't -- Spending a lot of money,  
7 but just very focused. Thank you.

8  
9 **CHAIRMAN NANCE:** Thank you. Roy.

10  
11 **DR. CRABTREE:** That's what the amendment in process that the  
12 council is working on now -- That is exactly what they're doing,  
13 right?

14  
15 **DR. FREEMAN:** Yes, sir, and so give me one second. I apologize.  
16 The current draft framework action has three alternatives, and one  
17 is to maintain the current method, where NMFS would be collecting  
18 the memory cards from the units via mail, and the second is to  
19 implement a cellular VMS requirement, and, as I mentioned before,  
20 the council will be hearing presentations in April, and so NMFS  
21 has done side-by-side testing of cellular VMS, two different  
22 systems, against the data collected by the cELB units, and then  
23 Alternative 3 was to install an approved electronic logbook that  
24 archives vessel position when on a fishing trip in the Gulf and  
25 automatically transmits that data, via cellular service, to NMFS,  
26 and that is something that LGL will be giving a presentation on,  
27 and so there are some options currently in the draft document.

28  
29 **DR. CRABTREE:** While I don't have any problem with the motion, I  
30 think we need to be clear that the council needs to address this  
31 issue, because this is a critical program, and it's kind of dying  
32 on the vine, and it needs to be fixed, because we need the data  
33 with it, and I have watched this process lag on for years now, and  
34 I think they need to make some decisions and fix this program.

35  
36 **CHAIRMAN NANCE:** Paul.

37  
38 **DR. MICKLE:** This is just a question, and I don't think it's been  
39 seconded yet.

40  
41 **CHAIRMAN NANCE:** It hasn't.

42  
43 **DR. MICKLE:** If it's been seconded, I have a question.

44  
45 **CHAIRMAN NANCE:** Okay. Let me hear from Dr. Gloeckner, and then  
46 we can go ahead and -- Dave, please.

47  
48 **DR. GLOECKNER:** I agree with what Roy just said. You know, we are

1 -- The agency is looking at other electronic monitoring methods,  
2 and, you know, we've got the VMS, or the new version of the  
3 electronic logbook, up for the council to consider, but, when we  
4 start talking about AI and cameras, we are actively pursuing that,  
5 and that's the whole reason that we hired Farron Wallace away from  
6 the west coast, because he was working on that on the west coast,  
7 and so he is essential to the Southeast bringing those types of  
8 technologies online.

10 The concern I have is it's taking us years just to move from what  
11 essentially was a VMS to a new VMS, and so bringing these new  
12 technologies online, and putting these on commercial vessels, is  
13 going to be a monumental task that may take us until the end of my  
14 career, and so I just wanted to make it clear that the agency is  
15 working on this, and we are exploring these options. We are  
16 working on an AI, on a library of images, so we can identify fish  
17 from a camera, from what we get from a camera, and we are getting  
18 close, but I think the heavy lift is going to be getting cameras  
19 on commercial vessels. It's going to be a hard sell, and I think  
20 that's going to be the biggest hurdle, and not necessarily the  
21 technology. Thanks.

23 **CHAIRMAN NANCE:** Thank you for that. Mandy.

25 **DR. KARNAUSKAS:** Thanks, Mr. Chair. I think Luke had some good  
26 points earlier about sort of the information we can get from focus  
27 groups, or social sciences, and, if what I'm hearing from Dave is  
28 that one of the biggest hurdles is going to be industry acceptance  
29 of these technologies, I don't know if the SSC wants to make some  
30 sort of recommendation, in terms of that we're looking at not only  
31 the technologies themselves, but industry uptake and some sort of  
32 focus group, or outreach, that could also help us interpret the  
33 current data streams as well. As Luke said, there's all sorts of  
34 reasons that people don't report, or they report incorrectly, and  
35 being able to understand why people are doing the things they're  
36 doing could help us with the current data streams as well.

38 **CHAIRMAN NANCE:** Thank you. We have a motion, made by Dr. Mickle.  
39 Do we have a second for this motion? Richard.

41 **DR. WOODWARD:** I will second it.

43 **CHAIRMAN NANCE:** Okay, and so we have a motion, and we have a  
44 second. Any further discussion? Do we have -- Jason, please.

46 **MR. SAUCIER:** Thank you, Mr. Chair. Sorry to jump in there late.

48 **CHAIRMAN NANCE:** That's fine.

1  
2 **MR. SAUCIER:** I guess my only concern is, and I'm not against the  
3 motion, but is this a redundant effort, if it's already something  
4 that the council is considering, and the Science Center is already  
5 exploring? If we pass this motion, what is it going to -- You  
6 know, where are we going to get with this motion, if they're  
7 already going through this exercise?

8  
9 **CHAIRMAN NANCE:** I agree to that point, and it's a -- I think we're  
10 reiterating what's happening, and maybe it just shows stronger  
11 that we would certainly like these things to be happening. Josh,  
12 please.

13  
14 **DR. KILBORN:** Yes, that was my question, too. Thank you.

15  
16 **CHAIRMAN NANCE:** You're very welcome. Paul.

17  
18 **DR. MICKLE:** I was going to suggest amending the motion just to  
19 the SSC supports NMFS' continued examination of new technology.

20  
21 **CHAIRMAN NANCE:** Okay. Richard, are you okay with that change?

22  
23 **DR. WOODWARD:** Perfect.

24  
25 **CHAIRMAN NANCE:** I think that -- Certainly that change addresses  
26 that, and we're not saying you need to be looking at this, and you  
27 haven't been, and, as Dr. Gloeckner pointed out, they have been  
28 looking at it, and I think this just reiterates that we, as a body,  
29 feel it very imperative that we start to look at ways to be able  
30 to collect data from this fishery in a passive manner that we're  
31 able to continue to be able to get these data streams that are  
32 critical to so much of the management of the Gulf of Mexico  
33 fisheries. Doug, please.

34  
35 **MR. GREGORY:** Thank you. I agree with the earlier comments that  
36 this seems redundant, and the specificity of the phrase "passive  
37 spatial monitoring" kind of concerns me, but, at the same time,  
38 it's broad enough to also concern me, and so I will definitely be  
39 voting against this particular motion. Thank you.

40  
41 **CHAIRMAN NANCE:** Thank you. Any other discussion on this motion?  
42 Mandy, please.

43  
44 **DR. KARNAUSKAS:** Sorry, and can I suggest a friendly amendment  
45 that we look at not just the technology itself, but the potential  
46 uptake in the industry, because, again, I think that's going to be  
47 a barrier. We might have the technology, but whether or not it's  
48 going to be accepted -- Paul, I don't know if you would consider

1 adding a phrase "examination of new technology and its potential  
2 uptake in the industry", or something along those lines. Thank  
3 you. **That's a better word, "acceptance".**

4  
5 **DR. MICKLE:** Yes, I agree with that amendment.

6  
7 **CHAIRMAN NANCE:** Okay. Richard? Okay. Any other discussion? I  
8 am certainly supportive of this, and I think it adds to that we,  
9 as a body, are very supportive of looking at putting new  
10 technology, and how can we have it implemented in the fishery.  
11 Just to have units is one thing, and getting it on and being able  
12 to utilize it is a whole different thing, and so I do like this.  
13 Paul.

14  
15 **DR. MICKLE:** Just one last thing, and so I really appreciate Farron  
16 Wallace's work to this point, and hopefully this further adds to  
17 the flame of what's going on, but I really like that the spatial  
18 component is in there. It's so important to our conversation here  
19 today, to understand that, with all the things going on at the  
20 council, and the protected areas always coming up at the council,  
21 and the spatial analysis helping the states, as well as the federal  
22 side, the spatial component is key. Thank you. That's all I have.

23  
24 **CHAIRMAN NANCE:** Thank you. Luke.

25  
26 **DR. FAIRBANKS:** I just wanted to say -- Well, first, thanks, but  
27 I think I would support this motion, but, you know, I don't know  
28 if there could be value in splitting it. If there are folks that  
29 think that examining the new technology is redundant, you know,  
30 they may or may not still support, you know, looking into potential  
31 acceptance, or related sort of research issues, as a separate  
32 thing, and so I don't -- You know, I guess we won't really know,  
33 until or unless we vote, but, you know, we could be kind of gumming  
34 it up a little bit, if there are folks that support one-half and  
35 not the other, or vice versa.

36  
37 **CHAIRMAN NANCE:** So we'll see here.

38  
39 **DR. FAIRBANKS:** Okay.

40  
41 **CHAIRMAN NANCE:** I think the way it's written, I think it's  
42 certainly supportive, but I am going to read this motion, and I  
43 guess, Jessica, we may have some of those that are opposing and so  
44 let's go ahead and do a roll call, but let me read the motion and  
45 then go ahead and do a roll call vote on it.

46  
47 **The SSC supports National Marine Fisheries Service's continued**  
48 **examination of new technology and its potential acceptance in the**

1 industry for passive spatial monitoring in the offshore Gulf of  
2 Mexico shrimp industry to aid in meeting the assumptions of the  
3 current methods of calculating effort.  
4  
5 MS. MATOS: David Chagaris.  
6  
7 DR. CHAGARIS: Yes.  
8  
9 MS. MATOS: Josh Kilborn.  
10  
11 DR. KILBORN: Yes.  
12  
13 MS. MATOS: Cindy Grace-McCaskey.  
14  
15 DR. GRACE-MCCASKEY: Yes.  
16  
17 MS. MATOS: Mike Allen.  
18  
19 DR. ALLEN: Yes.  
20  
21 MS. MATOS: Luiz Barbieri.  
22  
23 DR. BARBIERI: Yes.  
24  
25 CHAIRMAN NANCE: I am going to have -- Mike, let's see, is Reef  
26 Fish, right?  
27  
28 MS. MATOS: Am I only doing Shrimp?  
29  
30 CHAIRMAN NANCE: I think, for this -- For motions, I think we need  
31 to do the -- Mike, thank you, and I appreciate -- It will be Shrimp  
32 and Standing. I'm sorry.  
33  
34 MS. MATOS: Okay. All right. Hold on. Jim Tolan.  
35  
36 DR. TOLAN: Yes.  
37  
38 MS. MATOS: Sean Powers.  
39  
40 DR. POWERS: Yes.  
41  
42 MS. MATOS: Trevor Moncrief.  
43  
44 MR. MONCRIEF: Yes.  
45  
46 MS. MATOS: Doug Gregory.  
47  
48 MR. GREGORY: No.

1  
2 **MS. MATOS:** Peyton Cagle.  
3  
4 **MR. CAGLE:** Yes.  
5  
6 **MS. MATOS:** Jason Saucier.  
7  
8 **MR. SAUCIER:** Yes.  
9  
10 **MS. MATOS:** John Mareska. Sorry.  
11  
12 **CHAIRMAN NANCE:** Jack, yes. Jack Isaacs is Socio. Socioeconomic  
13 can vote, yes, and it's just basically the three Reef Fish.  
14  
15 **MS. MATOS:** Cannot. Okay.  
16  
17 **CHAIRMAN NANCE:** Cannot.  
18  
19 **MS. MATOS:** Okay. Jack Isaacs.  
20  
21 **DR. ISAACS:** Yes.  
22  
23 **MS. MATOS:** Okay.  
24  
25 **CHAIRMAN NANCE:** Steven can.  
26  
27 **MS. MATOS:** Steven Saul.  
28  
29 **DR. SAUL:** Yes.  
30  
31 **MS. MATOS:** Rich Woodward.  
32  
33 **DR. WOODWARD:** Yes.  
34  
35 **MS. MATOS:** Paul Mickle.  
36  
37 **DR. MICKLE:** Yes.  
38  
39 **MS. MATOS:** Benny Gallaway.  
40  
41 **CHAIRMAN NANCE:** Benny is away right now.  
42  
43 **MS. MATOS:** Harry Blanchet.  
44  
45 **MR. BLANCHET:** Yes.  
46  
47 **MS. MATOS:** Luke Fairbanks.  
48

1 DR. FAIRBANKS: Yes.  
2  
3 MS. MATOS: Mandy Karnauskas.  
4  
5 DR. KARNAUSKAS: Yes.  
6  
7 MS. MATOS: Don Behringer.  
8  
9 MR. BEHRINGER: Yes.  
10  
11 MS. MATOS: Steven Scyphers.  
12  
13 DR. SCYPHERS: Yes.  
14  
15 MS. MATOS: Jim Nance.  
16  
17 CHAIRMAN NANCE: Yes.  
18  
19 MS. MATOS: David Griffith.  
20  
21 DR. GRIFFITH: Yes.  
22  
23 MS. MATOS: Roy Crabtree.  
24  
25 DR. CRABTREE: Yes.  
26  
27 MS. MATOS: Luiz Barbieri.  
28  
29 DR. BARBIERI: Yes.  
30  
31 MS. MATOS: That's it, right? Correct? Cindy.  
32  
33 DR. GRACE-MCCASKEY: Yes.  
34  
35 MS. MATOS: Josh Kilborn.  
36  
37 DR. KILBORN: Yes.  
38  
39 MS. MATOS: David Chagaris?  
40  
41 DR. CHAGARIS: Yes.  
42  
43 MS. MATOS: Okay.  
44  
45 CHAIRMAN NANCE: Thank you. Okay, and so that takes care of that  
46 motion. I think we've moved forward a lot on this. Matt, did you  
47 have something, just from an endpoint?  
48

1 **DR. FREEMAN:** Certainly, and so, given that the council will be  
2 looking at the draft document again, and given some of the SSC's  
3 interest in assumptions, and the conversation from SSC members  
4 surrounding it, does the SSC want to make any sort of suggestion,  
5 or recommendation, that the council consider census-level coverage  
6 in its discussions? That's a question-mark, just so that, when I  
7 bring the document to them, I know, you know, if that is something  
8 that the SSC would like for them to consider, and it's not  
9 currently in the document.

10  
11 **MS. MATOS:** Don.

12  
13 **MR. BEHRINGER:** As I said before, I think it make sense long-term,  
14 and I didn't know if we were getting ahead of ourselves by bringing  
15 something like that up now, but, if it's worth of consideration by  
16 them now, as something that we, as a body, think would be  
17 worthwhile, then sure, I would --

18  
19 **CHAIRMAN NANCE:** Would you make a motion?

20  
21 **MR. BEHRINGER:** Sure. **Motion that the council consider adopting**  
22 **universal -- What's the terminology for it?**

23  
24 **CHAIRMAN NANCE:** Maybe that the SSC is supportive of --

25  
26 **MR. BEHRINGER:** **The SSC is supportive of universal adoption of a**  
27 **passive electronic monitoring system.** I mean, "passive", I think  
28 that was key, right? I mean, we wouldn't want to move in that  
29 direction without this being passive.

30  
31 **SSC MEMBER:** Speaking of passive, can we avoid the passive voice  
32 in the motion here and just say "the SSC supports", blah, blah,  
33 blah?

34  
35 **CHAIRMAN NANCE:** Thank you. The SSC supports universal adopting  
36 of passive electronic monitoring -- Let's see. **Adoption of passive**  
37 **electronic monitoring system in the Gulf of Mexico shrimp fishery.**  
38 Offshore Gulf of Mexico shrimp fishery.

39  
40 **MR. BEHRINGER:** So what is the definition of "offshore"?

41  
42 **CHAIRMAN NANCE:** It's basically beach out.

43  
44 **MR. BEHRINGER:** Okay.

45  
46 **CHAIRMAN NANCE:** It doesn't include the bays and estuaries. Don  
47 made that motion. Do we have a second for that motion? Do we  
48 have a second? Roy seconds. Mike, did you have a comment?

1  
2 **DR. TRAVIS:** I did. I think part of this I guess I will defer to  
3 Tom, in terms of whether the council is going to understand what  
4 the SSC is referring to here, when it refers to "universal adoption  
5 of a passive electronic monitoring system". I mean, I assume we're  
6 talking about census-level coverage with respect to whatever unit  
7 is used to collect the vessel position data, but it's a little --  
8

9 **CHAIRMAN NANCE:** Well, plus, Mike, I think the key is, as I present  
10 this to the council, I present it in a way -- I do the motion, but  
11 then, from a discussion standpoint, I say what we're attempting to  
12 do, and I think, from my understanding, we're all pretty similar  
13 with this, but we could change it a little bit.  
14

15 **DR. TRAVIS:** Okay. Wait. I'm not done, and so the last part of  
16 that, "in the offshore Gulf of Mexico shrimp fishery", is  
17 problematic, because the council, and the agency, can only speak  
18 to this with regard to federally-permitted vessels, and that would  
19 not necessarily cover all activity in offshore waters, because  
20 there are some vessels that are not federally-permitted that  
21 operate in state offshore waters, and so I'm not fond of that  
22 wording.  
23

24 **CHAIRMAN NANCE:** No, and I appreciate that, and so we need to  
25 change this one. The other ones, we could do "offshore" easily,  
26 because we were looking at effort. For this one, we cannot -- The  
27 council cannot adopt -- Within only federally-permitted vessels,  
28 and so "monitoring system for federally-permitted vessels in the  
29 Gulf of Mexico".  
30

31 **DR. TRAVIS:** Yes. Thank you.  
32

33 **CHAIRMAN NANCE:** Gulf of Mexico shrimp fishery.  
34

35 **DR. TRAVIS:** Yes.  
36

37 **CHAIRMAN NANCE:** Okay. Thank you, Mike. I appreciate that.  
38 Trevor.  
39

40 **MR. MONCRIEF:** Thank you, Mr. Chair, and so I kind of -- I brought  
41 up this before, that, if we're going to come up with a  
42 recommendation, and my thought process still stands on it. To me,  
43 you know, we're a scientific body, and we're trying to provide  
44 advice to the council as a whole, and while, you know, it's an  
45 easy route to go to just say we just want all the data from  
46 everybody, all the time, but, in practicality, I don't know if  
47 this is a motion to carry to fruition, right, and, if you look  
48 down beyond just simply saying, hey, why don't you just try it out

1 on everybody -- I mean, we have to define, or have some knowledge  
2 of some substantive need to get the data from everybody, and have  
3 it accepted by everybody.

4  
5 While the fishery is large, and it carries a large monetary value,  
6 and there are certainly a lot of folks participating, not as many  
7 as in the 1980s and 1990s, and, yes, it probably has some bycatch  
8 associated with other species, and it does, and we include that  
9 into assessments and everything else, the step, to me, is to limit  
10 -- Not necessarily limit, and that's the wrong word, but we  
11 shouldn't go all out to just try to designate, you know, universal  
12 compliance with a rule, just because we think that would allow us  
13 the best possible coverage, right, because we go down that road in  
14 every single instance.

15  
16 I think we need to do some due diligence here to either determine,  
17 or have whatever group is assigned to do this determine, if that's  
18 a practical look, or could we go down the road of just making sure  
19 we have a representative sample from the fishery, and it needs to  
20 be -- I will just -- I am not going to support the motion, simply  
21 because I don't like the thought of trying to push a universal  
22 adoption of any rule unless there is a direct, substantive need  
23 that can be illustrated across-the-board, and I just don't know if  
24 we have that here, in my mind.

25  
26 **CHAIRMAN NANCE:** Trevor, how about if I add this word? **I am going**  
27 **to say, "the SSC supports consideration of the".** How about that?

28  
29 **MR. MONCRIEF:** Yes.

30  
31 **CHAIRMAN NANCE:** Don and Roy, is that --

32  
33 **MR. MONCRIEF:** I think any consideration taken is substantial,  
34 right, because this isn't a small recommendation, or a point, and  
35 it's a pretty drastic one, if you look about complete coverage of  
36 everyone and everyone complying with these rules and everything  
37 else, and it's going to -- There's some ramifications behind it,  
38 is all I'm trying to say.

39  
40 **CHAIRMAN NANCE:** I think there's ramifications. Yes, you're right.  
41 Roy.

42  
43 **DR. CRABTREE:** Well, I would support -- Because my intent, with  
44 this motion, is to ask the council to make sure this is one of the  
45 alternatives that it considers. I suspect, in most places where  
46 we've required vessel monitoring systems of some sort, it has been  
47 on all vessels in the fleet, and the thing that I have a hard time  
48 grasping is you're going to need to move these units around, and

1 you're not going to put them on a subset of vessels and leave them  
2 there, and that becomes then a problem to move it around, because  
3 the vessel owners are going to own these units.

4  
5 Even if they're reimbursed for them, they still own them, and so,  
6 if you move them around, on an annual basis, within just a period  
7 of a few years, everybody in the fleet, probably, will have been  
8 selected and have one, and, if they have them on their vessels, it  
9 doesn't -- If it's a passive system like this, it seems to make  
10 sense, to me, that it should be on, and we should collect the data  
11 from it. I also think this gets around some of the difficult-to-  
12 test assumptions that are being made, because it eliminates them,  
13 because you don't have to make them anymore, but I support the  
14 change to the motion, that we're asking the council to make sure  
15 this is one of the things that they consider, and then we can come  
16 back in, when the amendment is more fully developed, and decide if  
17 we want to encourage it more forcefully than that.

18  
19 **CHAIRMAN NANCE:** Thank you. Josh, please.

20  
21 **DR. KILBORN:** Thank you. I understand everything Trevor is saying,  
22 and I agree with what Roy is saying, and so I think I would support  
23 this motion as it is, but, just kind of going back to some of what  
24 Trevor was saying, I would really have a hard time, personally,  
25 you know, agreeing to the notion that more data is not better.  
26 You know, just from a scientific perspective, I don't think asking  
27 for complete coverage is an offhand thing to do. I think it's  
28 actually very scientifically valid.

29  
30 I also think that, given the importance of this fishery and its  
31 impacts, given the bycatch on other fisheries, it's a doubly-  
32 important reason to have full coverage, and, third, given all the  
33 conversation that we've had today around the uncertainty of those  
34 vessels that are not monitored in this way, again, I think it's a  
35 very important ask, and so I would -- I hear what Trevor is saying,  
36 and I don't disagree with the ideas, but I do think that,  
37 scientifically and statistically, it is the right thing to do.  
38 Thank you.

39  
40 **CHAIRMAN NANCE:** Thank you. Peyton.

41  
42 **MR. CAGLE:** I just wanted to ask, and are we overstepping, at this  
43 point, considering they've not even determined yet what gear type  
44 of is going to be used to monitor offshore? I mean, if we go right  
45 now, and everybody is saying that, in two years, everybody has to  
46 get the current gear, but, in year-three, we go to a VMS, or to P-  
47 Sea WindPlot, now everybody is going to have to buy that gear too?

1 **CHAIRMAN NANCE:** I think this is saying that we are supporting  
2 having that, from the council perspective, to have universal  
3 coverage on the fishery, whatever unit is being placed on.

4  
5 **MR. CAGLE:** Would it be better to do this after that gear type is  
6 determined?

7  
8 **CHAIRMAN NANCE:** I think, in April, the council is going to start  
9 considering this amendment, which this is part of, and so I think  
10 we just want to go on record as, if the council is looking at  
11 universal coverage in this fishery, we, as an SSC, are supportive  
12 of that. I think that's what this is portraying, and it's not  
13 necessarily this is the only unit that you can get, and next year  
14 you've got to get this one, that type of thing. I understand what  
15 you're saying though, Peyton, absolutely. Jason.

16  
17 **MR. SAUCIER:** Thank you, Mr. Chair. I think what's gotten us to  
18 this point is we want to be -- We're looking at pretty concise  
19 confidence bounds currently, but we feel like, at some point, with  
20 data degradation, we will not be comfortable with making these  
21 assumptions, and so we're trying to get to a point where we ensure  
22 that we are going to remain comfortable in the interim and long-  
23 term, and so there's a huge disparity there.

24  
25 I think, if we're getting 50 percent, we're getting really good  
26 confidence intervals, right, but we're asking for up to 100  
27 percent, but sort of white noise that's going on is we continue to  
28 see apathy in participation on the current track, with the current  
29 technology, the SD cards, and participants are dropping off, or  
30 we're getting inaccurate data, and so I think what the motion is  
31 trying to get at is we're supportive of the best data we can get.

32  
33 That being said, and I'm not against the motion, but, that being  
34 said, do we need 100 percent participation, or 75 percent  
35 participation, knowing that that's not necessarily practical, you  
36 know, from a management, and we're not the management body, and  
37 we're just the science body, and is that necessary, or practical,  
38 and, ultimately, will the council approve that, and that's beyond  
39 us, but I don't think we need, necessarily, 100 percent. I know  
40 you mentioned that we do have that on the reef fish boats, and is  
41 that correct, and are there any other fisheries where we have a  
42 mandate for 100 percent participation?

43  
44 **CHAIRMAN NANCE:** Rock shrimp, all of them, I think, except for  
45 this one.

46  
47 **MR. SAUCIER:** So the precedent has been set across multiple  
48 fisheries?

1  
2 **CHAIRMAN NANCE:** Yes.

3  
4 **MR. SAUCIER:** Okay, and that was just my two-cents. I'm not  
5 against the motion, but I just think it's getting us well above  
6 and beyond what we need to be comfortable with the data.

7  
8 **CHAIRMAN NANCE:** Roy, please.

9  
10 **DR. CRABTREE:** In this motion, I don't think we're saying that you  
11 need to have 100 percent coverage. We're saying it should be  
12 considered in the amendment that's going to make modifications to  
13 this program, and then, in the consideration and analysis of this  
14 in the amendment, there will be a conclusion reached about whether  
15 100 percent coverage makes sense, or some lesser level, but I think  
16 the key here is we're just asking to make sure that is under  
17 consideration.

18  
19 **CHAIRMAN NANCE:** Kyle.

20  
21 **MR. DETTLOFF:** I just want to mention that, to be able to completely  
22 eliminate Assumptions 3 through 5, that's what takes the 100  
23 percent coverage, and so, with any kind of fractional coverage,  
24 those Assumptions 3 through 5 are going to exist at some level,  
25 and we may be more comfortable with them, with a higher coverage  
26 proportion, but, again, those confidence bounds don't do anything  
27 to get at the representativeness of that sample, and it's assuming  
28 that that's representative, whether it's 10, 20, 30, or 40, and  
29 so, in order to completely eliminate 3 through 5, that's where the  
30 universal comes in.

31  
32 **CHAIRMAN NANCE:** Thank you. Trevor.

33  
34 **MR. MONCRIEF:** Just a quick response, and it certainly has come up  
35 multiple times, not only at our commission, but in this group, and  
36 more data is not always better, and that's not the case here. Josh  
37 pointed out, and I agree with him completely, right, and, in this  
38 instance, having 100 percent coverage would definitely better the  
39 situation that we have now, but, as a group, right, we try to  
40 recommend the best possible recommendation for gathering data and  
41 collecting scientific information and everything else.

42  
43 If we went down that road every single time, right, I think it's  
44 real easy to just come to the conclusion that, yes, let's just  
45 mandate that we have 100 percent compliance in multiple aspects,  
46 this being one of them, but I think we have to see it with some  
47 lens of practicality, and some lens of fisheries management, to  
48 understand that, you know, recommending this does -- It does put

1 into motion a consideration of a rule that is going to have a lot  
2 of ramifications, repercussions, to it that might not necessarily  
3 been seen now, and we need to think about whether that's absolutely  
4 necessary, given the state of the fishery now.

5  
6 We have declines in federal permits, and that was presented to us  
7 two or three months ago, right, and we're not seeing an uptake in  
8 the federal shrimp permits, and they're just kind of dropping off.  
9 The fishery is in decline, and the costs are increasing, but the  
10 cost of shrimp is staying the same, right, and we have all these  
11 groups that are a part of us, economists and socioeconomists and  
12 everything else, to kind of talk through all these issues, and I  
13 feel like, just the direction that this fishery is going, and what  
14 we have seen, that, yes, I would like to maintain that adequate  
15 number, to have some representative reflection of effort in the  
16 fishery, right, and I think that's a great thing to have, but  
17 taking an increased step to 100 percent universal adaptation, it  
18 just doesn't make much sense to me, given that this fishery is not  
19 where it was in the 1980s and 1990s, and it's on the decline, and,  
20 yes, that's just kind of -- Just so you understand what my kind of  
21 thought process is.

22  
23 That's kind of where I'm seeing this from, and I think the  
24 recommendation is great to have 100 percent, but I think we need  
25 to see it from the other side as well, and I agree with Roy and  
26 his interpretation of the motion, right, and, if it's just coming  
27 up to be presented as a consideration within a document, to be an  
28 option there, to weigh-out the pros and cons, to see if it's there,  
29 then, yes, the motion is, you know, benign to me, and I think it's  
30 an adequate route to take. I just don't want it to be taken as  
31 more than that, because, you know, that's just a strange road, I  
32 think, for us to go down, looking at this fishery as a whole.

33  
34 **CHAIRMAN NANCE:** Thank you, Trevor. Harry.

35  
36 **MR. BLANCHET:** Thank you, Mr. Chair. Someone earlier had a  
37 question about whether a motion was even required, and, to Roy's  
38 point, I kind of feel that the council, in putting together its  
39 set of options, would always consider universal adoption as one of  
40 those things that it's going to do. It's got a history already in  
41 other fisheries, and so I don't know that this motion is  
42 particularly helpful to the council, in that respect, and it does  
43 have the potential for being taken as the SSC supporting the  
44 adoption and skipping over the consideration, and we have not done  
45 the type of power analyses, or other analyses, that would be  
46 necessary to be able to demonstrate that this is a scientifically-  
47 useful, or necessary, path to take, and so -- Sorry. I'm done.  
48 Thank you.

1  
2 **CHAIRMAN NANCE:** Thank you, Harry. I appreciate that. Doug,  
3 please.  
4

5 **MR. GREGORY:** Thank you, Mr. Chair. The essence of what I was  
6 going to say has kind of been said, but this motion needs to be  
7 accompanied by the scientific need for this motion, and addressing  
8 a few assumptions is, I don't think, adequate. The universal  
9 adoption of VMS in other fisheries was largely for enforcement  
10 reasons, not for data collection, and we're more interested in  
11 data collection than enforcement, I believe, or we should be, and  
12 so I'm bothered by this, for that reason, and then we end up, as  
13 I think Trevor said -- If we go through this, we'll end with a  
14 census of the data, with little to no uncertainty, and that's not  
15 statistical. I mean, that's not good, and there's a reason that  
16 MRIP doesn't try to sample every recreational fisherman.  
17

18 We do have a data collection program that does that, the headboat  
19 survey, and it would be worth looking at some of the pros and cons  
20 of that. There's a lot to be said for statistically-valid sampling  
21 and getting estimates of uncertainty, and so I am bothered by this  
22 proposal as well, because I don't see the need for it, from a data  
23 collection or scientific standpoint. Thank you very much.  
24

25 **CHAIRMAN NANCE:** Thank you, Doug. Steven, please.  
26

27 **DR. SCYPHERS:** Thank you, Mr. Chair. My points were pretty much  
28 stated, and share some of Trevor's concerns, and I feel like some  
29 of the erudition of consideration helped lessen those, and in some  
30 of the other points that have been made, and I was going to suggest  
31 a friendly amendment to kind of clarify this even a little bit  
32 more, than this is not focusing on just a universal adoption  
33 element, and so I was going to suggest adding, after universal  
34 adoption, "among other levels of coverage", and I know that that  
35 does weaken this, to the point that it may, you know, have less  
36 meaning, but I think it clarifies that we're not encouraging  
37 universal adoption. Then a small typo, and I think you can take  
38 out the word "the", right before "universal".  
39

40 **CHAIRMAN NANCE:** Let's see. Don and Roy.  
41

42 **MR. BEHRINGER:** Well, I mean, I think -- Isn't it they already  
43 currently consider other levels -- That we currently have other  
44 levels of coverage, and so this is just suggesting -- Again, it's  
45 just the consideration, and perhaps it doesn't make sense in the  
46 end, and perhaps there are logistical challenges and other aspects  
47 that wouldn't make it practical, but I think it just -- The spirit  
48 of the motion is such that it is considered as a possibility, and

1 it's one that make sense, and maybe it turns out it's not, but I  
2 don't think that we're -- In the verbiage of this motion that we're  
3 suggesting that, you know, we unequivocally support the adoption,  
4 but that we support a consideration of that as a possibility.

5  
6 **CHAIRMAN NANCE:** Let me ask you two. Don and Roy, that addition  
7 of "adoption among other levels of coverage", do you want that in  
8 there or not?

9  
10 **MR. BEHRINGER:** I just -- Personally, I don't think it's necessary.

11  
12 **CHAIRMAN NANCE:** Well, you're the motion maker.

13  
14 **DR. CRABTREE:** I don't have any objection to it, and it seems  
15 implicit, in the whole notion of it, that, if we're asking them to  
16 consider this, that you're going to consider it along with some  
17 other things, and so it doesn't bother me.

18  
19 **CHAIRMAN NANCE:** So in or out?

20  
21 **MR. BEHRINGER:** I would say out.

22  
23 **CHAIRMAN NANCE:** Out?

24  
25 **DR. CRABTREE:** Well, I would say in, which maybe means that I  
26 withdraw my second and someone else seconds.

27  
28 **MR. BEHRINGER:** I think it's redundant with what we're already  
29 doing, but, sure, we can leave it in. It's just redundant, in my  
30 mind.

31  
32 **CHAIRMAN NANCE:** Okay. Mandy, please.

33  
34 **DR. KARNAUSKAS:** To some of Doug's and Trevor's concerns, I'm  
35 wondering if we can make this more of a carrot than a stick and  
36 try and recognize that the data collection is not just an  
37 enforcement and control mechanism, but it also benefits the  
38 fishery, if we're looking at things like how wind energy is going  
39 to impact the industry, hypoxia, and water quality.

40  
41 If we had greater coverage, or universal adoption, we could have  
42 a much better sense for how the industry is being impacted by these  
43 external forces, and so I don't know if Don would consider a  
44 friendly amendment to something like -- A clause at the end of  
45 like "to benefit --".

46  
47 **CHAIRMAN NANCE:** I am going to try to just stick with this, only  
48 because this is -- I think we've tried to add -- I will say that

1 there is a large group of the industry that is looking at 100  
2 percent coverage, that they feel that 100 percent coverage would  
3 be a benefit to the industry. Okay. We're going to tie this up,  
4 and, Tom, last comment, and then we're going to vote on this.

5  
6 **DR. FRAZER:** I'm just trying to help you out, Mr. Chair, and so  
7 I'm thinking about how the council will kind of receive this whole  
8 discussion, right, and I think, just starting at the top, you know,  
9 the first order of business was there's this new approach, right,  
10 for essentially estimating effort, and it's the only approach now,  
11 right, and I think everybody is in agreement that it's improved,  
12 that it's better.

13  
14 Then there's the second element that says, you know, we've got  
15 this issue with regard to data collection presently, and there's  
16 concerns about the deteriorating nature of the data, right, and so  
17 you go, okay, well, do we know what the minimum data collection  
18 standards are, right, to get a couple of things, and we need the  
19 effort data, right, in order to deal with a couple of other issues,  
20 and not landings or catch, possibly, but bycatch as well, and those  
21 are the most important things, moving forward, and so there has to  
22 be some minimum level of collection, and what this body is saying  
23 is that, given the current program, right, what they're trying to  
24 get at, we're evaluating the assumptions to say whether or not  
25 we're achieving those minimum standards, all right?

26  
27 As part of that effort, in and of itself, evaluating those  
28 assumptions, there's a recognition, right, that some universal  
29 monitoring capability would eliminate, or alleviate, or satisfy,  
30 right, some of those assumptions, and so it will come up in the  
31 council discussion, and I'm confident of that. The way that the  
32 language reads, and is it a framework or an amendment, and I think  
33 it's an amendment, right?

34  
35 **DR. FREEMAN:** It's a framework.

36  
37 **DR. FRAZER:** A framework? You know, whatever the appropriate  
38 sample coverage is, right, it's really at the discretion of the  
39 agency, you know, and I think that's where it will get tricky,  
40 right, because it's the science advisor, I think, for the agency  
41 that says, you know, you're selected to be in the program. Right  
42 now, there's some subset of that. I mean, theoretically, that  
43 individual could say that everybody has to participate, and it  
44 would be implemented that way.

45  
46 The discussion really -- I mean, there is value in -- I am not  
47 sure -- I mean, census is the goal, right, and why you have sampling  
48 is to get close to the census, right, but whether or not it's

1   overly burdensome to impose that is the question, and those are  
2   the discussions I think that happen at the council level, you know,  
3   and so I think everything that is -- I think the council is fine  
4   with this, and it's not going to cause any heartache, and they  
5   will understand the context here.

6  
7   **CHAIRMAN NANCE:**   Because I do think consideration is -- Because  
8   you need to look at the social and economic, those types of things,  
9   to be able to see if this is even practicable.  Let me go ahead  
10  and read the motion, and we'll go ahead and do a roll call vote on  
11  it, and then we'll end.

12  
13  **The SSC supports consideration of universal adoption, among other**  
14  **levels of coverage, of passive electronic monitoring systems for**  
15  **federally-permitted vessels in the Gulf of Mexico shrimp fishery.**  
16  It's the same group again, yes, please.  Abstain may be -- Anyway,  
17  that's there to help you.  Perfect.  Okay.

18  
19  **MS. MATOS:**   Okay.  Steven Saul.

20  
21  **DR. SAUL:**    Yes.

22  
23  **MS. MATOS:**   Jack Isaacs.

24  
25  **DR. ISAACS:**   Yes.

26  
27  **MS. MATOS:**   Jason Saucier.

28  
29  **MR. SAUCIER:**   Yes.

30  
31  **MS. MATOS:**   Peyton Cagle.

32  
33  **MR. CAGLE:**    Yes.

34  
35  **MS. MATOS:**   Doug Gregory.

36  
37  **MR. GREGORY:**   No.

38  
39  **MS. MATOS:**   Trevor Moncrief.

40  
41  **MR. MONCRIEF:**   Yes.

42  
43  **MS. MATOS:**   Sean Powers.

44  
45  **DR. POWERS:**    Yes.

46  
47  **MS. MATOS:**   Jim Tolan.

1 DR. TOLAN: A real abstain.  
2  
3 MS. MATOS: Rich Woodward.  
4  
5 DR. WOODWARD: Yes.  
6  
7 MS. MATOS: Paul Mickle.  
8  
9 DR. MICKLE: Yes.  
10  
11 MS. MATOS: Harry Blanchet.  
12  
13 MR. BLANCHET: No.  
14  
15 MS. MATOS: Luke Fairbanks.  
16  
17 DR. FAIRBANKS: Yes.  
18  
19 MS. MATOS: Mandy Karnauskas.  
20  
21 DR. KARNAUSKAS: Yes.  
22  
23 MS. MATOS: Don Behringer.  
24  
25 MR. BEHRINGER: Yes.  
26  
27 MS. MATOS: Steven Scyphers.  
28  
29 DR. SCYPHERS: Yes.  
30  
31 MS. MATOS: Jim Nance.  
32  
33 CHAIRMAN NANCE: Yes.  
34  
35 MS. MATOS: David Griffith.  
36  
37 DR. GRIFFITH: Yes.  
38  
39 MS. MATOS: Roy Crabtree.  
40  
41 DR. CRABTREE: Yes.  
42  
43 MS. MATOS: Luiz Barbieri.  
44  
45 DR. BARBIERI: Yes.  
46  
47 MS. MATOS: Cindy Grace-McCaskey.  
48

1 **DR. GRACE-MCCASKEY:** Yes.

2  
3 **MS. MATOS:** Josh Kilborn.

4  
5 **DR. KILBORN:** Yes.

6  
7 **MS. MATOS:** David Chagaris.

8  
9 **DR. CHAGARIS:** Yes.

10  
11 **CHAIRMAN NANCE:** Okay. I appreciate those discussions. We'll go  
12 ahead and break for lunch, and we'll come back at 1:15 and resume  
13 shrimp.

14  
15 (Whereupon, the meeting recessed for lunch on March 7, 2023.)

16  
17 - - -

18  
19 March 7, 2023

20  
21 TUESDAY AFTERNOON SESSION

22  
23 - - -

24  
25 The Meeting of the Gulf of Mexico Fishery Management Council  
26 Standing and Special Reef Fish, Special Socioeconomic, Special  
27 Ecosystem, and Special Shrimp Scientific and Statistical  
28 Committees reconvened on Tuesday, March 7, 2023, and was called to  
29 order by Chairman Jim Nance.

30  
31 **CHAIRMAN NANCE:** Okay. We will get gathered and move on with our  
32 agenda. I think we're done with Agenda Item Number V, and we're  
33 now going to move on to Agenda Item Number VI, which is Review of  
34 New Shrimp Assessment Models, and we have Dr. Munch is online, and  
35 Dr. Stevens is here with us, and, Matt, would you go over the scope  
36 of work for this agenda item, please?

37  
38 **REVIEW OF NEW SHRIMP ASSESSMENT MODELS**

39  
40 **DR. FREEMAN:** Certainly, and so Dr. Stevens will present an update  
41 on the development of empirical dynamic models, and so EDMs, for  
42 predicting brown and white shrimp abundance in the Gulf of Mexico.  
43 This will be discussed in the context of the SEDAR 87 research  
44 track assessment, which will focus on brown, white, and pink shrimp  
45 in the Gulf, and so the SSC should consider the information  
46 presented and make any recommendations, as appropriate.

47  
48 **CHAIRMAN NANCE:** Thank you. Dr. Stevens, we'll go ahead and turn

1 the time over to you to start the presentation.

2  
3 **DR. MOLLY STEVENS:** Sounds good, and I think Steve Munch will be  
4 sharing his screen, since he'll be doing the bulk, the meat, of  
5 the presentation, once we get started, and so I'll give him a  
6 second to get that up.

7  
8 The purpose of this agenda item was to review new shrimp assessment  
9 models. Given that our research track assessment starts in July  
10 of this year, we thought it would be appropriate to give a summary  
11 of the empirical dynamic modeling workgroup, alongside some  
12 updates from Steve Munch and Cheng-Han Tsai.

13  
14 The workgroup was convened following a request to the Southeast  
15 Fisheries Science Center from the Gulf Council, after their April  
16 2022 meeting, and the purpose was to continue engagement of SSC  
17 members, council staff, and the shrimp industry throughout the  
18 development of shrimp EDMs. This was done to provide an avenue to  
19 address logistical and groundtruthing questions immediately,  
20 alongside receiving technical insight, institutional knowledge,  
21 management expertise, and on-the-water perspectives.

22  
23 This workgroup met three times from August to October of 2022, and  
24 the participants are listed here, and this was a mix of, again,  
25 SSC members, council staff, and the shrimp industry.

26  
27 Prior to the workshop commencement, participants were provided  
28 with an overview of EDM theory and examples in fisheries  
29 applications, and they were provided with an overview of current  
30 Gulf of Mexico shrimp EDM methods, results, and proposed next steps  
31 for the Gulf of Mexico shrimp EDM work.

32  
33 The objectives of the first two meetings were to brief participants  
34 on Gulf of Mexico EDM, and specifically on Gulf of Mexico shrimp  
35 EDM results, receive input on future model development, and discuss  
36 the utility of shrimp EDM to inform management, and Steve Munch  
37 has joined us today to go over those results, as well as  
38 development since the last workgroup meeting in October of 2022,  
39 and so I will pass that off to him now.

40  
41 **DR. STEVE MUNCH:** Thanks, Molly. Thanks for setting that up, and  
42 thank you to the SSC for taking the time to hear this report.  
43 Since I presented background on EDM to this committee last year,  
44 I don't want to take up too much time repeating that, but I thought  
45 that it might be good to refresh your memory, and so feel free to  
46 unmute and tell me to skip ahead, if this is unnecessary.

47  
48 The rationale is that, whenever we fit models to data, unexplained

1 variation is treated as noise, but then the noise represents all  
2 of the things that we've left out of the model, and we know that  
3 those things, things like environmental drivers, predators,  
4 competitors, food, they're not noise, and they have their own  
5 dynamics, and feedbacks with these other parts of the system and  
6 management probably matter, but we rarely know enough to build  
7 complete models of the whole system, and so we want some way to  
8 manage around this, and the tool that we're proposing for shrimp  
9 is empirical dynamic modeling.

10  
11 The rationale for EDM is illustrated with this slide, and so EDM  
12 is based on Takens theorem of time-delay embedding, and I showed  
13 you this video last time. On the right, in black, and so over  
14 here, is the axes are the abundance of each of the three species,  
15 and so we have this tree-species simulation model, and the axes  
16 here are the abundance of each species at a moment in time, and  
17 the time series, for each of these species in the simulation setup,  
18 are being shown here, but, when we plot those time series in this  
19 phase space for the system, we get this shape.

20  
21 Now, in red, we have a reconstruction of that shape using just  
22 abundance of the producers, and so, instead of the axes being the  
23 abundance of each of the three different species, the axes are now  
24 the abundance of the producer at now, a step into the future, and  
25 then three steps into the future, and the important thing here is  
26 that there is a one-to-one correspondence between the shapes in  
27 black and red.

28  
29 Now, to actually operationalize this for -- You know, to make this  
30 useful, right, thinking about plotting the states of the system in  
31 this way is what we use to sort of -- What we leverage to make use  
32 of it, to make predictions, in EDM, and so, if we think about it,  
33 if we don't know the equations of the system, how the system works,  
34 but we have enough data to make this picture, right, the one in  
35 black, and we know, roughly, where we are now, we could ask -- If  
36 we want to make a prediction, we could just ask, okay, well, what  
37 happened the last time we were in this circle, right, and so where  
38 do we go next, and a very reasonable thing to do would be to just,  
39 you know, use the average of where we ended up next as a prediction.

40  
41 If we were to repeat that exercise, moving the circle around in  
42 the state space, we're effectively constructing a discrete time  
43 model for the system directly from data, and, obviously, we could  
44 do the same kind of thing with the attractor, or the shape in red,  
45 and, when we do that, we end up with an analogous model, in delay  
46 coordinates, whose dynamics are identical to the dynamics in the  
47 full state space, and that's what we get from this one-to-one  
48 correspondence, but they're based solely on the data that we have

1 at-hand, just on the abundance data for this one species.

2  
3 The take-homes from this are that, in order to make useful  
4 inferences in forecasts from a system, we don't need to have data  
5 on all of the state variables, and we don't need equations. As  
6 long as we have enough data, we can let the data tell us what the  
7 equations ought to look like, and so I want to try to putting this  
8 one other way, before moving on, and so we can think about modeling  
9 as dividing the world into two sets of state variables, the things  
10 that we are interested in, and have data for, and those are the  
11 observed variables, and then that's X, and then Y is all the other  
12 stuff, everything we've left out, and Takens theorem provides a  
13 theoretical justification for writing models strictly in terms of  
14 the observables, where we compensate for the fact that we're  
15 missing all the Ys, using lags, and we have the Xs, and Takens  
16 theorem shows that, for a deterministic system, this can be made  
17 exact in the limit of lots of data.

18  
19 Okay, but it's always bothered me, and it probably bothers you  
20 too, that Takens doesn't say anything about how the delay-embedding  
21 map, this F with the squiggle, relates to the real dynamics of the  
22 system, and it just says that there is some function, and it  
23 doesn't tell us how this function, with the squiggle on the F,  
24 relates to the real dynamics for the observed variables.

25  
26 It turns out that it's not hard to show that what we get, when we  
27 do this delay-embedding stuff, is the conditional mean for the  
28 true dynamics, where the average is taken over the unobserved  
29 states, given the history that we're putting into the model, the  
30 history of the observed variables, and that conditional  
31 expectation argument works for both the deterministic systems and  
32 the stochastic systems.

33  
34 Okay, and now, in both cases, we need some way to approximate the  
35 delay-embedding map, or the map from past states to the future,  
36 and, in all the shrimp work, we do that using Bayesian Gaussian  
37 process regression, which I talked about last time, and no one  
38 ever really cares about, but I would be happy to tell you more  
39 about that if you have questions.

40  
41 All right, and so why delay coordinates? You know, thinking about  
42 things in terms of lags seems foreign, and so this is one of the  
43 things that we definitely went through with the working group, is  
44 why are we doing this with lags, but it's actually something that  
45 we've done a bunch in fisheries for a while.

46  
47 For instance, if we start with a standard age-structured model,  
48 with density-dependent recruitment, and we then assume that growth

1 is linear, and natural mortality is constant, we can convert this  
2 age-structured model into a production model, where we have a lag,  
3 where the time lag is the age at maturation, and so we end up with  
4 an equation that says that the biomass next time is linear in the  
5 spawning biomass this time and has this functional dependence on  
6 the biomass  $A_m$  years ago, where  $A_m$  is the age at maturation.

7  
8 In this case, the production model, the lag in the production  
9 model, is, you know, there to compensate for missing age structure,  
10 and the idea is that the EDM approach, and Takens theorem, just  
11 makes this idea more general, and we can use lags to compensate  
12 for things other than just missing age structure.

13  
14 All right, and so the next step in applying EDM to fisheries  
15 management is to ask whether we can estimate management reference  
16 points or evaluate harvest controls, and we've done this several  
17 ways. The first is that we could assume constant effort, and then  
18 use EDM, our fitted EDM models, to identify maximum sustainable  
19 yield, and I will show you a couple of results along these lines  
20 in a few slides.

21  
22 We can also use dynamic programming to determine an optimal harvest  
23 policy, and we've published several papers on this, and it works  
24 pretty well if you have enough data, but it is numerical intensive  
25 and statistically challenging, and so we actually need to have not  
26 just a long enough time series, but we need to have spanned enough  
27 of the state space to be able to make good extrapolations, and so,  
28 numerically, it's limited to systems of one to three dimensions,  
29 which is actually a bit at odds with the rationale for doing EDM  
30 in the first place, and so we've recently shifted gears to thinking  
31 about evaluating more conventional control rules, rather than  
32 doing this optimal control stuff, things like we might do in a  
33 management strategy evaluation.

34  
35 In all cases, the trick to making this go is to build our EDM model  
36 using lags of both an abundance index and landings data, or we  
37 could do landings and effort, but the idea is that we want to split  
38 the inputs into something representing the state of the system and  
39 something representing our controls on the system, and so we can  
40 do that either with abundance in landings, like we're doing for  
41 shrimp, or landings in effort, like we're doing in a sort of  
42 parallel project on squid in the California Current.

43  
44 Just a few more seconds on setting up, conceptually, how this would  
45 work, and we're going to do exactly, with EDM, what we would do  
46 with any sufficiently complex assessment model, and that is, in  
47 the standard approach, what do we do? We fit the assessment model  
48 to the available data, and then we fix the harvest rate, and we

1 run the model out for some large number of steps, hopefully to get  
2 to equilibrium, to find the sustainable yield at that harvest rate,  
3 and then we change the harvest rate and do that again, and we do  
4 that again and again, and, eventually, we end up with a curve  
5 relating the sustainable yield to the fixed exploitation rate.  
6 From there, we say, okay, well, the peak of that curve must be  
7 MSY.

8  
9 Okay, and so, in EDM, we're going to do exactly the same thing,  
10 right, and we fit the model to the abundance index and catch data,  
11 and then we fix the harvest rates, and so we have our model that  
12 we fit to the data, and that's the top one here, and then we fix  
13 the exploitation rate, and, for a fixed exploitation rate, we're  
14 going to run that model forward into the future to ask what the  
15 long-run sustainable yield would be, and then we can vary the  
16 exploitation rate to make this curve, and, in fact, the curve that  
17 I have shown over here is one that we made using EDM for some  
18 simulated data.

19  
20 Here is an example of that, using a Ricker model with fishing, and  
21 the simulated time series are shown here, and the left is abundance  
22 and the right is catch. Now, if we were to plot the observed catch  
23 versus the observed exploitation rate, those are the blue dots  
24 here, and so that's directly from the data, and the red line is  
25 the theoretical steady state from the Ricker model.

26  
27 Now, the reason I'm showing this is to show that, in the observed  
28 data, we don't have any evidence for their being a peak in the  
29 relationship between catch and exploitation, like we would need to  
30 identify MSY, and so we're actually going to try and extrapolate  
31 a bit, using our empirical dynamic modeling approach.

32  
33 When we do that, this is what we get, and so recall that each of  
34 these results for a particular exploitation rate is obtained by -  
35 - You know, we fit this model, and we fix the exploitation rate,  
36 and we iterate out to steady state, or some number of years into  
37 the future, and we end up with a curve that looks like this, that  
38 has a clearly-defined peak, and it turns out that red line here is  
39 the true relationship between exploitation rate and catch from the  
40 Ricker model, and so, at least in this example, the EDM approach  
41 extrapolates with high accuracy, to get us a good estimate of MSY,  
42 but that's just one example.

43  
44 Here are a few others, and the top row is for Pella-Tomlinson  
45 model, and the bottom row is for a two-species model in which we're  
46 harvesting the predator and we have no data for the prey. Each of  
47 these simulations is based on a hundred observations, just like in  
48 the previous slide, and the left plots are MSY, and the right plots

1 are estimates of BMSY, and, in all of them, the dashed line is the  
2 theoretical right answer.

3  
4 Now, instead of using a random exploitation rate, like we did in  
5 the previous simulation, now we have three different exploitation  
6 history scenarios, one where the effort just goes up, one where it  
7 goes up and then levels off, and then the third one is where effort  
8 goes up and then comes back down, and so, for each of those  
9 different scenarios, and across these two different kinds of  
10 models, I think the main takeaway from this is that our EDM  
11 estimates are within 10 percent of the right answer, even though  
12 we only have data on one species and no equations for how the  
13 system works.

14  
15 That's the sort of general theoretical stuff that we presented to  
16 the working group, and I thought I would pause here and ask if  
17 there are any sort of general questions, before I move on to the  
18 shrimp-specific implementation, and I am totally okay with you  
19 guys not having any questions, and I will just keep going.

20  
21 **CHAIRMAN NANCE:** Thank you. Any questions? We've seen this part  
22 before. David, please.

23  
24 **DR. CHAGARIS:** Hi, Steve. I have a question about what you're  
25 calling an equilibrium run with EDM, and so, you know, like the  
26 forecasting skill, you know, degrades as you go out further from,  
27 you know, your starting point, and depending on the autocorrelation  
28 in the time series and everything, and so one of the things that  
29 I have a hard time wrapping my head around is what you mean as an  
30 equilibrium condition with EDM versus what we would typically think  
31 of as an equilibrium condition that might be running out a hundred  
32 years with an age-structured model, or something like that, for it  
33 to reach equilibrium, but, with EDM, if you can only forecast a  
34 couple of time steps ahead, is that still considered a steady-  
35 state-type equilibrium outcome?

36  
37 **DR. MUNCH:** So, David, I think the important thing is that, if we  
38 have our traditional model, we also can't forecast very well into  
39 the future, right, and we're sort of hoping -- You know, the steady  
40 state is just what number do we put in and get back the same thing,  
41 right, and you can do that regardless of what the shape of the  
42 model looks like, and iterating is just a standard numerical trick  
43 to find that, the fixed point, for whatever model we have.

44  
45 The prediction accuracy for both, I agree. If we're trying to  
46 make specific predictions very, very far into the future, whether  
47 we had a production model or an EDM model, it's going to decay.  
48 The question is whether or not the shape is sufficient to find the

1 right fixed point, and that's what all the simulations show, is  
2 that we find the value of catch and effort that gets back, or  
3 landings and abundance that gets us back, to the same value of  
4 landings next time.

5  
6 That works for -- Not just for the models that we've shown here,  
7 but it works for a wide range of things, and it's just because  
8 we're reconstructing the conditional expectation with the right  
9 shape, and does that make sense?

10  
11 **DR. CHAGARIS:** Yes, a little bit. I mean, I'm still, you know,  
12 trying to, I guess, break myself from thinking in the traditional  
13 age-structured sense, you know, where you have equilibrium  
14 conditions under different fishing mortality rates and  
15 selectivities and things, and, obviously, this isn't an age-  
16 structured model, and this is just why I'm, you know, personally  
17 struggling with that.

18  
19 **DR. MUNCH:** So what would you do, in an age-structured model, where  
20 things are sufficiently complicated, right, and how would you find  
21 the equilibrium? Well, you're not going to do it with a pencil,  
22 right, and you're going to have the computer iterate that model  
23 forward a bunch of steps, right?

24  
25 **DR. CHAGARIS:** Right. Yes.

26  
27 **DR. MUNCH:** That's exactly what we're doing with the EDM, and so  
28 we're trusting that we've recovered roughly the right shape for  
29 the map that goes from the current to the next state, and, if that  
30 shape is reasonable, right, then our estimate of the fixed point  
31 for that shape would be reasonable, and so, numerically -- Like  
32 you pick some starting condition, and you run it forward for thirty  
33 or a hundred steps, and then you get an answer, and that's exactly  
34 what we do in both cases.

35  
36 I totally get that it feels like there should be some disconnect,  
37 because, if we were trying to make exact predictions, going very  
38 far into the future, both of those kinds of models will not get us  
39 to the right answer, right, but they will get us to a long-run  
40 average, and that's what we're getting, in both cases, is a guess  
41 at the long-run average.

42  
43 **DR. CHAGARIS:** So maybe another way to ask the question is would  
44 you get a different curve from your EDM, a different shape, or a  
45 different MSY value, if you started from a different starting  
46 point?

47  
48 **DR. MUNCH:** No, because you converge to the same -- It's driven

1 entirely by the shape of the function, right, and so it's  
2 definitely possible that, if you had a map with multiple fixed  
3 points, right, that you could end up at different starting points,  
4 but that's -- Almost all of the time, when we do these things for  
5 either the shrimp data or these simulations, there's only one fixed  
6 point, and so you don't end up with a model that converges to some  
7 crazy alternate equilibrium.

8  
9 It is possible, and, when we've done this for systems with multiple  
10 fixed points, you have to start from lots of different initial  
11 conditions to see those different fixed points, and that's where  
12 we start from. We start from a range of initial conditions, and  
13 we get to the same thing here, right, because there is, in the  
14 system, only one stable fixed point.

15  
16 **DR. CHAGARIS:** Okay. Thank you.

17  
18 **DR. MUNCH:** Sure.

19  
20 **CHAIRMAN NANCE:** Steven.

21  
22 **DR. SAUL:** Thanks so much for the presentation. A quick question,  
23 and I was curious to know how this approach differs from your sort  
24 of standard delayed difference model that's set up kind of in a  
25 similar way, where you like time block, you know, one component of  
26 the life history from another.

27  
28 **DR. MUNCH:** That's a great question, and, conceptually, right, the  
29 main difference is just that this is a little bit more general,  
30 right, in that we're using lags not just to represent sort of age  
31 structure, or alternate life stages, and we're using lags to  
32 represent everything that we've left out, which is, potentially,  
33 abundance of predators, abundance of prey, environmental drivers,  
34 and we don't have a fixed functional form for the model, right,  
35 and that's the other sort of big difference, is that, rather than  
36 writing down say a Pella-Tomlinson model, where we have a fixed  
37 shape, but there's a few parameters, right, we're doing this in a  
38 fully non-parametric way, where the shape is very flexible.

39  
40 **DR. SAUL:** Thank you.

41  
42 **DR. MUNCH:** Sure.

43  
44 **CHAIRMAN NANCE:** Any other questions? Any online, Jessica? Okay.  
45 Thank you. David, I have the same -- When it's being presented,  
46 I understand it, but, trying to wrap my head around it, I have a  
47 hard time, but I appreciate -- You know, your presentation is  
48 great, but, I mean, I'm just still wrapping my head around it.

1  
2 **DR. MUNCH:** You know, for what it's worth, we had a project, a  
3 couple of summers ago, where the goal was to ask whether you cannot  
4 just estimate fixed points, but the complete bifurcation diagram  
5 for a dynamical system, given just a little bit of time series  
6 data, and I never thought this would work, because it -- Well, it  
7 just doesn't seem like it should, but it turns out that, as long  
8 as you get the shape of the delay-embedding map right, and so you  
9 have to have enough data to do that, right, and then the full  
10 bifurcation diagram is something that we can reconstruct, and so  
11 finding the fixed point is something that we do actually very  
12 easily.

13  
14 I agree that it is definitely a conceptual hurdle, but the  
15 important part is that we're not trying to forecast very far into  
16 the future, to obtain a specific estimate of what happens in Year  
17 T-plus-100, and what we're trying to do is run it forward long  
18 enough to find the long-run average of a point where the abundance  
19 now is the same as the abundance next time, and we're just finding  
20 the steady state.

21  
22 **CHAIRMAN NANCE:** Okay. Thank you. It looks like there are no  
23 more questions, and so we can go ahead and move on.

24  
25 **DR. MUNCH:** Okay. Super, and so, last year, I showed you guys  
26 some of the forecasting work for brown shrimp and white shrimp,  
27 using just the SEAMAP data, where we used a hierarchical model to  
28 combine data across SEAMAP Stat Zones, and it worked pretty well,  
29 and that's now published in a Canadian journal, and it could --  
30 Those sorts of stat-zone-specific forecasts could plausibly be the  
31 basis for an index-based management approach. I wasn't going to  
32 show you those results again, because I showed them last time, but  
33 we also wanted to try and evaluate MSY for brown and white shrimp  
34 using EDM.

35  
36 To do that, like we were just talking about, we need time series  
37 of both abundance and catch, and so, as you guys probably  
38 appreciate already, there's a bit of a scale question, right, and  
39 we have SEAMAP, which is spatially resolved, and it gives us an  
40 abundance index, but only from two seasons, and then, for landings,  
41 we have monthly landings data, but, you know, the data that I had  
42 available are Gulf-wide, and so how do we combine those?

43  
44 I'm sure that there are more statistically-savvy ways to combine  
45 these datasets that have differing spatial and temporal  
46 resolutions, but, for this working group, we decided to do  
47 something easy as a first pass, and so what we did was we just  
48 aggregated everything down to annual Gulf-wide averages for both

1 SEAMAP and landings.

2  
3 We also, and I will get to this in a few slides, evaluated  
4 environmental drivers and the Louisiana survey as possibly inputs,  
5 and so what we did now is a little bit different than what I was  
6 setting up in the previous slides, because, now that we have these  
7 sort of Gulf-wide annual averages, we have relatively shorter,  
8 relatively less, data to put into our delay-embedding map, and so,  
9 instead of the delay-embedding map having not a full time series  
10 of both abundance index and catch, now we're using this reduced  
11 delay-embedding map, where the inputs are the abundance index minus  
12 some parameter times the catch, and I will clear this up in a  
13 minute, but the parameter is effectively the catchability, and I  
14 will explain that more in a few slides.

15  
16 All right, and so here are the data streams that go in. On the  
17 top, we have brown shrimp, and, on the bottom, we have white  
18 shrimp, and the CPUE, in the SEAMAP data, are shown on the left,  
19 and then the catch data are shown on the right. All right, and  
20 so, using those two sets of time series, here are the leave-one-  
21 out predictions, and so this isn't fit to, and it's we leave out  
22 each year and then ask, given the current state, what's our best  
23 prediction for that year.

24  
25 They're pretty reasonable, in both cases, and the red line is the  
26 prediction, and then the black line is the observed. The  
27 correlation between predicted and observed, which is -- I will  
28 probably say as prediction accuracy, and that's what I mean, is at  
29 least 0.8, in both cases, and so that's not bad.

30  
31 I should say that, in the interest of fairly representing the  
32 opinions of the working group, that I should note that several of  
33 our working group members did not think that predicting SEAMAP was  
34 a reasonable metric for success, because they were not convinced  
35 that the SEAMAP survey was producing a reliable estimate of shrimp  
36 abundance. However, since this is the only Gulf-wide source of  
37 fishery-independent data, we continued using that in the rest of  
38 our analyses. The next thing we wanted to know was how much these  
39 lags --

40  
41 **CHAIRMAN NANCE:** Steve, there's a question here. Luiz, please.

42  
43 **DR. BARBIERI:** Thank you. Sorry for interrupting, Steve, but can  
44 you go back one slide?

45  
46 **DR. MUNCH:** Sure.

47  
48 **DR. BARBIERI:** Just that statement that you made about the concerns

1 from the working group, right, regarding how well the SEAMAP survey  
2 is truly representative of shrimp abundance in the Gulf, and did  
3 they give you more information to explain why they had those  
4 concerns?

5  
6 **DR. MUNCH:** Well, I think that the folks who felt that way were  
7 largely folks who catch shrimp for a living, and they felt that  
8 the SEAMAP survey was not necessarily designed to catch shrimp,  
9 and so maybe using that as our benchmark wasn't necessarily the  
10 best way to predict what catch would be in the future, and so I  
11 think that there was potentially a bit of a disconnect between  
12 sort of a fishery-independent index, right, versus something that  
13 would tell us more of what we would actually catch in the fishery,  
14 and I am probably mangling the rationale for that, and I was really  
15 just bringing this up because I am not a scientist in the Gulf,  
16 and so I actually don't know very much about SEAMAP versus  
17 shrimping, and so I have these data streams, and I felt like, in  
18 the interest of fairness, and representing what the opinions of  
19 the working group were -- I should say that the folks who work on  
20 SEAMAP, and the folks who have used the data before, did not feel  
21 that SEAMAP had problems as a representative survey.

22  
23 **DR. BARBIERI:** Right, and that makes sense. Thank you, Steve.

24  
25 **DR. MUNCH:** Sure. Okay, and so the next thing that we want to  
26 know is whether EDM is actually contributing anything here, and so  
27 is using lags to help predict the next state actually making things  
28 better, and so the easiest way to do that is to constrain our  
29 empirical dynamic modeling approach to have only one input, and so  
30 that's the light-blue bars here, is our EDM model, and so, again,  
31 they're non-parametric, and there is no fixed functional form, but  
32 now we're only saying that there's only one input, and, when we do  
33 that, the prediction accuracy drops to about 0.3, for both brown  
34 and white shrimp, and so using lags improves our ability to make  
35 predictions of next abundance by about a factor of two to three,  
36 and so that strongly suggests that there are other factors, beyond  
37 current abundance and catch, that significantly contribute to the  
38 dynamics of shrimp.

39  
40 As a frame of reference, I think it's probably worth trying to  
41 think about the EDM approach that was used here in the context of  
42 something more familiar, like a production model, and maybe this  
43 gets to some of the questions from a few minutes ago.

44  
45 In the production model, we have an equation that describes the  
46 change in spawning biomass from now to next time that is based on  
47 current biomass and catch, and some parametric production  
48 function, right, and we have an index of abundance that is assumed

1 to be proportional to biomass, right, and then the exploitation  
2 rate is the catch relative to biomass. Now, of course, I can plug  
3 this index in, to show that the exploitation rate is proportional  
4 to the ratio of catch to index, right.

5  
6 Okay, and so, in a standard production model setup, we then do  
7 some regression kind of thing to estimate the parameters, the  
8 catchability and the parameters, for the production function and  
9 estimate the biomass through time. You guys know this stuff better  
10 than I do, but the point I want to make is that, if we multiply  
11 the biomass dynamics equation by the catchability, right, and we  
12 multiply it all the way through by two, then we end up with,  
13 immediately, a model that's just in terms of the index of abundance  
14 and the catch, where this term, this index of abundance minus  
15 constant times catch, is proportional to the surviving biomass,  
16 the biomass that's left after we've fished that year, right, and  
17 so, in our EDM model, right, we are just using the same inputs as  
18 we would for the production model, right, except that we have more  
19 of them, to compensate for things that are left out of the model,  
20 and we have a flexible functional form, as opposed to a known  
21 production function. I hope that helps.

22  
23 Well, since we're talking about production models, in the middle  
24 of the working group, Lew Coggins, that joined the team and did  
25 this production model, and so this is a fit for the production  
26 model to the SEAMAP survey and the catch data, and he also had  
27 some preliminary effort data that was used to train this production  
28 model, which I didn't have, but, anyway, this is the production  
29 model output, where the overall correlation with the SEAMAP indices  
30 is about 0.4, and that's a correlation in the sample, as opposed  
31 to sort of out-of-sample.

32  
33 Recall that the 1-d EDM model has a correlation, an out-of-sample  
34 correlation, of about 0.4, whereas our model with lags has a  
35 correlation of about 0.8, and so the production model is about  
36 half as accurate as the EDM model, and, when we drop the lags, the  
37 accuracy drops, and so this something more consistent with the  
38 production model. Based on this, I would say that the adding lags  
39 helps a lot when what we're trying to do is reconstruct the  
40 dynamics of the shrimp.

41  
42 Now, the working group was pretty keen to see the influence of  
43 environmental drivers in our EDM model, and they also wanted to  
44 know whether the Louisiana inshore survey could provide additional  
45 information, and so we included estimates of temperature,  
46 salinity, and dissolved oxygen from the SEAMAP survey, and then  
47 folks wanted rainfall, and so we ended up with rainfall, obtained  
48 from Galveston, and we also included the Louisiana index.

1  
2 The environmental data from the SEAMAP survey are shown here, and  
3 the Louisiana survey indices that we used are shown here, for brown  
4 shrimp on the left and white shrimp on the right, and so here's a  
5 summary of the results when we include the environmental drivers,  
6 and so the vertical bars show the prediction, or forecasting,  
7 skill, when we leave one out, and so that's the leave-one-out  
8 correlation between predictions and observed.

9  
10 The dark-blue bars are the model that I had shown before, and the  
11 light-blue bars include dissolved oxygen, and the peach-colored  
12 bars include salinity, the red bars show temperature, and thing to  
13 take away from this is, in terms of leave-one-out prediction  
14 accuracy, including the environmental drivers does not help. If  
15 anything, it tends to take something away.

16  
17 When we added in the Louisiana indices, we weren't quite sure of  
18 that the right timestep was, since the Louisiana indices are  
19 sampling juveniles, and so, to compare with the SEAMAP survey, we  
20 asked, okay, well, what happens if we say that we include the  
21 Louisiana index in the same year, the year before, or two years  
22 before that, and it turns out that it doesn't make a huge  
23 difference.

24  
25 There is a slight, I would say statistically non-significant,  
26 improvement using past values of the Louisiana index, but only for  
27 brown shrimp, and that's negligible, and so the takeaway from this  
28 is that including the environmental drivers and the Louisiana  
29 indices did not make big improvements when we're trying to predict  
30 Gulf-wide annual average SEAMAP catch per unit effort.

31  
32 This causes everyone some angst, since we have good reasons to  
33 think that shrimp are strongly affected by the environment, and  
34 this is a hard thing to get our heads around, but the lack of  
35 improvement in the EDM model does not mean that shrimp are not  
36 affected by the environment. What it means is that the information  
37 contained in those environmental time series is already contained  
38 in the lags of shrimp, and so they're redundant. Once we have the  
39 lags of shrimp, we are compensating for all of the stuff that's  
40 been left out, including the environmental drivers, and so adding  
41 the environment doesn't make things better.

42  
43 Importantly, when we drop the lags of shrimp, the environmental  
44 drivers do become important, right, and so, based on this, we  
45 thought that it was reasonable to move ahead with evaluating MSY  
46 using only lags of catch and effort.

47  
48 **CHAIRMAN NANCE:** We have a question, before you move on.

1  
2 **DR. MUNCH:** Okay.

3  
4 **CHAIRMAN NANCE:** David, please.

5  
6 **DR. CHAGARIS:** Thanks, and sorry to interrupt you, but I wanted to  
7 ask a question on that previous slide, with the environmental  
8 variables, and so those environmental variables, your temperature,  
9 salinity, and oxygen, those were the average from the year prior  
10 from the SEAMAP data, if I understand correctly, and my -- You  
11 know, I guess my concern here is the reason they probably didn't  
12 perform so well is that there's not really a good mechanism, you  
13 know, for those conditions the year prior to affect the catch rate  
14 for the current year.

15  
16 **DR. MUNCH:** We also used the same year, and it doesn't change  
17 anything.

18  
19 **DR. CHAGARIS:** Well, so, using the year prior or using the same  
20 year, and I think we talked about this on one of the workgroup  
21 calls, about, you know, there is probably a window of environmental  
22 conditions leading up to the survey going out that are likely  
23 affecting abundance, and so, instead of looking at last year and  
24 current year, did you look at any oxygen or salinity or temperature  
25 two months prior, or one month prior, things like that, that might  
26 actually have more biological justification?

27  
28 **DR. MUNCH:** So, David, what we did is we looked at the sort of  
29 annual -- The annual cycles in those environmental drivers, to ask  
30 is there a lot of variation in the cycle, from one year to the  
31 next, that requires more than one degree of freedom representation,  
32 and so, if you have -- It really looks like all you need is one or  
33 degrees of freedom to incorporate the information on the  
34 temperature for that year, and that is the annual cycle goes up  
35 and down, and it's more or less the same shape from one year to  
36 the next, and not exactly the same shape, but, from one year to  
37 the next, what happens is that cycle stretches or shrinks, and so,  
38 really, any point in the year is an adequate representation of the  
39 rest of the year, because there's only, effectively, one degree of  
40 freedom in that annual cycle, and so we didn't actually go any  
41 further than that. I would be happy to do it, but I'm pretty sure  
42 I know how it turns out.

43  
44 **CHAIRMAN NANCE:** David, are you -- Mandy has her -- Mandy, please.

45  
46 **DR. KARNAUSKAS:** Thanks, Steve, and just one additional  
47 clarification. Did you use environmental data from the SEAMAP  
48 survey itself or like satellite-derived?

1  
2 **DR. MUNCH:** In this plot, we have the SEAMAP data, and folks on  
3 the working group wanted to see other environmental data, and so  
4 we also did this for rainfall, and we got rainfall data from  
5 Galveston. They weren't quite happy with using Galveston as our  
6 rainfall location, but nobody was willing to actually go and get  
7 us other rainfall data, and so it started to feel like identifying  
8 exactly the right environmental inputs that would satisfy our  
9 working group overall was a never-ending task, and so this is where  
10 we stopped.

11  
12 **DR. KARNAUSKAS:** Okay. Thanks. Certainly I can buy your argument  
13 that including the environmental data doesn't improve the  
14 predictions, because it's already in here in the lags, or it's  
15 implicit in the lags, and so I can buy that, but I do agree with  
16 David that I'm not sure, at the scales that it was considered,  
17 that it would have yielded better results, but, anyway, again,  
18 it's --

19  
20 **DR. MUNCH:** I think that the important question is whether or not  
21 the spatial/temporal fields for these environmental drivers are  
22 reasonably smooth or they're very rugged. If reasonably smooth,  
23 right, so that we only have like a one degree of freedom, or maybe  
24 two degrees of freedom, surface that we're effectively  
25 representing for a given year in the Gulf, then this is adequate.

26  
27 If it's actually a lot more rugged than that, I totally agree. I  
28 totally agree that we would need more information, that more  
29 location-specific information would help. When we looked at the  
30 sort of annual averages, right, it looked like this was totally  
31 fine, but I definitely see the point that location-specific things  
32 could deviate from the Gulf-wide average, right, for a wide variety  
33 of reasons, and that that might be more informative. Absolutely,  
34 but we didn't have that handy.

35  
36 Maybe, in the next extension of this, in the research track,  
37 obtaining more specific, more justifiable, mechanistically-  
38 reasonable environmental drivers is an important thing to do, but  
39 this is what we did so far, and so --

40  
41 **CHAIRMAN NANCE:** Peyton.

42  
43 **MR. CAGLE:** Thank you, Mr. Chair. I was just curious, since the  
44 -- Go down one slide, please. Thank you. Since the Louisiana  
45 abundance index is a very good forecasting skill, according to  
46 this, have you considered using the Louisiana inshore  
47 environmental conditions?

1 **DR. MUNCH:** I think the important thing here is that the Louisiana  
2 index doesn't add anything to the model.

3  
4 **MR. CAGLE:** Well, what about the consideration of using those  
5 environmental conditions?

6  
7 **DR. MUNCH:** Not yet. Let's just say not yet.

8  
9 **CHAIRMAN NANCE:** I think the key, also, is, as they develop this,  
10 that's something they would look at. They didn't have the data to  
11 do it right now. Molly, did you --

12  
13 **DR. STEVENS:** I was just going to note the same thing, Jim, that  
14 throughout -- This is sort of a starting point, and then,  
15 throughout the research track assessment, we'll be looking at  
16 different temporal and spatial scales, and even integrating size  
17 classes, if we can, and so this is sort of a proof of concept and  
18 jumping-off point, to then look throughout the data and see what  
19 the most appropriate model form would be.

20  
21 **DR. MUNCH:** Thanks, Molly. Yes, I think that's sort of an important  
22 thing to keep in mind, as we're talking about this, is the  
23 intention here is not to have the final product, and this is sort  
24 of like a is-this-worth-pursuing-at-all kind of thing, right, and  
25 I, of course, have my opinion, but so this is definitely not the  
26 final product, and I'm sure that there are many, many ways that we  
27 can make this better, and having site-specific environmental data  
28 is definitely a good idea.

29  
30 **CHAIRMAN NANCE:** Harry, please.

31  
32 **MR. BLANCHET:** Thank you, Mr. Chairman. Back to the slide that  
33 you were on right before the one you have here, that one, with the  
34 environmental variables, two points. We're talking about two  
35 different species, and brown shrimp -- Historically, in Louisiana,  
36 we have had a predictive model to relate things like southeast  
37 Louisiana rainfall, river stage of the Mississippi River, and  
38 spring water temperatures, and as well as the catch per unit  
39 effort, to predict what our inshore landings might be.

40  
41 I am not real comfortable with advocating that as a model, going  
42 forward, but what I was saying is that, for brown shrimp, it seems  
43 that the parameter that has the most possible utility is that  
44 salinity. However, you're measuring it offshore, at the adult, or  
45 sub-adult, level, instead of in the inshore and the juvenile  
46 habitat, and so consideration of some juvenile salinity might be  
47 useful, at least for brown shrimp.

1 For white shrimp, that's a different animal, so to speak, and it  
2 is not nearly as influenced by salinity, in terms of its  
3 distributions, or growth rate, and so I can definitely see where  
4 -- And the seasonality especially, and that's when you're going to  
5 be having -- As those things are recruiting to the offshore is  
6 when you're going to be having hypoxic events happening off the  
7 coast of Louisiana, and so there is -- There, you've got something  
8 that is more of an influence on your adult animals in the adult  
9 environment, but not so much with that brown shrimp, and so I think  
10 that each of them needs to be thought of individually, as you  
11 develop this process. Maybe go through some of that type of  
12 winnowing of the information. Thank you.

13  
14 **DR. MUNCH:** Thank you for that, and so where was I with this? Are  
15 there more questions here?

16  
17 **CHAIRMAN NANCE:** No, and go ahead and go on.

18  
19 **DR. MUNCH:** Okay, and so, like I was saying, the fact that including  
20 the environmental drivers and the Louisiana index doesn't really  
21 improve the EDM model caused the working group quite a lot of  
22 angst, and it seems that the working group is not isolated in that  
23 respect, but it does not mean that those things are not relevant.  
24 It's just that the lags of shrimp are doing a pretty good job of  
25 reconstructing the relevant dynamics. I'm sure that we can make  
26 it better, but it's already not bad.

27  
28 In terms of using this to try and get an estimate of MSY, we did  
29 the same thing that we did in the simulated data, where we, you  
30 know, ask where we are now, what's the next state, using the EDM  
31 model, and then put that back in and iterate, until we get to a  
32 fixed point, or a steady state, and we estimate the long-run  
33 average catch, holding different exploitation rates fixed, and we  
34 did this with a Monte Carlo approach, sort of a distribution of  
35 long-run average catches, and here's how it turns out.

36  
37 The grid of harvest rates that we evaluated is on the horizontal,  
38 and the vertical axis on the left is the SEAMAP, predicted SEAMAP,  
39 CPUE at steady state, and on the right is our predicted catch at  
40 steady state.

41  
42 For comparison, with the production model, our estimates of the  
43 exploitation rate that produces maximum sustainable yield -- We  
44 end up with 0.7, and the production model ended up with 0.9. In  
45 terms of like the maximum sustainable yield, we ended up with 200  
46 million pounds, and the production model ended up with ninety-five  
47 million pounds, and so these aren't -- In terms of the MSYs,  
48 they're not particularly close, but I should reiterate that both

1 of these estimates should be thought of as preliminary.

2  
3 I had no effort data, and the production model that Lew put  
4 together had effort data, but it was very much preliminary effort  
5 data that had not been vetted by the effort working group, and so  
6 the point that I am bring up with this slide is that we get at  
7 least plausible estimates that are within the range of -- Or  
8 consistent with the range of observed values for catch from the  
9 historical data.

10  
11 All right, and so, to summarize, we found that our EDM model works  
12 pretty well at predicting the SEAMAP catch per unit effort. By  
13 removing the lags, and asking how well we did then, we find that  
14 this is because of the lags, rather than the shape of the  
15 production function, and so, for completeness, I should note that  
16 several working group members were not entirely thrilled with the  
17 idea of forecasting the shrimp abundance. They preferred to have  
18 an estimate of current biomass that would be used to set targets  
19 for a given year.

20  
21 However, given that shrimp only live for a year, and there's  
22 roughly a year-long lag in data collection and processing, any  
23 estimate of current biomass requires a forecast from the previous  
24 year, and so I think that, you know, that's actually an important  
25 thing to keep in mind when we're asking about, you know,  
26 forecasting versus estimating. They're really kind of the same  
27 thing, in this case, and iterating the models for brown shrimp and  
28 white shrimp, under constant rates, we obtained plausible  
29 estimates of MSY and BMSY. Obviously, once we have these in-hand,  
30 we can also estimate stock status, right, because we get one from  
31 the other.

32  
33 Our next step, or our next steps, at least from my end, are to  
34 develop software for evaluating policies other than constant  
35 effort, something more in line with what we do in a management --  
36 Wow. Yikes. Then to finish writing up the current round of --

37  
38 **CHAIRMAN NANCE:** I think whatever you said at the end we didn't  
39 hear.

40  
41 **DR. MUNCH:** Okay. Did you hear the part about stock status?

42  
43 **CHAIRMAN NANCE:** Yes.

44  
45 **DR. MUNCH:** Okay, and so the last bit is that my next steps are to  
46 figure out how to evaluate other policies, other than constant  
47 effort, things like we might evaluate with a management strategy  
48 evaluation, and to write up our current round of results for

1 publication. We have a draft now, but it's kind of a mess, and  
2 that it is for me, and I'm going to pass this back to Molly, who  
3 will close out this presentation.

4  
5 **CHAIRMAN NANCE:** Okay. Thank you. Let's go ahead, and, before we  
6 turn it over to Molly, is there any SSC questions particularly  
7 just to the EDM stuff? David, please.

8  
9 **DR. CHAGARIS:** Sorry, and I have a question, and I don't think  
10 I've asked this one before, and I've probably asked those other  
11 ones before, Steve, and so thanks for filling in my questions, but  
12 it just kind of occurred to me that, here, we have a single, you  
13 know, scalar, or catchability coefficient, that relates the index  
14 to biomass, but then we're also using that as a multiplier on the  
15 catch, assuming that the catchability in the survey is the same as  
16 the catchability for the fleet, and is that a correct assumption,  
17 or am I separating it differently?

18  
19 **DR. MUNCH:** So, I have no catchability for the fleet. There's  
20 just whatever we caught.

21  
22 **DR. CHAGARIS:** Right, but, in the conceptual explanation, you know,  
23 you multiplied through the Q, you know, to show how you basically  
24 converted it all to units of the index.

25  
26 **DR. MUNCH:** There is an assumption that the relationship between  
27 the index and the catch, the overall average catch, and the overall  
28 average index, that there's a proportionality between them that  
29 stays constant, and that there's just the one constant, yes.

30  
31 That could be something that we explore further, in terms of  
32 breaking that out across either different seasons or across  
33 different, you know, vessel characteristics, however, makes the  
34 most sense in terms of obtaining a useful benchmark for management,  
35 but having this one parameter in there, at least at the aggregated  
36 level that we were looking at, does okay. Did that answer your  
37 question, David?

38  
39 **DR. CHAGARIS:** Yes, and, I mean, I'll think about it some more,  
40 but, I mean, you definitely answered my question. I am still --  
41 I am not sure what the right approach is, and, I mean, I can  
42 definitely -- We typically assume that, you know, the stock is  
43 proportional to the index, but I don't think we've ever really  
44 made the assumption that catch would be proportional to the index,  
45 because, as abundance is increasing or decreasing, the fishery  
46 might behave differently, and so that was just something that just  
47 came to mind. Thank you.

1 **DR. MUNCH:** My intro fisheries book, like Quinn and Deriso, right,  
2 we say catch is  $Q$  times effort times abundance, right, and so, if  
3 we divide catch by abundance, we get  $Q$  times effort, and so that's  
4 a --

5  
6 **DR. CHAGARIS:** That's a fleet  $Q$ .

7  
8 **DR. MUNCH:** Yes, absolutely, but, because there's this sort of  
9 proportionality, right, if I divide two proportionality constants,  
10 I just get one number, right, and it's just a different constant,  
11 and it means something different, but it's still just a fixed  
12 number, and so it's buried in there.

13  
14 I totally agree with you that there's two sort of -- Like, in real  
15 life, you know, we think about total biomass as being, you know,  
16 proportional to -- Or catch being proportional to effort and  
17 biomass, right, and that we think about the index of abundance as  
18 being proportional to biomass. Well, if two things are  
19 proportional to the same thing, they're proportional to each other,  
20 right, roughly.

21  
22 **CHAIRMAN NANCE:** David, because the SEAMAP uses different net,  
23 different trawling and -- There's a lot of difference between what  
24 SEAMAP is doing as an index survey and what a fisherman is doing  
25 to catch shrimp. Catchability would be not similar, for sure.

26  
27 **DR. MUNCH:** Absolutely. There is assertion -- I totally agree,  
28 and there is no assertion that this  $Q$  is the fishery catchability,  
29 right, and there's no way to go from like catch with this  $Q$  to  
30 biomass, and I totally agree.

31  
32 **CHAIRMAN NANCE:** Okay. Thank you. Doug Gregory, please.

33  
34 **MR. GREGORY:** Thank you, Mr. Chair, and thank you, Steve. This is  
35 very interesting, and it is hard to get my head wrapped around it  
36 all, but the basic question is, and this may have been in your  
37 talk, but do you use indices from the year before to make estimates  
38 of abundance, and let's say indices in year- $X$ -minus-one to make  
39 estimates of abundance in year- $X$ , or is it  $X$ -plus-one that you're  
40 making estimates of abundance in? Like is it a one-year lag or a  
41 two-year lag in what abundance estimate you're coming out with?

42  
43 **DR. MUNCH:** The setup that we're using is that we have -- We have  
44 an index of abundance this year, and catch this year, index of  
45 abundance last year, catch last year, and we go back four years  
46 for brown shrimp and three years for white shrimp. Actually, we  
47 did both to four or five years and found that four was sufficient  
48 for brown shrimp and that white shrimp only needed three, and what

1 we're predicting is the index of abundance next year.

2  
3 **MR. GREGORY:** Okay, and so, using current year data, you estimate  
4 abundance next year.

5  
6 **DR. MUNCH:** Yes.

7  
8 **MR. GREGORY:** Just glancing at the paper, the background paper,  
9 that you provided, that is at least a year, if not two years,  
10 quicker than we could do with Stock Synthesis, which I think isn't  
11 the goal to find something to replace the logistical efforts, and  
12 this may be more for Molly than others, than you, but I assume  
13 this going to be evaluated in the upcoming stock assessment as a  
14 potential replacement for the way we've been doing abundance  
15 estimates.

16  
17 **DR. MUNCH:** That is my hope, but, yes, I think that's the plan, is  
18 to sort of compare them side-by-side, maybe, and ask, you know,  
19 what looks like it works, and one of the big advantages to this  
20 setup is that it is a lot easier to implement, and it requires  
21 less data, and we get a year ahead, as just sort of part of the  
22 process.

23  
24 **MR. GREGORY:** All right. Thank you. I appreciate it.

25  
26 **DR. MUNCH:** Sure.

27  
28 **CHAIRMAN NANCE:** Thank you. Any other questions from the SSC?  
29 Okay. Steve, thank you very much for that presentation and for  
30 your willingness to be on here.

31  
32 **DR. MUNCH:** It's my pleasure.

33  
34 **CHAIRMAN NANCE:** Molly, please.

35  
36 **DR. STEVENS:** I will take over from here, and so, after -- That  
37 was sort of up to the first two working group meetings, with a  
38 little bonus, and then, in the final EDM workgroup meeting, the  
39 participants were briefed on the shrimp fishery management plan  
40 and stock assessment requirements, as well as the Gulf of Mexico  
41 shrimp SEDAR research track assessment planning, and so the slide  
42 that they were shown at that time -- Here's sort of where we're  
43 at, in teal, and so we've identified data providers.

44  
45 We are in the process of, you know, identifying the SEDAR  
46 participants by stage, and so whether or not they would be involved  
47 in the data workshop, the assessment workshop, or the assessment  
48 development team, and we're working with the council and SERO to

1 appoint, and you all have alluded, at this stage, a lot throughout  
2 the presentation, that we're constructing a conceptual model,  
3 along with data provision and review, and so I'm hoping to, at the  
4 data scoping call in July, sort of lay out what data streams we  
5 have available for each of the three species, for brown, pink, and  
6 white shrimp, and alongside what the required data inputs are for  
7 the various models, and then how we could use those in different  
8 management strategies.

10 That sort of leads into, at the data workshop in September -- We'll  
11 have a few data workshops. In the Science Center, we've been  
12 looking at adding a stakeholder working group, and we've discussed  
13 this with SEDAR some, and we're going to provide some more updates  
14 on that at the Shrimp AP next week, but the goal is to get  
15 information from the fishermen, and that is especially important  
16 for a fishery like this, where, you know, we don't really have a  
17 lot of the data streams, and a lot of it's oral history of the  
18 fishery, things that we want to document and use, and potentially  
19 launch off into a full management strategy evaluation.

21 EDM is a nice framework for that, for testing different management  
22 procedures. I like it just for its capability to integrate, you  
23 know, economic data streams, and that's just where we're at in the  
24 planning, and I will take any questions on the process up to that.

26 **CHAIRMAN NANCE:** Thank you. This is -- What you've outlined here  
27 is basically SEDAR 87, and this is a component, or is it SEDAR 87?  
28 I guess is this part of -- Are there other things that we're going  
29 to do in that SEDAR, or is this the whole thing?

31 **DR. STEVENS:** As in are there -- No, and so, after the data  
32 workshop, then we still have the assessment and review, and is  
33 that what you're alluding to?

35 **CHAIRMAN NANCE:** No, and I guess my -- For SEDAR 87, is effort  
36 part of the SEDAR?

38 **DR. STEVENS:** The effort, like shrimp fishing effort?

40 **CHAIRMAN NANCE:** Yes, and so like what we talked about -- I guess  
41 I'm trying to figure out, for SEDAR 87, is it only assessment, or  
42 is it everything on shrimp to be used in assessment and those types  
43 of things?

45 **DR. STEVENS:** Yes, and so it's everything on shrimp. We'll be  
46 picking through all the data sources, and Kyle hit on this some,  
47 and, you know, we're not as worried about the effort streams from  
48 2014 to present. We'll be teasing through all the landings and

1 where we have potential overlap in data streams, like the port  
2 agent sampling, when the different trip tickets come through, and  
3 we'll be developing a time series of when the fishery has changed,  
4 you know, just based on things like freezers coming into place,  
5 and the recall getting worse, down to changes in data streams and  
6 how we've collected it through time, and so it's definitely a lot.

7  
8 It's a very complex fishery that is in a lot of people's heads,  
9 and so I'm hoping to have the timeline developed by the data  
10 scoping call, but we'll definitely have a working draft by  
11 September and get that validated and approved throughout that  
12 process of, yes, not just the assessment, but all the pieces going  
13 into it. With shrimp, cleaning up the data is very -- It's a top  
14 priority.

15  
16 **CHAIRMAN NANCE:** So, basically, the data workshop in September is  
17 for all, landings data and effort streams and assessments and those  
18 types of things.

19  
20 **DR. STEVENS:** Yes.

21  
22 **CHAIRMAN NANCE:** Thank you. That's for my own -- Okay. Perfect.  
23 Any other questions? Thank you for the presentation, Molly and  
24 Stephen.

25  
26 **DR. MUNCH:** Thank you for taking the time to listen.

27  
28 **CHAIRMAN NANCE:** Well, I'm going to tell you this, that, when  
29 you're presenting it, I understand it, but I go home and think  
30 about it, and I get all discombobulated again, and so, anyway, I  
31 appreciate -- It sounds -- You know, when you're presenting it, it  
32 sounds perfect, and then I start thinking, and maybe I shouldn't  
33 think, but anyway.

34  
35 **DR. MUNCH:** I am happy to answer questions as they come to you.

36  
37 **CHAIRMAN NANCE:** Well, I don't know about that. It could be three  
38 o'clock in the morning or so. Okay. Any other questions from the  
39 panel? David, please.

40  
41 **DR. CHAGARIS:** I do have a question, but, before I ask my question,  
42 I just want to thank Steve for all the work he's put into this and  
43 the patience of, you know, presenting these overviews and  
44 conceptual EDM information to us, and I don't know, Steve, maybe  
45 half-a-dozen times now, and I learn something new each time, and  
46 so thank you, Steve.

47  
48 **DR. MUNCH:** It's my pleasure.

1  
2 **DR. CHAGARIS:** My question is about those production models that  
3 Lew had started, because I had a conversation with him before,  
4 and, you know, he has some ideas that I think go beyond what Steve  
5 kind of showed up there with those preliminary models, and so I  
6 guess -- Maybe this is for you, Katie, but are those still kind of  
7 on the table? You know, what's the status on those?  
8

9 **DR. SIEGFRIED:** What we're trying to do, with this research track,  
10 is first start a conceptual model, and we should have done that  
11 with SEDAR 74, frankly. That way, we could get an idea of what  
12 modeling approach would be most appropriate, and also address the  
13 management needs, and so that will give us a nice big package of  
14 what would be the best way to approach it.  
15

16 Biomass dynamic models are still on the table. They're not off  
17 the table. You know, we'll evaluate them in concert with it,  
18 because, obviously, we have the data for them, but we want to look  
19 at the pros and cons of that approach, as opposed to EDM and  
20 anything else that we think of, and we still have pink shrimp,  
21 which we don't know what to do with yet, and so, I mean, there  
22 will be lots of creativity allowed for presenting modeling  
23 approaches at that meeting.  
24

25 **CHAIRMAN NANCE:** Mandy, please.  
26

27 **DR. KARNAUSKAS:** Thanks, Mr. Chair. I have a sort of comment and  
28 then a question. First of all, thanks, again, to Molly and Steve  
29 for presenting this work. I think it's really exciting, and,  
30 conceptually, it makes a lot of sense to think about shrimp as --  
31 You know, they're a short-lived and highly-environmentally-driven  
32 species, and it makes sense to consider something like EDM, instead  
33 of our typical production models, and I think what we've seen today  
34 has the potential to work really well. I mean, we could pick apart  
35 the environmental data a little bit more, but I think that what  
36 we've seen today shows a lot of promise, and so I'm definitely  
37 supportive of the approach, and, again, thanks for the really great  
38 work that you've put into this.  
39

40 I do have a question about sort of the long-term -- Or the vision  
41 for EDM, in terms of is it useful to try and extract an MSY? I  
42 mean, is MSY even sort of a useful concept for shrimp, given that  
43 I don't think it's at risk of overharvesting, or are we going to  
44 try and use the EDM to predict a year forward and just try and  
45 maximize the catch in any given year, and so could you just fill  
46 me in on kind of the application of EDM?  
47

48 **DR. MUNCH:** We've talked a little bit about both, either using

1 this as sort of an index-based management kind of thing, where we  
2 project out and then use that to decide how much catch is  
3 reasonable, versus, you know, trying to estimate stock status, or  
4 MSY, those kinds of things. I think that's still up in the air,  
5 what the best thing to do would be, and, you know, it's hopefully  
6 something that we evaluate in the next year in the research track.

7  
8 **CHAIRMAN NANCE:** I think Matt can add a little clarity.

9  
10 **DR. FREEMAN:** I will let you be off the hot seat for a second, and  
11 so that is something that we discussed this fall, as part of the  
12 working group, and so, in Shrimp Amendment 15, we do have MSY  
13 values for brown, white, and pink, as well as overfishing and  
14 overfished values, and then, in a separate amendment, we also have  
15 an aggregate MSY value, and so, yes, there are values that will  
16 have to be taken into consideration, depending upon what sort of  
17 model gets adopted.

18  
19 **CHAIRMAN NANCE:** Katie, please.

20  
21 **DR. SIEGFRIED:** I just wanted to add a little bit to that. It's  
22 been a struggle for us to figure out what to do about that, mainly  
23 because there isn't any concern that we're going to overfish  
24 shrimp, and we've said that multiple times, and the stakeholders  
25 agree, but it's a requirement, and it doesn't necessarily mean  
26 that we want to --

27  
28 I don't want Matt's head to explode, but it doesn't mean that we're  
29 going to keep going with that sort of approach, but I think it is  
30 a requirement that establish status, but the management procedure  
31 after that doesn't have to update the status, necessarily, and so,  
32 if we -- The MSY, I think, and Steve can correct me if I'm wrong,  
33 but the MSY that's predicted is nowhere close to what the fishery  
34 has ever pulled out of the ocean, and so I think that's all -- The  
35 management procedure can just sort of keep track of shrimp, without  
36 setting any hard-and-fast rules about what they should or shouldn't  
37 catch, and it will still give us the information, with all of the  
38 ancillary data for bycatch and other sorts of ways that shrimp are  
39 managed.

40  
41 **CHAIRMAN NANCE:** It's always been that struggle, and some of the  
42 status -- You need to have those values established, but how you  
43 use them is up for debate, I guess, but we do have it on the books  
44 right now, and I think Amendment 15, and is that --

45  
46 **DR. FREEMAN:** Yes.

47  
48 **CHAIRMAN NANCE:** Amendment 15 has those that we've established a

1 while ago, and so we need to do something with them and move  
2 forward. Peyton.

3  
4 **MR. CAGLE:** Thank you. I wanted to go back to my earlier comments,  
5 since we stated that we're in preliminary, and, you know, we're  
6 looking at different variables that may be included, and you can  
7 look at SEAMAP especially during the recent COVID years, and  
8 there's a lot of data gaps, lack of data, and so, when we're using  
9 this lack of data to utilize these lags, we're forecasting with  
10 additional gaps, and that's why something along the lines of our  
11 independent trawl survey data, which you did see was fairly  
12 compatible with the EDM model -- It's consistent, along with the  
13 environmental data that's going to be provided there too, that I  
14 requested that we look at, and so I just wanted it to be known  
15 that the consistency of that fifty-five-year-long program, and  
16 project, versus SEAMAP, which is shorter, and there's a lot more  
17 data gaps in it, and I just think it's important to keep  
18 consistency somewhere in the model.

19  
20 **CHAIRMAN NANCE:** Molly.

21  
22 **DR. STEVENS:** Thanks for bringing that up, Peyton, and that reminds  
23 me that I am not familiar with every single data stream that  
24 pertains to shrimp, and so data scoping is also for raising  
25 relevant data streams that you think could be helpful in the data  
26 workshop in September, and so, just as a general announcement,  
27 everybody definitely come with data streams that you know exist,  
28 and I will do my best to compile and provide, species-by-species,  
29 spatially what we have, but data scoping is also for identifying  
30 data streams. Thanks.

31  
32 **CHAIRMAN NANCE:** Perfect. Any other input from the SSC? I think  
33 this certainly is a viable option that we can look at in the  
34 workshop, for sure, and there's a lot of work that's been done,  
35 and I appreciate that.

36  
37 **DR. STEVENS:** Thank you, Steve.

38  
39 **DR. MUNCH:** It's my pleasure. You guys are so nice. This has  
40 been very good. Thank you. I am happy to keep helping, if that's,  
41 you know, useful.

42  
43 **CHAIRMAN NANCE:** I don't think we need any recommendations or  
44 anything from the SSC, as far as input on this, right, Matt?

45  
46 **DR. FREEMAN:** Right, and so the AP will see a similar presentation  
47 next week, but this is -- Unlike the effort estimation model, this  
48 will not be going to the council in April, because, as stated,

1 this will be part of the SEDAR process, and so you guys and the AP  
2 are the only ones getting a bite of the apple for questions at  
3 this point.

4  
5 **CHAIRMAN NANCE:** I think we've taken some bites, which is good,  
6 and, anyway, let's go ahead and move on. We'll go ahead, and this  
7 one will probably take a long time to do. Royal red, and so we're  
8 going to do Item Number VII, Review of the Royal Red Shrimp  
9 Landings. Dr. Stevens is here to do that, and, Matt, could you  
10 give us the scope of work for this, please?

11  
12 **REVIEW OF ROYAL RED SHRIMP LANDINGS**  
13

14 **DR. FREEMAN:** Certainly, and so Dr. Stevens will summarize the  
15 2021 landings for royal red shrimp relative to the annual catch  
16 limit, and the SSC should consider the information presented and,  
17 again, make any recommendations, as appropriate.

18  
19 **DR. STEVENS:** I will be going over the 2021 royal red shrimp  
20 landings, and this will be a time series that you all have seen  
21 before, with confidential data excluded in this figure. It's  
22 staying pretty much in the same ballpark, and the ACL of 337,000  
23 pounds is shown, and we've remained pretty consistently below that.  
24 I believe you all saw, in May of 2022, that Mike Travis gave a  
25 presentation on Argentine imports that may have driven down  
26 domestic production, and it's staying kind of consistently low.

27  
28 If you go to the next slide, this shows the confidential data as  
29 a mean, where I just lumped -- 2019 was confidential, and so I put  
30 2017 and 2018 on that same bar, and they're pretty much in that  
31 same ballpark. I also wanted to note that, of the about 1,400  
32 shrimp permits, 339 are endorsed for royal red shrimp, but only  
33 about six vessels have been landing royal reds annually over the  
34 past six years or so. I believe Mike Travis and Jessica Stephen  
35 helped pull those numbers, and so thank you to them.

36  
37 This is a longer-lived stock, and it's not considered annual, and  
38 so the ACL is required, but we've been pretty consistently below  
39 that. I can pause for questions, and I think the next slide is  
40 just acknowledgements, but I can thank the contributors.

41  
42 **CHAIRMAN NANCE:** I know that we, in the 1980s, used a Schaeffer's  
43 curve to estimate MSY for royal red, and it was 360,000 pounds,  
44 and then we had to come up with an ACL for that, and it looks like  
45 it's about 5 percent below what the OFL would be, and this has  
46 been on the books since we had to come up with values for shrimp.

47  
48 Back when we did one of the shrimp management plans -- We used to

1 have nine species in the shrimp management plan, Trachypenaeus,  
2 seabobs, rock shrimp, and so forth, and royal red -- We had a  
3 difficult time with royal red, and, in fact, we tried to remove it  
4 from the shrimp plan, but, of course, it came back, and it's the  
5 only species that's caught totally in federal waters, and so,  
6 anyway, that's why it's still there with the other three penaeids,  
7 and so it's always been a difficult one, and we don't have a lot  
8 of information on it. It's not a prosecuted fishery, you know, by  
9 a lot of vessels.

10  
11 It used to be twenty-six, I think, at one time, and it certainly  
12 has gone back and forth, but it's really not -- So there are six  
13 vessels now, I think, that fish it, and not totally all the time.  
14 Usually, when there's not a penaeid production, then they're going  
15 after royal reds offshore. Sean.

16  
17 **DR. POWERS:** You mentioned there were vessels, and is there any  
18 other effort measurement, as far as -- Or we just kind of know how  
19 many vessels are landing?

20  
21 **DR. STEVENS:** I am only aware of how many vessels are landing, but  
22 I've only been working on this for two months now.

23  
24 **CHAIRMAN NANCE:** I have never looked at it, and there are --  
25 Because I can see the tracks in the ELB data, and so I know that  
26 there are some royal red vessels that have electronic logbooks on  
27 them, because you can see that line off of Alabama and Florida in  
28 deep water, and so I'm not -- I think it would be interesting to  
29 look at that data and see if there's a way to estimate effort and  
30 to be able to come up with a newer value for where we're at.

31  
32 **DR. POWERS:** It would be nice to have sense, but when do the  
33 confidentiality rules kick in, and what does that mean, relative  
34 to expressing effort in any other than number of vessels?

35  
36 **DR. STEVENS:** We actually might be better off with effort, rather  
37 than landings, because most of the confidentiality kicks in with  
38 less than three dealers, and so, if we're looking at three or more  
39 vessels, then I think we have a little bit more leeway in showing  
40 every year.

41  
42 **CHAIRMAN NANCE:** I think the problem is, like Molly is alluding  
43 to, is that vessels haven't been an issue, but, if you have one or  
44 two dealers, and you're giving landings data, then the other dealer  
45 knows exactly how much the other one got, that type of information.

46  
47 **DR. POWERS:** So is the effort not covered by that, and it's just  
48 landings, and so we can see as much effort as we want?

1  
2 **CHAIRMAN NANCE:** I think the confidentiality has to do with  
3 landings, and it has to do with -- I know I'm going to say this  
4 incorrect, but economic value type of thing for certain segments  
5 of the fishery. Like, if you have two vessels, you would never  
6 want to show what the total catch, total value of the catch was,  
7 so that each of them then would know what the other guy got, that  
8 type of thing, and that has to do with dealers also, but effort,  
9 I think, is a component, because it's a calculated value, not  
10 really based on -- No one can say how much of the total was produced  
11 by this vessel, that type of thing. Matt.

12  
13 **DR. FREEMAN:** I did want to add that Dr. Travis had given a  
14 presentation last year, I know at least to the Shrimp AP. As Molly  
15 noted and discussed, again, the imports, and the number of dealers,  
16 was a primary concern, and, as Jim noted as well, one of the  
17 things, again, that becomes confidential data is things like the  
18 ex-vessel price, et cetera, and so we do get limited, in terms of  
19 what can be shared broadly during these meetings.

20  
21 **CHAIRMAN NANCE:** Katie, please.

22  
23 **DR. SIEGFRIED:** I understand the value of the effort data for other  
24 analyses, but, to compare to the ACL, we still have to present the  
25 landings, correct? I mean, I think that's the main point of what  
26 Molly needs to show each year, to make sure that it's under this  
27 threshold.

28  
29 **CHAIRMAN NANCE:** For this one, yes, because the overfishing is  
30 based totally on landings.

31  
32 **DR. SIEGFRIED:** Right.

33  
34 **CHAIRMAN NANCE:** But I guess what Sean was asking is, is there a  
35 way to come up with maybe an MSY value, and is that something that  
36 would be useful for this fishery.

37  
38 **DR. POWERS:** Also just to see what the effort trends are. I mean,  
39 if we see more and more effort going into it, or if it's decreasing  
40 like that, and, if we see more and more effort, regardless, it's  
41 an indication that maybe we have to look at this more closely, and  
42 so it's just another way to look at, you know, how much attention  
43 we have to pay to this stock.

44  
45 **CHAIRMAN NANCE:** Katie, please.

46  
47 **DR. SIEGFRIED:** Just to follow-up, I think that's valid, but it  
48 may be a lower priority to getting the effort figured out in

1 general, and so, if we have like one or two boats that we have  
2 ELBs on right now, that's 30 percent of the active fleet, and it  
3 poses even more problems to what we were just saying, especially  
4 if one of them doesn't report, and so I think that, once we get  
5 the effort situation figured out, then we can pull out royal reds  
6 and see if there's a viable effort stream.

7  
8 **CHAIRMAN NANCE:** Yes, and I was just -- You could probably look at  
9 it, and it's certainly not a high priority, but, as we do just  
10 landings, there's no way to know is landings decreasing because  
11 the stock is gone or are they just not prosecuting it like they  
12 used to.

13  
14 **DR. POWERS:** I would agree with you, Jim. It's not a high priority,  
15 and it's just a thought that crossed my brain, I mean, really,  
16 but, like you said, Katie, if there is some way to do it with very  
17 little time, when you do the other stuff on effort, it would be  
18 great to have.

19  
20 **CHAIRMAN NANCE:** Josh, please.

21  
22 **DR. KILBORN:** Thank you. I actually lowered my hand, and I was  
23 interested in the confidentiality issue, but it looks like we  
24 talked about that. Thank you.

25  
26 **CHAIRMAN NANCE:** You're very welcome. Any other considerations on  
27 shrimp? Okay. Let's go ahead and take a fifteen-minute break,  
28 and we'll come back for the rest of shrimp and then move into some  
29 of the other things.

30  
31 (Whereupon, a brief recess was taken.)

32  
33 **CHAIRMAN NANCE:** Okay. We'll go ahead and get started, and so our  
34 next item is Item Number VIII, and, Matt, do you want to give us  
35 the scope of work for that one? Thank you.

36  
37 **SEDAR 87 GULF OF MEXICO SHRIMP TORs, SCHEDULE, PARTICIPANTS**  
38 **APPROVAL**  
39

40 **DR. FREEMAN:** Okay. For Agenda Item VII, which is SEDAR 87, and  
41 so SEDAR 87 will be a research track assessment to develop newly-  
42 proposed models for penaeid shrimp in the Gulf. Tentatively, the  
43 data workshop will be held from September 18 through 22, 2023, and  
44 the assessment process will be conducted via webinars between April  
45 and July in 2024, and the review workshop will be conducted in  
46 January of 2025.

47  
48 The SSC should review the proposed terms of reference and recommend

1 edits, as necessary. The SSC should also consider the proposed  
2 schedule and solicit volunteers for participation in SEDAR 87 from  
3 its membership.

4  
5 **CHAIRMAN NANCE:** Okay, and so let's go ahead and bring the TORs  
6 up, so we can take a look at those.

7  
8 **MR. RINDONE:** I have a Word version of this that I'm going to edit  
9 as we go.

10  
11 **CHAIRMAN NANCE:** What's that, Ryan?

12  
13 **MR. RINDONE:** I have a Word version of this, and I'm going to edit  
14 as we go, also.

15  
16 **CHAIRMAN NANCE:** Perfect. Thank you. I think each of you have  
17 had the opportunity to have looked at this, and let's go ahead and  
18 go through this and change anything in the TORs that we deem  
19 necessary, whether add or subtract, and we can certainly do both  
20 for this. Matt, do you want to go through it with us, or Ryan?  
21 Okay. Thank you, Ryan.

22  
23 **MR. RINDONE:** Matt has been demoted back to just the back table.  
24 All right. SEDAR 87, the research track for shrimp, we're looking  
25 at brown, white, and pinks, and a lot of these are standard, you  
26 know, things like review, discuss, and tabulate life history data,  
27 evaluate growth, where possible, determine adequacy of the  
28 available data for the different types of assessment population  
29 models.

30  
31 **CHAIRMAN NANCE:** Can I ask just a real quick question?

32  
33 **MR. RINDONE:** Absolutely not.

34  
35 **CHAIRMAN NANCE:** Okay.

36  
37 **MR. RINDONE:** Yes, sir.

38  
39 **CHAIRMAN NANCE:** Is this -- Are we just going to do the penaeids  
40 on this one? Royal red is --

41  
42 **MR. RINDONE:** Yes. No royal red.

43  
44 **CHAIRMAN NANCE:** Okay. Thank you.

45  
46 **SSC MEMBER:** (The comment is not audible on the recording.)

47  
48 **CHAIRMAN NANCE:** Well, I don't know if we're someday going to have

1 to go back to royal red, but, right now, these are the three that  
2 we want to move forward with and not -- Okay. I just wanted to  
3 make sure on that.

4  
5 **MR. RINDONE:** To evaluate and discuss sources of uncertainty and  
6 error and data limitations, and a lot of these things are pretty  
7 standard kit. Provides measures of population abundance that are  
8 appropriate, like with looking at fishery-dependent and  
9 independent data sources, document all programs evaluated, such as  
10 addressing program objectives, methods, coverage, sampling  
11 intensity, et cetera, and this will just make these easier to  
12 compare.

13  
14 Provide maps of the fishery and survey coverage, develop fishery  
15 and survey CPUE indices by appropriate strata, and so knowing how  
16 those programs are constructed will help with that. Provide  
17 appropriate measures of uncertainty, document pros and cons of  
18 available indices, regarding their ability to represent abundance,  
19 and the reason we're going through all of these kind of seemingly  
20 nit-picky bits that we kind of do on automatic with other things  
21 is that this is the first time we're having this kind of a frame-  
22 off restoration for shrimp, and so this is the time to document  
23 all of this stuff, so that, moving forward, with future efforts to  
24 assess the penaeids, we know what we agreed to, and we have the  
25 foundation upon which everything subsequently will be built.

26  
27 For recommended indices, document any known or suspected temporal  
28 patterns in catchability that are not accounted for by  
29 standardization and provide appropriate measures of uncertainty  
30 for abundance indices. Provide all the commercial catch statistics  
31 for each of the species, document specific issues, provide maps,  
32 where possible, by sector and/or gear, by species, and estimates  
33 of uncertainty about those.

34  
35 Describe any evidence regarding ecosystem, climate, species  
36 interactions, habitat considerations, range modifications and/or  
37 episodic events that could affect shrimp, and the effectiveness of  
38 the biological reference points, and it sounds like Dr. Stevens  
39 and Dr. Munch have been working on that with the EDM setup, and so  
40 some promise there.

41  
42 Provide species envelopes, and that is the minimum and maximum  
43 values of environmental boundaries, like depth, temperature,  
44 substrate, et cetera, based on observations of occurrence and  
45 develop hypotheses to link the ecosystem and climatic events  
46 identified in addressing this population and fishery patterns that  
47 could be evaluated and modeled.

1 This one is a newer one for our assessments, and we've tried to  
2 incorporate this into some past assessments also, and that's to  
3 integrate economists into the stock assessment model development  
4 process, in order to explore a bioeconomic model that can address  
5 questions such as benefits of seasonal or spatial closures, impacts  
6 of fuel prices on effort, and ex-vessel prices of different market  
7 categories, if possible, and to detail the early 2000 industry  
8 consolidation and the impacts of ex-vessel price on effort. As a  
9 standard, provide recommendations for future research and prepare  
10 a report. Any questions thus far? Yes, sir.

11  
12 **CHAIRMAN NANCE:** David, please.

13  
14 **DR. GRIFFITH:** Thank you, Mr. Chair. I am wondering, on Number 6,  
15 if we could say "integrate social scientists into the stock  
16 assessment model development", and then explore a biosocioeconomic  
17 model that addresses those three things, because I think that, you  
18 know, sociologists and anthropologists could participate in that  
19 process just as well as economists. Thanks.

20  
21 **CHAIRMAN NANCE:** Okay. I was just thinking out loud of whether -  
22 - I know that we have done pure economics in the past, and we have  
23 a pure bioeconomic model, and -- Whether -- Let me ask you this,  
24 because I'm not certainly a social scientist here, but is it better  
25 to keep social and economic separate or combined?

26  
27 **DR. GRIFFITH:** Personally, I would argue that they should be  
28 combined, that economics has a lot of social dimensions to it, and  
29 a lot of sociology and anthropology also has a lot of economic  
30 dimensions to it, and so --

31  
32 **CHAIRMAN NANCE:** Okay. I think that's -- Mandy, please.

33  
34 **DR. KARNAUSKAS:** On that same term of reference, just a minor  
35 point, but it says integrating them into the model development  
36 process, and we might want to think about broadening that. I mean,  
37 there's the SEASAW report that we looked over, and that kind of  
38 recommends that social and economic scientists get integrated all  
39 the way through the assessment process, from the data collection  
40 all the way to the delivery, and so I don't know if we can broaden  
41 that terminology.

42  
43 **CHAIRMAN NANCE:** Certainly -- Go ahead, Molly.

44  
45 **DR. STEVENS:** I was just going to mention that, when we developed  
46 this TOR, we were thinking more concrete streams of economics,  
47 economic data, that could be potentially used within the empirical  
48 dynamic modeling framework, and so I'm not sure exactly how, other

1 than -- I mean, the language is written in such a way that it is  
2 consider detail, if possible, and things like that, and so I'm not  
3 opposed, but just to provide a little bit of background there,  
4 whenever we were adapting this.

5  
6 **CHAIRMAN NANCE:** Peyton.

7  
8 **MR. CAGLE:** Maybe -- I am just speaking out of turn here, but I  
9 don't see anything about the incorporation of imported shrimp on  
10 economics.

11  
12 **CHAIRMAN NANCE:** I think those economic models would probably take  
13 that into consideration, and that certainly is -- If you look at  
14 that detail the early 2000 industry consolidation, a lot of it had  
15 to do with imports, and imports and fuel prices were, I think, the  
16 two drivers of what happened there in that 2000 period. I don't  
17 know if having it specifically in there is necessary, but maybe  
18 good to have it, just so that we remember it. I think this is one  
19 -- I am more familiar with this than other species, for sure, but  
20 I know that, with this one, imports really has impacted the  
21 industry a lot, and probably in other fisheries too, but I know,  
22 for shrimp, it really has. Just from the Center's standpoint,  
23 does this -- Let's see. How would you say it?

24  
25 **SSC MEMBER:** (The comment is not audible on the recording.)

26  
27 **CHAIRMAN NANCE:** Okay. Thank you. I appreciate that. Does that  
28 impact -- Does that cause issues? Okay.

29  
30 **DR. SIEGFRIED:** No, that's fine, and I was actually going to point  
31 out that all of our economists are in our Social Science Research  
32 Group, and so "social science" is the term, instead of identifying  
33 just economists.

34  
35 **CHAIRMAN NANCE:** Okay. Perfect. I know that, through time,  
36 sometimes different groups had issues with "socioeconomic", that  
37 that term -- They liked to be separated, in some ways, and so an  
38 economist said why I am in with the sociologists, that type of  
39 thing, and so it's just -- Anyway, no issue here. Richard.

40  
41 **DR. WOODWARD:** Sorry that I'm late coming in, and I had to be part  
42 of a meeting, but a bioeconomic model is something that has a very  
43 specific meaning for fisheries economists, and so I am not sure  
44 what a biosocioeconomic model would be, but a bioeconomic model is  
45 not something vague.

46  
47 **CHAIRMAN NANCE:** David, please.

1 **DR. GRIFFITH:** Well, believe, we could incorporate bio -- We could  
2 incorporate socioeconomic data in a bioeconomic model. I'm sure  
3 we could. You know, we could develop indices, all kinds of stuff,  
4 that are just as quantifiable as other stuff.

5  
6 **CHAIRMAN NANCE:** Dr. Travis.

7  
8 **DR. TRAVIS:** When looking at price effects --

9  
10 **CHAIRMAN NANCE:** Mike, you are -- We caught just the very tail-  
11 end of something.

12  
13 **DR. TRAVIS:** Yes, because something happened with the muting. To  
14 repeat, the effect of imports would be accounted for when looking  
15 at price effect, and so that's part-and-parcel to the process.  
16 With respect to sociobioeconomic models, that has already been  
17 done, and it was a long time ago, and this was Wade Griffin and  
18 some other folks who worked on it, and I can't remember their names  
19 right off the top of my head, but, you know, we could go did go  
20 down that path at one point in time, and David is correct that  
21 there are certain social variables, factors, that you can quantify  
22 and include in that kind of a model, if you have the data.

23  
24 The main set of data that was used back then was demographic data,  
25 but I will just say that, in general, we have had our issues with  
26 demographic data, and I don't want to get into it on this call,  
27 but I don't want to say that it can't be done, but it's just not  
28 that easy.

29  
30 Then the other thing is I heard someone use the term  
31 "socioeconomic", and you might not want to use that term, given  
32 the recent court decision regarding the SEFHIER program, and I  
33 will leave it at that.

34  
35 **CHAIRMAN NANCE:** Okay. Not being familiar with that, but I won't  
36 use it, but I understand, and I appreciate that comment. I do  
37 think -- David, I appreciate you bringing this up, and I think  
38 that certainly we want to have social things added to this, because  
39 I do think, sometimes in economic biology, we just have these, and  
40 social factors add into that. I think it's good to look at.  
41 Katie.

42  
43 **DR. SIEGFRIED:** We can just make it more general and say "integrate  
44 social scientists into the stock assessment development process,  
45 in order to explore appropriate models that can address key  
46 questions, such as" -- Then we'll have the freedom to do whatever  
47 the data allow.

1 **CHAIRMAN NANCE:** That was social scientists, and would that include  
2 economists? It does?

3  
4 **DR. SIEGFRIED:** Yes.

5  
6 **CHAIRMAN NANCE:** Okay. Any other comments? Katie, does that --  
7 Do you see any issues?

8  
9 **MR. RINDONE:** All right, Mr. Chair. I've made the change.

10  
11 **CHAIRMAN NANCE:** What's that, Ryan?

12  
13 **MR. RINDONE:** I said I've made that change. If there's nothing  
14 else, we can move to the assessment terms of reference.

15  
16 **CHAIRMAN NANCE:** I think Katie maybe wants to add something.

17  
18 **DR. SIEGFRIED:** I didn't hear Mandy's question, and so I was  
19 looking at something, and I asked her if it had been addressed,  
20 and I would like to hear it again, if I could.

21  
22 **DR. KARNAUSKAS:** My point was just that the SEASAW report  
23 recommended integration of socioeconomic science from kind of  
24 start to finish, from data provisioning all the way to delivering  
25 a product to management, and so I didn't know if we could broaden  
26 Number 6 beyond just integrating economists in the model  
27 development process. Could it be throughout the --

28  
29 **CHAIRMAN NANCE:** I thought that that's what we had done, but go  
30 ahead, Ryan.

31  
32 **MR. RINDONE:** This is just for the data part of it, and so this is  
33 only pertaining to the data part.

34  
35 **DR. KARNAUSKAS:** Okay. My apologies.

36  
37 **MR. RINDONE:** At this point, it's been modified to say, "integrate  
38 social scientists", which includes economists, as I've been told,  
39 "to explore models that can address questions such as", et cetera.  
40 Then we can make further considerations as we move through the  
41 other terms of reference.

42  
43 **CHAIRMAN NANCE:** Thank you, Ryan. Let's go ahead.

44  
45 **MR. RINDONE:** Compartmentalization.

46  
47 **CHAIRMAN NANCE:** That's good.

1 **MR. RINDONE:** We'll go to the assessment ones next, if you scroll  
2 on down, please, Jess. All right, and so we'll review any changes  
3 in the data or analyses, following the data workshop, and summarize  
4 all of it that was used and provide justifications for any  
5 deviations from the data workshop recommendations.

6  
7 Develop population assessment models that are appropriate for the  
8 available data, recommend biological reference points for use in  
9 management and consider how these reference points can be affected  
10 by management, ecosystem, climate, species interactions, habitat  
11 considerations, and/or episodic events. It might be that this is  
12 an area where we might consider some effects of, you know, changes  
13 in the economic environment and how that might affect these  
14 biological reference points, and so, if there's a change in the  
15 ex-vessel price, or something like that, that encourages  
16 additional harvest or, you know, discards of harvest, or something  
17 like that, and how that could have an effect, but it's up to you  
18 guys to add these to it.

19  
20 Provide estimates of stock population parameters, including  
21 fishing mortality, abundance, biomass, selectivity, and other  
22 parameters, as necessary. Characterize uncertainty in the  
23 assessment and the estimated values, and provide the typical  
24 research recommendations, and complete an assessment workshop  
25 report.

26  
27 **CHAIRMAN NANCE:** Katie, please.

28  
29 **DR. SIEGFRIED:** I should have suggested this when we were drafting  
30 these TORs, but I would cut "abundance" out of Number 4, because  
31 we're not going to give you the number of shrimp.

32  
33 **MR. RINDONE:** "Abundance" has been deleted.

34  
35 **CHAIRMAN NANCE:** Any other changes or edits?

36  
37 **MR. RINDONE:** Mandy, how do you feel about what I said about Number  
38 3, with respect to what you were talking about before?

39  
40 **DR. KARNAUSKAS:** Maybe -- Should we add something about social or  
41 economic drivers as well?

42  
43 **MR. RINDONE:** Okay.

44  
45 **CHAIRMAN NANCE:** I think that's a good place to put it.

46  
47 **DR. KARNAUSKAS:** Yes. Thanks.

1 **MR. RINDONE:** It's added.

2  
3 **CHAIRMAN NANCE:** Molly, please.

4  
5 **DR. STEVENS:** Thanks, Mr. Chair, and that will be worded in a way  
6 that we won't be tied to, if none of them turn out to be feasible,  
7 or meaningful?

8  
9 **MR. RINDONE:** Well, it's consider.

10  
11 **DR. STEVENS:** Perfect.

12  
13 **MR. RINDONE:** So, if you consider it, and you lack the data to be  
14 able to characterize it --

15  
16 **DR. STEVENS:** Right, and I wasn't sure if you were adding it in  
17 the recommend biological and/or, or how you were going to word  
18 that first bit, because, if we're tied to recommending, but just  
19 if you -- I trust you.

20  
21 **MR. RINDONE:** Well, broadly speaking, you're going to recommend  
22 biological reference points for use in management, and that is  
23 something you are tied to doing, but, in the process of doing that,  
24 you would consider how these could be affected by these factors,  
25 and so if, in consideration of how those reference points could be  
26 affected by those factors, you lack the data to specifically  
27 address any that are explicitly listed, you lack the data, you  
28 know, and that's really all you have to say about it.

29  
30 **DR. STEVENS:** Perfect, because, I mean, I've thought about economic  
31 reference points, but that's not being added here as something to  
32 consider.

33  
34 **MR. RINDONE:** No.

35  
36 **DR. STEVENS:** Perfect. Thank you.

37  
38 **CHAIRMAN NANCE:** Katie, please.

39  
40 **DR. SIEGFRIED:** For Number 2, would it be -- I guess I'm wondering  
41 if it would be a good idea to add something about developing models  
42 that are both appropriate for the available data and provide  
43 necessary management quantities. I am just worried that there  
44 could be multiple models, but we also need to consider how they  
45 would function in a management environment.

46  
47 **CHAIRMAN NANCE:** Basically, are appropriate for available data and  
48 for developing management advice? Does that make sense, Ryan?

1  
2 **MR. RINDONE:** Yes.

3  
4 **CHAIRMAN NANCE:** Okay. You're right, Katie, in the fact that we  
5 want -- We have to have something come out of it that's going to  
6 be useful. This is -- Just for -- We've never run shrimp through  
7 SEDAR before, and so this is going to be a different experience,  
8 I guess, but so this is the first time, and that's why I think  
9 we're spending some time on these TORs, in that we've not done it  
10 before, and we want to be able to integrate it through that system,  
11 as we do the other species. Matt, please.

12  
13 **DR. FREEMAN:** I did want to add that I thought the modification  
14 for Number 3 was a good point. The current aggregate OY for  
15 shrimp, and it actually says, explicitly, that it is aggregate MSY  
16 reduced for certain ecological, social, and economic factors, and  
17 so, even currently on the books, it accounts for that, and so that  
18 would be consistent with what the council had done previously.

19  
20 **CHAIRMAN NANCE:** I am trying to remember, and did we have -- Did  
21 we have OY for each species or for overall? Do you remember,  
22 Katie?

23  
24 **DR. SIEGFRIED:** If there's an MSY for each species, there should  
25 be an OY for each, right?

26  
27 **CHAIRMAN NANCE:** I am trying to remember if we just have an overall  
28 for shrimp.

29  
30 **DR. SIEGFRIED:** I don't think I was working on shrimp back then.

31  
32 **CHAIRMAN NANCE:** You were doing blackfin shark. Anyway, I can't  
33 recall.

34  
35 **DR. FREEMAN:** (Dr. Freeman's comment is not audible on the  
36 recording.)

37  
38 **CHAIRMAN NANCE:** Okay. I think that's probably what -- We had  
39 MSYs, but then we had an overall fishery OY. Okay.

40  
41 **DR. SIEGFRIED:** How was OY defined then? I am getting chats up  
42 the ying-yang about this, and so I'm curious how -- I don't  
43 remember how OY was developed.

44  
45 **CHAIRMAN NANCE:** Was it Amendment 15?

46  
47 **DR. FREEMAN:** So Amendment 17B addresses the aggregate OY, and  
48 it's Action 2, and there's a short discussion there, and then it

1 leads into the minimum threshold of Gulf shrimp vessel permits  
2 that was derived, in essence, to achieve that.

3  
4 **DR. SIEGFRIED:** Okay, and so you're asking, Jim, if there was an  
5 overall OY, because you want to add something to the TORs or --

6  
7 **CHAIRMAN NANCE:** No, and I was just curious. If we're coming up  
8 with MSYs for individuals -- Christopher, go ahead. I'm sure that  
9 you can add some clarity to this one.

10  
11 **DR. CHRISTOPHER LIESE:** Sorry. No, and I had a different question.  
12 I think it was it's the optimal yield was for all species together,  
13 but I had a different question. Sorry.

14  
15 **CHAIRMAN NANCE:** Okay. Good. Well, I'll come back to you when  
16 we're done with -- So, in this one, we're going to come up with  
17 individual MSYs, I think, and I'm assuming then that individual  
18 OYs?

19  
20 **DR. SIEGFRIED:** I would -- Okay. No? Then why would it -- Sorry.  
21 For the people that aren't in the room, Matt is shaking his head  
22 at me, and so I don't know what he was going to say, but, for other  
23 species where we offer an MSY, the OY is related to that MSY, and  
24 so I'm not sure how it was done before, but I think we probably  
25 would develop an independent OY for each.

26  
27 **CHAIRMAN NANCE:** That's what I was thinking for this one too, and  
28 we have not done that in the past, and I think, because we didn't  
29 run it through this process, we were looking at species, to make  
30 sure each species was taken care of, but then we looked at overall  
31 OY for the whole fishery, to develop some of the other management  
32 things, but it's a little bit different than what we've done for  
33 some things. Christopher, please.

34  
35 **DR. LIESE:** Hi. I'm an economist over at the Center, and I just  
36 wanted to mention to this group that, over probably the last ten  
37 years, the council has, at least on two occasions, asked the Center  
38 to evaluate the economics of the Texas closure, and, each time, we  
39 basically deferred and said we will have to do it in the future,  
40 when the stock assessment and economists have sort of figured out  
41 how to do it, because we just couldn't do it based on what we had,  
42 and the staff were -- You know, we were missing people.

43  
44 I just wanted to throw that out there, that if you want to evaluate  
45 something -- I don't know if the EDM models, and the other models  
46 being discussed, and these terms of reference -- If that would be  
47 useful to consider about putting in here, that whatever these  
48 biological model output would be able to inform sort of those type

1 of management questions, and how does the Texas closure impact the  
2 growth of shrimp, and then, when the shrimp grow bigger, how do we  
3 catch them, and there is a cost and benefit of higher price per  
4 pound and higher costs of going further out, and so those are net  
5 benefit analysis type things that can be done, but you need to  
6 have the biological understanding how the shrimp migrate and grow  
7 to even do the economics, and so I just wanted to remind and throw  
8 that out there. Thanks.

9  
10 **CHAIRMAN NANCE:** Okay. Thank you. I will look to, I know, the  
11 Center perspective on that. Yes, please, Molly.

12  
13 **DR. STEVENS:** I can comment on that, and so I've talked to Steve,  
14 at some length, about aggregating the data in a way that  
15 accommodates looking at the Texas closure, and so that would be  
16 shifting our spatial blocks around, spatially and temporal, as  
17 well as accommodating some size classes, and so it seems like it's  
18 possible, but we would need an index of abundance, a representative  
19 index of abundance, within each spatial block that we define, and  
20 so I'm still digging through everything that's there, how we can  
21 break out the different size classes, and, if we can shift around  
22 the time blocks in a way that can capture the Texas closure, and  
23 so it's something that we're trying to do, but I don't necessarily  
24 want to tie ourselves to that.

25  
26 If we can get a better biological model, either Gulf-wide, or not  
27 necessarily Gulf-wide, but a rougher scale than the Texas closure,  
28 then I would prefer to go that way. Hopefully we can look at it,  
29 but I don't know how we would integrate it here in a way that  
30 wouldn't constrain us.

31  
32 **CHAIRMAN NANCE:** Okay. Thank you. Any other changes or  
33 modifications to the TORs? Katie, please.

34  
35 **DR. SIEGFRIED:** Sorry. My mind isn't working linearly today, and  
36 I was actually thinking of the data TORs again, and is it okay to  
37 go back, Ryan? I am wondering if, based on what Molly presented  
38 before, where we were interested in having a stakeholder working  
39 group, if we want to put in a TOR here about the types of data  
40 that we would be collecting during that working group, similar to  
41 like what happens during a participatory workshop.

42  
43 We're getting, you know, verbal data from them, but we need to  
44 somehow record that and create a conceptual model from it, and so  
45 is it necessary to list that in the TORs? I don't think it's ever  
46 good to just say it's understood, and so --

47  
48 **MR. RINDONE:** We can be explicit.

1  
2 **CHAIRMAN NANCE:** Kind of, in my mind, it is, only in the fact that  
3 we haven't constrained other ones with adding that in, but whatever  
4 is brought to the workshop is incorporated, to the best of their  
5 ability, as it can be. I don't know if it's -- If there are  
6 certainly other opinions on that, and I don't think it needs to  
7 be, but do we need to add it? Does anybody feel strongly to add  
8 it?

9  
10 **MR. RINDONE:** I mean, I could add it as Number 3. I mean, there's  
11 nothing wrong with being explicit about it.

12  
13 **CHAIRMAN NANCE:** Maybe, for this one, let's go ahead and do it. I  
14 think it's the first time we've done it, and maybe a little more  
15 being explicit in this one is probably better.

16  
17 **MR. RINDONE:** So create a conceptual model based on -- Create a  
18 conceptual model based on feedback from fishermen participants.

19  
20 **CHAIRMAN NANCE:** Industry. How about that?

21  
22 **MR. RINDONE:** Or industry participants.

23  
24 **DR. SIEGFRIED:** The idea is to capture the institutional knowledge  
25 as well.

26  
27 **MR. RINDONE:** In the data workshop, to capture institutional  
28 knowledge. Help me out here. To create a conceptual model based  
29 on feedback from industry participants in the data workshop to  
30 capture institutional knowledge.

31  
32 **DR. SIEGFRIED:** From as wide of a variety of participants as  
33 possible, something like that.

34  
35 **MR. RINDONE:** Okay.

36  
37 **CHAIRMAN NANCE:** Steven Scyphers, did you have a question?

38  
39 **DR. SCYPHERS:** No, and it was just a comment, and I was going to  
40 say that I think that sounds like a good addition. I could be  
41 wrong on this, but I did think that we had something similar that  
42 we reviewed for red grouper, when Mandy and Skyler and those folks  
43 had done participatory modeling through that process, but I wasn't  
44 sure, and I was going to try to look it up.

45  
46 **CHAIRMAN NANCE:** Okay. Thank you. Harry, please.

47  
48 **MR. BLANCHET:** Thank you, Mr. Chairman. I was thinking that this

1 would go under Item Number 5 in the data workshop.

2  
3 **CHAIRMAN NANCE:** We'll scroll down in just a sec. Let's scroll  
4 down to 5. Perfect, Jessica. Thank you. Now go back up to 3. I  
5 am not sure. Ryan, that was a point being made by Harry to add -  
6 - That that would be more appropriate in Number 5.

7  
8 **MR. BLANCHET:** It might not be appropriate for assessment, but  
9 they may be appropriate for management or some other aspects of  
10 pop-dy.

11  
12 **CHAIRMAN NANCE:** So it would be basically saying regarding  
13 ecosystem, climate, species interaction, habitat, a variety of  
14 different things.

15  
16 **MR. RINDONE:** That that be better in the assessment portion?

17  
18 **CHAIRMAN NANCE:** That the historical knowledge from the industry,  
19 that that item would be better in Number 5 than 3.

20  
21 **MR. RINDONE:** I don't -- I'm just going to say it. I don't think  
22 it's good to nest it within 5, because I feel like the kind of  
23 information that you're likely to get from industry  
24 representatives is going to be far-reaching into lots of nooks and  
25 crannies of all the different things that are going to be required  
26 of this assessment, and, granted, Number 5 is broad, I will  
27 concede, but it's probably more appropriate to dedicate it as its  
28 own thing, especially since this is a research track, and we're  
29 trying to introduce as much information as can be managed, and so  
30 let's -- I think leaving it separate is probably the better call,  
31 acknowledging that what is now the new Number 3 will contribute to  
32 what is currently Number 5.

33  
34 **CHAIRMAN NANCE:** I think that probably sounds -- The fact that --  
35 Certainly, if items are brought up, Harry, they could be added,  
36 and, you know, what if it's in ecosystem and those types of things,  
37 and it could be utilized down there.

38  
39 **MR. BLANCHET:** Yes, I'm good with that.

40  
41 **CHAIRMAN NANCE:** Okay. Thank you. Doug.

42  
43 **MR. GREGORY:** Thank you, sir. I was just -- I don't have suggested  
44 wording, but it seems to me that, if we're going to be addressing,  
45 or trying to develop economic or social modeling in the data  
46 workshop, there should be some reference to it in the assessment  
47 workshop and the review workshop, and where I could see the review  
48 workshop providing the input is on the success of the efforts in

1 the data and assessment workshops and incorporating social and  
2 economic information in the stock assessment. It just seems to be  
3 hanging out there right now in the data workshop and being dropped  
4 after that.

5  
6 **CHAIRMAN NANCE:** Molly.

7  
8 **DR. STEVENS:** I think that's somewhat intentional, just because,  
9 you know, shrimp has enough hurdles as it is, and we haven't  
10 successfully integrated economic data, in even our data-rich  
11 stocks, which, to me, would be, you know, a more logical first  
12 step, adapting SS and integrating some ex-vessel price functions,  
13 and so, to try to integrate it within shrimp, within a functioning  
14 biological model, and, obviously, we would love to have it in the  
15 assessment model, and, to me, it is the most -- It's one of the  
16 more useful ways to consider different management procedures and  
17 objectives, but, from my perspective anyway, I was hesitant to  
18 have it added in the assessment stage.

19  
20 **MR. GREGORY:** If I may?

21  
22 **CHAIRMAN NANCE:** Absolutely. Please.

23  
24 **MR. GREGORY:** I was thinking not incorporating it into a  
25 bioeconomic model, or a biosocioeconomic model, because I think -  
26 - You know, we've been trying to do this for thirty-five years,  
27 since the very beginning of the stock assessments in the 1980s,  
28 and so what I perceive might happen here would be we would have  
29 parallel assessments, or we would have ancillary information, that  
30 would go along with the assessment, and we've got to start  
31 somewhere, and so, if we're not going to do something like that,  
32 follow through, it just seems like it's out of place at all in the  
33 assessment, and there should be a separate effort to do all this.  
34 Thank you.

35  
36 **CHAIRMAN NANCE:** Thank you, Doug. Molly.

37  
38 **DR. STEVENS:** Thank you, Mr. Chair. I agree with you, Doug, and  
39 I'm just not sure who would be tasked with doing that work, if it  
40 can't be integrated in the stock assessment itself, and it would  
41 be nice to have a report within the assessment workshop, sort of  
42 the finalization in the data streams and everything, but just who  
43 that would fall on would be my question.

44  
45 **MR. GREGORY:** I see that Mike is volunteering.

46  
47 **CHAIRMAN NANCE:** Mike, please.

1 **DR. TRAVIS:** I am not sure that I should have raised my hand now.

2  
3 **CHAIRMAN NANCE:** Not after that, for sure, but go ahead, please.

4  
5 **DR. TRAVIS:** No, and Doug just set me up. I do want to go back,  
6 just for a second, on the whole MSY and OY issue, and so it is --  
7 I had to go do some digging, but it's my understanding, from  
8 reviewing previous documents, that, at the individual species  
9 level, we still define OY as being equal to MSY. I think that was  
10 set up actually a long time ago, and it's never been changed, but  
11 we looked at it in 17B, at the fishery level, and there is an  
12 obvious difference between aggregate MSY and aggregate OY, because  
13 we intentionally tried to account for the economic and ecological  
14 and social factors, and we were trying to do -- We were trying to  
15 account for those factors at an individual species level, and we've  
16 never really solved that puzzle, and it's just -- Christopher can  
17 speak to this as well, but we generally don't look at the economics  
18 of pink shrimp, or the economics of white shrimp, or brown, and  
19 it's just we don't do it that way, for a number of reasons.

20  
21 **CHAIRMAN NANCE:** Thanks, and I know, back in the 1980s, we set it  
22 up as MSY equals OY, but --

23  
24 **DR. TRAVIS:** Yes.

25  
26 **CHAIRMAN NANCE:** I didn't know if we had taken that out, but I  
27 know that, from a fisheries standpoint, that's why we went to --  
28 It was a fishery whole that we developed the OY for.

29  
30 **DR. TRAVIS:** That is correct.

31  
32 **CHAIRMAN NANCE:** Okay. Thank you for that. Katie.

33  
34 **DR. SIEGFRIED:** So one of the things that we're trying to  
35 accomplish, by including social scientists and social science  
36 data, is to fulfill what Mandy had mentioned earlier, but also  
37 because this is a place where we see a real driver of economics,  
38 in particular, on the fleet behavior, and, because this is an  
39 opportunity, we thought, well, we want to at least gather all of  
40 the information together and get the social scientists involved at  
41 the data workshop phase and then see what we have data for, and so  
42 I like the idea of having it very clear in the TORs for the data  
43 workshop, what we're trying to accomplish, and I take Molly's point  
44 that we don't want to overpromise what we'll be able to do.

45  
46 However, it is possible that, if we get -- If we get support, and  
47 momentum, on an MSE, that we would be able to have an assessment  
48 that meets management needs for shrimp, but also have a bioeconomic

1 model, or something that includes other social science data, in an  
2 MSE that can inform different management procedure success in that  
3 MSE, and so what I would like to do is to get that into these TORs,  
4 so that it not only gives us a momentum to meet these goals that  
5 we've had for a long time, but also to get people in the room that  
6 will give us those data, and then hopefully get support for an  
7 MSE.

8  
9 **CHAIRMAN NANCE:** Okay. I think that's appropriate. Okay. Any  
10 other changes to this?

11  
12 **MR. RINDONE:** (Mr. Rindone's comment is not audible on the  
13 recording.)

14  
15 **CHAIRMAN NANCE:** Katie.

16  
17 **DR. SIEGFRIED:** I knew Ryan was going to say that. I was hoping  
18 that I would say what I would said and that other people would go,  
19 oh, here's what the TOR should be, but I do think -- Okay, and so  
20 we can -- In the assessment, and, again, I don't have it on the  
21 screen, and so I'm not sure what Ryan has already got down, but we  
22 can --

23  
24 **MR. RINDONE:** If we scroll down to the assessment process.

25  
26 **DR. SIEGFRIED:** In Number 3, there's a place where we can  
27 incorporate, or at least be able to explain if there's an impact  
28 of those social science -- The social science data on our  
29 biological reference points, and I think that we can -- I think we  
30 probably would want to add -- We probably want to add something  
31 separate that just talks about, you know, what those models may  
32 be, if possible, from Number --

33  
34 **CHAIRMAN NANCE:** You've got management, ecosystem, and how about  
35 bioeconomics? That leaves --

36  
37 **DR. SIEGFRIED:** Which one are you on?

38  
39 **CHAIRMAN NANCE:** Number 3, the bullet under Number 3, consider how  
40 reference points could be affected by -- Then, if you just put  
41 "bioeconomics", that's a general term that you could do most  
42 anything with. Molly.

43  
44 **DR. STEVENS:** Could we add "as informed by stakeholders through  
45 participatory workshops", because we're at least going to do one  
46 in Mobile, Alabama, and we're working with SEDAR to get a half-  
47 day.

1 **CHAIRMAN NANCE:** How about "industry input"?

2  
3 **DR. STEVENS:** That's perfect.

4  
5 **MR. RINDONE:** Okay, and so is that going in recommend biological  
6 reference points for use in management, as informed by stakeholders  
7 through industry input? Where is that going?

8  
9 **CHAIRMAN NANCE:** It's in Number 3, consider how reference points  
10 would be affected by management, and I guess input from industry,  
11 industry input. Go ahead, Ryan.

12  
13 **MR. RINDONE:** So consider how reference points could be affected  
14 by -- Then we're going to thin this herd down to just a few things  
15 now, instead of all of that?

16  
17 **CHAIRMAN NANCE:** I think -- I don't think it hurts to have them  
18 listed there. Luiz, please.

19  
20 **MR. RINDONE:** Maybe have a second bullet then that says, "examine  
21 the impacts of these factors on the reference points, as informed  
22 by stakeholders through industry input"?

23  
24 **CHAIRMAN NANCE:** I think that would be good. I think we just want  
25 to have it in there, where we're able to use it and look at it.  
26 Luiz, did you have a comment?

27  
28 **DR. BARBIERI:** Well, a quick question for Katie. Katie, help me  
29 understand what this would be doing. I mean, how would we be  
30 looking at these reference points within the assessment framework,  
31 right, and not the data part of it, and that's my question.

32  
33 **DR. SIEGFRIED:** I think, at the data workshop, we want -- We're  
34 sort of getting a picture together, and, at the assessment  
35 workshop, we're showing what picture we've gotten from all of the  
36 data, so that we would have an idea of what would be an appropriate  
37 reference point, given both the data we have and then the  
38 management goals that would come from that conceptual model that  
39 we've built from the stakeholders.

40  
41 **DR. BARBIERI:** Then a quick follow-up, Mr. Chairman. Right, and  
42 that makes sense, but, you know, similar to some of the other, you  
43 know, assessment, or SEDAR workshops, right, I mean, if you have  
44 fishers that are appointed to be on that panel, and all of them,  
45 all the panel members, have equal opportunity to provide input and  
46 comments and address questions, right, from the analytical team  
47 and others, and I don't see the need to be explicit here.

1 You know, I don't think that we would leave their input on the  
2 outcome of those model runs and estimates of reference points, or  
3 choosing reference points, and I am just thinking, if you put  
4 something like that explicitly, how people are going to interpret,  
5 you know, the scope of that discussion that might become, I'm  
6 envisioning, potentially quite complicated.

7  
8 **CHAIRMAN NANCE:** Katie.

9  
10 **DR. SIEGFRIED:** Perhaps we can leave it out of 3, so reference  
11 points are separate, and have a separate one that just talks about  
12 the progress on the modeling that was explained in 6 of the data  
13 workshop TORs, just sort of -- Let's also look at those models, or  
14 that model, at the same time that we're looking at the assessment  
15 model, something to continue -- It's sort of along Doug's point,  
16 but others as well, to make sure that we're following that progress  
17 and keep up that momentum.

18  
19 **CHAIRMAN NANCE:** Would that be captured in Number 1 there, Katie?  
20 Would that be captured in Number 1, to review any changes in data  
21 or analyses following the -- Summarize data, as used, and provide  
22 justification for any deviations.

23  
24 **DR. SIEGFRIED:** I see it as its own, separate from these, because  
25 I do see a need for that first one. There's always some data  
26 modifications that we need to do.

27  
28 **CHAIRMAN NANCE:** We did have a Number 2, and we added it, that  
29 would provide management advice, and you're suggesting like a  
30 Number 3?

31  
32 **DR. SIEGFRIED:** I don't mind, and whatever number it is, but just  
33 a separate one that follows the model that's listed in 6, and I  
34 don't know what we ended up calling it.

35  
36 **MR. RINDONE:** I just said to examine the impacts of social science  
37 factors on biological reference points, as informed by  
38 stakeholders through industry input, and that is the new Number 3  
39 in the assessment terms of reference.

40  
41 **CHAIRMAN NANCE:** How is that?

42  
43 **DR. SIEGFRIED:** Molly says that's okay, and so I'm good.

44  
45 **MR. RINDONE:** Green, green, green.

46  
47 **CHAIRMAN NANCE:** Okay. Perfect.

1 **MR. RINDONE:** All right. Anything else on the assessment terms of  
2 reference?

3  
4 **CHAIRMAN NANCE:** If you come back, Molly, and tell Katie you can't  
5 -- If you've got a problem, then you're going to have an issue,  
6 but -- Okay. Any other input?

7  
8 **MR. RINDONE:** All right. Let's go down to the review. Okay.  
9 These are standard kit for the review. It's to evaluate the data  
10 used, including discussion of strengths and weaknesses, are the  
11 data decisions justified between the two workshops, are  
12 uncertainties acknowledged and reported within normal or expected  
13 levels, was the appropriate model applied to the available data,  
14 and are the input data series sufficient to support the approach?

15  
16 Evaluate the strengths and weaknesses of the methods, taking into  
17 account available data, such as are the methods scientifically  
18 sound and robust. Are priority modeling issues clearly stated and  
19 addressed, are the methods appropriate for the available data, and  
20 are the models configured properly and used in a manner consistent  
21 with standard practices?

22  
23 Consider the uncertainty and potential consequences, comment on  
24 the degree to which methods used to evaluate uncertainty reflect  
25 and capture significant sources in the population, data sources,  
26 and assessment methods, and comment on the likely relationship of  
27 variability with possible ecosystem or climate factors and  
28 possible mechanisms for encompassing -- I don't think I'm going to  
29 say "encompassing". We're going to change that to "incorporating  
30 this into management reference points".

31  
32 Provide or comment on recommendations to improve things, consider  
33 research recommendations from the other workshops, in the context  
34 of the overall improvement to the assessment, and make any  
35 additional ones, if necessary, and provide recommendations for  
36 improvement and any inadequacies identified in the data or  
37 assessment modeling. Recommendations should be described in  
38 detail. Provide recommendations on ways to improve the research  
39 track process and write a report.

40  
41 **CHAIRMAN NANCE:** Sean, please.

42  
43 **DR. POWERS:** Don't we usually have, at some point in the review  
44 workshop, that did they meet the terms of -- Did they address the  
45 terms of reference in the assessment and the data workshops  
46 sufficiently, or -- I remember that being -- Because I do remember,  
47 you know, the international reviewers, in particular, that we had  
48 to talk -- Some statement, and, I mean, isn't the review panel

1 supposed to say that they met, or at least attempted to meet, the  
2 terms of reference?

3  
4 **MR. RINDONE:** We can add something explicit back in there, and  
5 that's one of those things that it's just kind of assumed that the  
6 review workshop panel is going to punch-list through, but we could  
7 put something in there of, to the degree of -- You know, evaluate  
8 the degree to which the terms of reference were addressed, as  
9 opposed to saying "met".

10  
11 **DR. POWERS:** Yes, I agree, and "met" is way too -- Like I said, if  
12 you add "met" -- I mean, it's almost did they attempt it, just  
13 because, if we haven't met it, it's usually because the analysts  
14 have attempted it, and it just couldn't be done.

15  
16 **MR. RINDONE:** Evaluate the degree to which the terms of reference  
17 from the data and assessment processes were addressed. Okay.  
18 That's Number 1 now.

19  
20 **CHAIRMAN NANCE:** Any other changes? Okay. It looks like we have  
21 that outline for the shrimp for SEDAR 87. Okay. Let's go ahead  
22 and -- What's next?

23  
24 **MR. RINDONE:** We're taking suckers for the workshop.

25  
26 **CHAIRMAN NANCE:** Yes. Participants.

27  
28 **MR. RINDONE:** Everybody calls them different things, Jim.

29  
30 **CHAIRMAN NANCE:** I know, and is Matt going to do that?

31  
32 **MR. RINDONE:** No, and I will do that. Since Will Patterson is not  
33 here right now, I think we should volunteer him.

34  
35 **CHAIRMAN NANCE:** He will come online now. Okay, and so let's see  
36 the --

37  
38 **MR. RINDONE:** Okay, and so this is the memo here that we received  
39 from SEDAR for appointing participants. Of note, and Molly touched  
40 on this already, and so data scoping is going to start in July,  
41 and the data workshop will be in September, and there will be  
42 assessment webinars held, tentatively, between April and July of  
43 next year, and the review workshop will be held in January of 2025.

44  
45 I will scroll on down a little bit, and, for the -- Since this is  
46 a research track, we're going to have an assessment development  
47 team, which is basically going to stick with this assessment front  
48 to back, and so from the data scoping all the way up to the review

1 process, and then we'll have eight participants for the data  
2 workshop panel, which will include SSC members, AP members,  
3 industry representatives, et cetera.

4  
5 Are there volunteers here? We can start with -- We have a suggested  
6 list, here on the next page, of folks who we thought would likely  
7 be interested, based on discussions from the planning group that  
8 helped develop the initial draft for the terms of reference. If  
9 you see your name on here, we thought you would be interested. If  
10 you're not, you can certainly say -- You can wave your hands in  
11 distress.

12  
13 **CHAIRMAN NANCE:** I know Benny and I are interested, and we'll be  
14 on the ADT.

15  
16 **MR. RINDONE:** Okay, and so we don't have to have five people on  
17 the ADT. We can have up to five, and so -- Just acknowledging  
18 that, you know, if you're on the ADT, you're also serving as the  
19 assessment panel, and so, I mean, you're going to need to  
20 participate in everything for the data workshop, and everything  
21 for the assessment process, and all the pre and post-webinars and  
22 everything, and so your attendance at that stuff is expected,  
23 and so it is a bit of a time commitment to be on the ADT, and those  
24 that are on the red snapper ADT can certainly attest to that.

25  
26 **CHAIRMAN NANCE:** I think Benny and I are certainly willing to do  
27 that.

28  
29 **MR. RINDONE:** Okay. Is there anyone else that would be interested  
30 in being on the ADT for shrimp?

31  
32 **CHAIRMAN NANCE:** If you're on the suggested list for the -- You're  
33 certainly welcome to say that I would like to be on the ADT, as  
34 opposed to data workshop, and so this was put together just as a  
35 preliminary thing. You know, if we have -- If we're going to have  
36 economics and social stuff, I think we need to have certainly some  
37 participation from that, and so certainly we're looking for all of  
38 you volunteers, and Ryan may use another term, but volunteers to  
39 be able to be on this. David.

40  
41 **DR. GRIFFITH:** Well, I would be happy to volunteer for the less-  
42 labor-intensive one.

43  
44 **CHAIRMAN NANCE:** The DW? Okay. Jim.

45  
46 **DR. TOLAN:** Thank you, Mr. Chairman, and, if you want to have  
47 another SSC member, you could probably drop me off of it, because  
48 I think Fernando, who is also from Texas Parks and Wildlife, would

1 cover the western part of the Gulf just fine, in terms of the data,  
2 and so, if you want another SSC member, I can gladly step back.

3  
4 **CHAIRMAN NANCE:** Okay. Katie, please.

5  
6 **DR. SIEGFRIED:** I just wanted to bring up a difficult topic, and  
7 so we talked, at the SEDAR Steering Committee meeting, about in-  
8 person participation being preferred during the data workshop, and  
9 so I guess I just wanted to throw that out there too, is that I  
10 think, right now, it's expected to be there in person for the data  
11 workshop, right? Okay, and only under very severe circumstances  
12 would -- Okay. Thank you.

13  
14 **MR. RINDONE:** Yes, and that in-person participation at the data  
15 workshop is crucial, because that's where the fishermen are going  
16 to show up, and, you know, they get to see the people that make  
17 the sausage, and they get to talk to them about it, and that's a  
18 key part of the transparency of the stock assessment process, and  
19 it's also an opportunity for a lot of expanded understanding of  
20 kind of the quirks and foibles of some of the data sometimes, and,  
21 you know, you'll be sitting there without a reasonable explanation  
22 for why the data are behaving in a way, and then somebody who was  
23 fishing that stock in 1981 says, oh, yeah, blah, blah, blah, and  
24 I can't believe you didn't know that, and it's like, well, I do  
25 now, and so it can be very helpful, and it certainly benefits from  
26 being in-person, and people are a lot more willing to share when  
27 they're looking at you in your eyes, as opposed to on a webinar  
28 with eighty other people.

29  
30 **CHAIRMAN NANCE:** I do think, and, Katie, I'm glad you brought that  
31 up, and the data workshop -- I think in-person is critical. I  
32 think we saw that at some of the other data workshops, and it's  
33 just that interaction, even offline. I mean, those are critical  
34 things.

35  
36 **MR. RINDONE:** Okay, and so we only have two for the ADT. Any other  
37 takers, before we move on to the data workshop? All right. Data  
38 workshop people.

39  
40 **CHAIRMAN NANCE:** David. David would like to be on that data  
41 workshop.

42  
43 **DR. GRIFFITH:** Yes, I would, and I would be happy to show up in-  
44 person for those, Mr. Chairman.

45  
46 **CHAIRMAN NANCE:** Okay. If there's anybody on here that is listed  
47 that wouldn't like -- That wouldn't be able to -- I won't say  
48 "like", but wouldn't be able to participate in the data workshop,

1 we need to know that too, because these are the names that are  
2 going to be going in. Luiz, please.

3  
4 **DR. BARBIERI:** Then, to that point, Mr. Chairman, and thank you,  
5 but Bob Gorecki is no longer working for FWRI. He has left the  
6 agency, I believe, and I'm trying to verify this now.

7  
8 **MR. RINDONE:** Okay. Well, if you just want to proffer up your  
9 most appropriate shrimp nerd.

10  
11 **DR. BARBIERI:** Well, let me consult with staff, and I will get  
12 back with you.

13  
14 **MR. RINDONE:** Okay. That sounds like that's going to be volun-  
15 told, and so -- Are there volunteers for the -- I know we have  
16 some people listed on here, and so, Shrimp SSC folks, we're looking  
17 at you guys, too.

18  
19 **SSC MEMBER:** (The comment is not audible on the recording.)

20  
21 **CHAIRMAN NANCE:** Okay. We're glad that we've got your name on  
22 there then. It's nice -- You know, these names are on there  
23 because of -- I know that, from the state perspective, that you're  
24 involved in the shrimp, and that's important, and so some of the  
25 names are on there because they were suggested by the states. What  
26 did you say, Ryan?

27  
28 **MR. RINDONE:** I just blamed it on Matt.

29  
30 **CHAIRMAN NANCE:** Okay.

31  
32 **DR. FREEMAN:** I told Ryan that he wasn't doing a good enough job  
33 selling that it's a meeting in Mobile, Alabama, and that might  
34 encourage more people.

35  
36 **CHAIRMAN NANCE:** Jason, please.

37  
38 **MR. SAUCIER:** I think Peyton will do a great job, and Craig is  
39 close to Mobile. No, but I'm happy to volunteer.

40  
41 **CHAIRMAN NANCE:** Okay. Good.

42  
43 **MR. SAUCIER:** Especially if Peyton is there.

44  
45 **CHAIRMAN NANCE:** You know, each state -- This is one of those  
46 species that each state has a necessary input into this, and it's  
47 interesting that each state has a perspective of the shrimp fishery  
48 within there, and it's nice to be able to hear that and be able to

1 utilize that in the assessment.

2  
3 **SSC MEMBER:** Mr. Chair, just a spelling correction, and it's  
4 "Newton" for Alabama and not "Nelson". Craig might be upset that  
5 I'm correcting that, and he will actually get the email.

6  
7 **CHAIRMAN NANCE:** Doug, please.

8  
9 **MR. GREGORY:** You can delete my name from that list.

10  
11 **CHAIRMAN NANCE:** Okay. Thank you.

12  
13 **MR. RINDONE:** This is just our suggested list, and, you know, if  
14 you're listed here, it doesn't mean that you're automatically in,  
15 and like you are required to verbally volunteer, and so it's not  
16 a silence is compliance sort of thing.

17  
18 **CHAIRMAN NANCE:** This is a list that we felt like --

19  
20 **MR. RINDONE:** These are the people that we were going to ask.

21  
22 **CHAIRMAN NANCE:** That we were going to ask because they had some  
23 information that we thought was pertinent, or some knowledge from  
24 the state, those types of things, and so --

25  
26 **MR. RINDONE:** Okay. Mr. Chair, right now, we have David Griffith,  
27 Peyton Cagle, and Jason Saucier, and so is there anyone else?

28  
29 **CHAIRMAN NANCE:** Don.

30  
31 **MR. RINDONE:** Don. Okay.

32  
33 **CHAIRMAN NANCE:** Thank you, and I think Leann and Corky have  
34 already said yes, and so --

35  
36 **DR. FREEMAN:** I am going to ask them during the AP meeting.

37  
38 **CHAIRMAN NANCE:** Okay. Perfect.

39  
40 **DR. FREEMAN:** And anyone else.

41  
42 **CHAIRMAN NANCE:** There may be others from the Shrimp AP that would  
43 be able to do that.

44  
45 **MR. RINDONE:** I don't know. As far as making sure that there is  
46 representation for the social sciences part of it, you know, if  
47 there's anybody from the Center that the Center wants to send that  
48 is part of that realm as well.

1  
2 **CHAIRMAN NANCE:** So, Peyton, Joe West, we put his name on there,  
3 as being intimate with --  
4

5 **MR. CAGLE:** I can't speak for Joe.  
6

7 **CHAIRMAN NANCE:** I realize that, but I'm just saying his name was  
8 on there only because he has inshore data from Louisiana, and he's  
9 been able to provide that, and so how do we get somebody that's  
10 not here at the meeting, like Joe, for example, Joe West?  
11

12 **MR. RINDONE:** I will email him and ask him, and he tells me that,  
13 yes, I will do it or, no, I won't.  
14

15 **CHAIRMAN NANCE:** Okay. Perfect.  
16

17 **MR. CAGLE:** Just to clarify, like I typically will work with Joe,  
18 and our other data management group, to pull whatever data needs  
19 there are, and then I will bring that on all of our behalf.  
20

21 **MR. RINDONE:** Okay. Well, in that case, then we won't hassle Joe  
22 with this, and we'll just hassle you.  
23

24 **CHAIRMAN NANCE:** Okay. That's good. Let's go ahead then, and I  
25 think we're done with shrimp.  
26

27 **MR. RINDONE:** Yes, sir. That takes care of it.  
28

29 **CHAIRMAN NANCE:** I thought it was a great to be able to do that,  
30 and it was a good time to be able to spend, and so let's go ahead  
31 and go to Item Number IX. This is Review of SEDAR Schedule and  
32 Planned Interim Analyses.  
33

#### 34 **REVIEW OF SEDAR SCHEDULE AND PLANNED INTERIM ANALYSES** 35

36 **MR. RINDONE:** We had a SEDAR Steering Committee meeting in  
37 February, in Charleston, and we talked about lots of things,  
38 including what we wanted to have assessed, and so, Jess, can you  
39 bring up that schedule for me, please?  
40

41 In 2023, we're finishing up the research track for red snapper,  
42 with the initial expectation that we were going to start the  
43 operational assessment, but there's been some rumblings that we  
44 may need to evaluate whether we need to move the review workshop,  
45 but I will let the Center speak to that.  
46

47 We're also going to be starting up the yellowedge grouper  
48 operational assessment, and we're going to get the Spanish mackerel

1 assessment, and I think I had that scheduled for May, and so is  
2 that still a May thing, or is that a move-it thing?

3  
4 **DR. SIEGFRIED:** There's a delay memo on Clay's desk right now.

5  
6 **MR. RINDONE:** So that will be a July thing then?

7  
8 **DR. SIEGFRIED:** Yes.

9  
10 **MR. RINDONE:** Okay.

11  
12 **DR. SIEGFRIED:** It says, please delay. Thank you.

13  
14 **MR. RINDONE:** So we'll be getting Spanish in July, and so I'll  
15 look at that punch list, Mr. Chair, and, what I had on there for  
16 July, we'll move stuff around to accommodate that review, and then  
17 starting up the shrimp research track. You guys be nice to Molly.

18  
19 Luiz is going to start us up on mutton, which had some other delays  
20 related to it for trying to accommodate things like yellowtail  
21 snapper and getting that assessment updated for management use.

22  
23 Moving into 2024, we have the start of the gray triggerfish  
24 research track and operational assessments for red grouper and the  
25 one for red snapper finishing up, and you guys are going to review  
26 the red grouper terms of reference here in a minute, and then the  
27 shrimp research track continues. Mutton snapper finishes, and  
28 west Florida hogfish starts.

29  
30 In 2025, we have a lot of things finishing up, and so like the  
31 gray triggerfish research track, and we have a gag operational  
32 assessment. We're going to start the greater amberjack research  
33 track, and then we have operational assessments for cobia and king  
34 mackerel. The shrimp research track has its review in early 2025,  
35 and then the operational assessment will start thereafter.

36  
37 Then, for FWC assessments, hogfish will wrap up, and then black  
38 grouper hopefully will start, and so, for 2026 and beyond, these  
39 are just proposed at this point, and we have the gray triggerfish  
40 operational assessment, which will be expected to follow the  
41 research track. The greater amberjack research track continues  
42 on, and we have listed on here the tilefish complex management  
43 processes, which is something that the steering committee needs to  
44 discuss a little bit more, and then an operational assessment for  
45 scamp, because it will be about four years, or five years, out, at  
46 that point, from that assessment having been done. Then black  
47 grouper would be expected to wrap up.

1 In 2027, we would expect, based on the progress for the greater  
2 amberjack research track, to have an operational assessment in  
3 there, but, you know, we've left this blank, because, that far  
4 out, it's kind of hard to tell at this point, but we would expect  
5 to have the greater amberjack operational assessment, and then we  
6 would be evaluating what other species we needed to do operational  
7 for. You know, I could imagine red snapper being in here, you  
8 know, perhaps looking at whether we can do another interim for  
9 vermilion, or whether we need to do an operational, things like  
10 that, to just go back and evaluate kind of where we are. Then a  
11 standard assessment for yellowtail snapper, and so any thoughts on  
12 any of this SEDAR schedule, as it stands?  
13

14 **CHAIRMAN NANCE:** So red grouper comes up every once in a while.  
15 Is it scheduled -- We've been doing an interim analysis for a while  
16 on it.  
17

18 **MR. RINDONE:** Yes, and it's scheduled for 2024.  
19

20 **CHAIRMAN NANCE:** Okay. Thank you. I see it now. Perfect.  
21

22 **SSC MEMBER:** Ryan, it looks like there's some typos in there for  
23 the Florida assessments, and so mutton snapper starts in 2023,  
24 with a terminal year of 2022, but, then, in 2024, it has a terminal  
25 year of 2021.  
26

27 **MR. RINDONE:** Good catch.  
28

29 **SSC MEMBER:** The same thing happened for the hogfish as well.  
30

31 **CHAIRMAN NANCE:** From the SSC perspective, any species that are  
32 hanging out there that it's felt we need to bring up now? John,  
33 please.  
34

35 **MR. MARESKA:** I guess I will just ask, and what was the  
36 consideration of red drum? That's a fish that just keeps going  
37 down the road.  
38

39 **CHAIRMAN NANCE:** It's just moving down the line. I know we had  
40 that -- We had planned a workshop on goliath grouper, and we were  
41 going to talk about red drum in that, and we have kind of put that  
42 off, and we haven't done anything with that, and I think we need  
43 to bring that back up, and I think that will help to maybe  
44 materialize red drum, to move it along, or keep it out of the  
45 picture, and I know we just kind of have not done things with it.  
46 I know, when there's an assessment that is tried, it's -- You know,  
47 it doesn't happen, but -- Sean.  
48

1 **DR. POWERS:** Didn't Kai have a working group, or a series of  
2 meetings, with the desire to figure out what we could do with red  
3 drum?  
4

5 **MR. RINDONE:** There have actually been a couple over the years,  
6 and you participated in --  
7

8 **DR. POWERS:** In the first, yes.  
9

10 **MR. RINDONE:** In like 2014 or 2015, and we had these red drum  
11 working groups, which were amalgamations of SSC and AP members and  
12 other data providers, to try to figure out what we could do for  
13 bringing together the data for a holistic Gulf-wide red drum  
14 assessment, and one of the limitations was not having a Gulf-wide  
15 fishery-independent survey, which there's been some work by your  
16 shop, by Sue Barbieri's shop, to do surveys of the offshore  
17 spawning population, or the offshore adult population.  
18

19 One of the other problems that we ran into, in reviewing all of  
20 that information, was that each of the states has a different  
21 approach for how they assess red drum, and the states -- The  
22 individuals present during these workshops agreed that it did not  
23 appear as if it would be anything shy of a herculean task to try  
24 to figure out how to combine those assessment practices together  
25 into something that would capture what was happening with the  
26 juveniles in all of the states, and so -- Plus the frequency with  
27 which the states address red drum is disparate. Some states do it  
28 every couple of years, and some do it every several years, and so  
29 having information that temporally was aligned was simply not going  
30 to happen.  
31

32 **DR. POWERS:** But I would argue that things have changed with red  
33 drum. Louisiana has found that they're not meeting their  
34 escapement rates, which is of major concern for the entire Gulf,  
35 and so, I mean --  
36

37 **MR. RINDONE:** Two-thirds of the landings come from Louisiana.  
38

39 **DR. POWERS:** Yes, and so I think that a lot of those were shaped  
40 earlier, with, well, everybody seems to be meeting their escapement  
41 goals, but I don't know what more could be done, if the information  
42 that Sue and I have gathered is enough, if there's still not much  
43 from the western Gulf, but, yes, and I was positive that Kai had  
44 run something recently to look at this very issue, but it might  
45 have just been stakeholder groups.  
46

47 **CHAIRMAN NANCE:** We had -- Remember we had, on the goliath grouper  
48 discussion, several months ago, we had put together -- We were

1 going to do it with the South Atlantic, and then, when we had our  
2 joint meeting with the South Atlantic, that issue came up, and it  
3 didn't seem feasible that we would be able to do that workshop  
4 with them, because they're doing the same type of thing, and so we  
5 kind of have left it.

6  
7 Would it be beneficial to be able to bring that up again, and maybe  
8 try to put something together? Is there a need? Talking about  
9 goliath grouper, but we had it open for other species, where we  
10 lack data to be able to do assessments on, red drum being one of  
11 them.

12  
13 **MR. RINDONE:** I think it's -- I mean, if we were to have -- If we  
14 were to try to approach having another assessment on red drum, the  
15 first thing to do would be to -- You know, like the data scoping  
16 situation, just to find out like do we even have enough information  
17 to do anything, and so, obviously, the list, through especially  
18 2025, is heavy, and so to move it into any of those years -- Well,  
19 we can't move it into 2023 or 2024, and I am going to strongly  
20 discourage 2025, unless there is some sort of five-alarm fire with  
21 red drum, Gulf-wide, just because of what it takes to set up these  
22 assessment processes.

23  
24 You know, we see the players in the room, but there's dozens and  
25 dozens more behind the scenes. This is a very large machine, and  
26 so I would think the earliest that we could consider like a data  
27 evaluation for red drum could be 2026, and that would give time  
28 for folks to finish some current work, you know, start poking  
29 around and seeing what they could come up with at the state levels,  
30 at the federal levels, and help us to -- You know, working with  
31 the steering committee and the SEDAR cooperators to develop a  
32 gameplan. I am seeing lots of slight head nods.

33  
34 **CHAIRMAN NANCE:** Well, I think maybe -- Certainly -- I'm sorry,  
35 Sean. Go ahead.

36  
37 **DR. POWERS:** You might be able to see if the Gulf States wants to  
38 help you all out on this one, since it's a big issue for them, but  
39 didn't SEDAR 49 also come to the same conclusion with red drum,  
40 that there wasn't essentially much that could be done? That's the  
41 SEDAR, right, where they dealt with a bunch of data-poor species.

42  
43 **MR. RINDONE:** That's the tweet-length version of it, yes. I mean,  
44 truthfully, that is, and a lot of the issues that I stated before,  
45 about especially as it relates to the offshore portion of the  
46 stock, and the frequency with which the stock was being assessed  
47 in nearshore waters, and so there's plenty of catch data,  
48 obviously, from the states, for the nearshore portion of the stock,

1 and there's a very small commercial fishery off of Mississippi,  
2 but, other than that -- I mean, that's the totality of the removals  
3 data, and so, as far as the frequency with which they are discarded  
4 offshore, I don't think that those data are considered to be very  
5 good.

6  
7 The work that you and Sue have done hasn't been considered prior  
8 to this point, because it hasn't been completed prior to this  
9 point, and so, I mean, we're in a different position than we were  
10 in 2015, with SEDAR 49, and so it's perfectly reasonable to put  
11 this back on the calendar, and, even if it's not, you know, full  
12 consideration of a stock assessment, or it could just be, you know,  
13 data evaluation for red drum, and, you know, we can talk about  
14 exploring the use of the data-limited toolkit that NMFS has.

15  
16 **DR. BARBIERI:** To that point, Mr. Chairman, please?

17  
18 **CHAIRMAN NANCE:** Yes, Luiz.

19  
20 **DR. BARBIERI:** Right, and I think that a data evaluation process,  
21 you know, would be helpful, Ryan. I mean, SEDAR 49 basically  
22 explored, very thoroughly, potential use of the data-limited  
23 methods, and, you know, anytime that you try to use one of those  
24 index-based approaches, right, and you don't have a huge portion  
25 of the stock covered, you end up running into problems, and then,  
26 of course, composition data was basically non-existent for a large  
27 portion of the data series, the time series, and so the panel  
28 basically recommended removing red drum from that exercise, and  
29 there is just not sufficient data to handle it, and so I think  
30 that a data evaluation workshop, some kind of a discussion, would  
31 be valid.

32  
33 Then integrate -- I think we need to work very closely with the  
34 Science Center, and the assessment group, to basically look into  
35 what kinds of methodologies could be used, right, to generate  
36 something that would be able to provide management advice for red  
37 drum and not, you know, really do it, and just like an academic  
38 exercise, because the Science Center is already trying to handle  
39 a number of assessments that we have over the next several years,  
40 and so exploring -- You know, doing something on the side that  
41 would explore data availability and potential methodology that  
42 could be used I think would be helpful.

43  
44 **CHAIRMAN NANCE:** The only problem with off to the side is everybody  
45 else is tracked on something with the schedule, and so it's hard  
46 to do it that way. Harry.

47  
48 **MR. BLANCHET:** Thank you, Mr. Chairman. Yes, this is -- I am kind

1 of like Luiz, and we've both been through a few red drum attempts  
2 at assessments along the way, and, a lot of times, what it comes  
3 down to is that we have completed projects, or proposed stuff, and  
4 we just do not have adequate time between the time the slide goes  
5 up that we're doing a red drum assessment and the red drum  
6 assessment is done.

7  
8 My thought is that, like some folks have mentioned, either as a  
9 workgroup of the SSC, looking at some workgroup in the Gulf States,  
10 or some other non-SEDAR workshop, to look at what data, and also  
11 what projects are available, and basically get a heads-up, so that,  
12 when you get to 2027, you can say that you've got an additional  
13 four years of information on a longline index, or some other --  
14 Maybe you have had an opportunity to collect several years of age  
15 information that you currently aren't doing, and there's ways to  
16 -- If we start now, we can actually start collecting some  
17 information and get something that would be useful in an assessment  
18 in 2027. I don't know the best way to do it, and I don't think  
19 that the SEDAR process is the way to go though. Thank you, sir.

20  
21 **CHAIRMAN NANCE:** Thank you, and I'm kind of thinking Gulf States.  
22 I would be happy to give Dave Donaldson a call and just tell him  
23 we're -- That we talked about it at the SSC, and we're interested  
24 in putting together something, just to see what kind of data we  
25 have left, and see what they would be able to do, and I think that  
26 would be the best approach. Sean and then --

27  
28 **DR. POWERS:** I think Harry makes an excellent point. I mean, the  
29 point is this is not going to be a discrete thing, and this is  
30 going to be, you know, a working group gets together and say, okay  
31 -- You know, review what we have, but also say what we can do in  
32 four years, and to keep that effort going, because I think that's  
33 -- I think his reference was we've been involved in a lot of  
34 working groups that say you can't do anything right now, and you  
35 don't have enough, but then the follow-through to say, well, here's  
36 the plan of how you can do it in four or five years.

37  
38 **CHAIRMAN NANCE:** Mike, please.

39  
40 **DR. ALLEN:** Thank you, Mr. Chair. I think a data scoping kind of  
41 effort like this makes a lot of sense. They just tried to do one  
42 in the South Atlantic, with Georgia, South Carolina, and Florida,  
43 and I don't know if that -- That assessment is not out yet, but  
44 it's going to be a revision, but I think just trying to summarize  
45 the data that exists around, and what the data needs are, would be  
46 a really good exercise.

47  
48 **CHAIRMAN NANCE:** We need a body to do this, and it's just, you

1 know, a couple of people getting together, but I think Gulf States  
2 seems to be the group that would be able to do that. I will go  
3 ahead and do that, John, and I'm glad that you brought that up. I  
4 appreciate that. Sean.

5  
6 **DR. POWERS:** For another species, you mentioned, Ryan, vermilion,  
7 and it's not -- Vermilion is not on here, and is there a plan to  
8 do an index or something on vermilion?

9  
10 **MR. RINDONE:** We're going to do an interim, and I had mentioned  
11 the possibility of adding an OA for it in like 2027, if it's  
12 determined that, at that point, that there needs to be one for  
13 some reason or another. You know, as we get further out from the  
14 terminal year of assessment -- At least, with red grouper, you  
15 guys expressed some concern with how far away you were from the  
16 last time that it had a legit stock assessment performed on it,  
17 and so -- You guys haven't established --

18  
19 We can talk about that, when we get to the interim stuff next, but  
20 it might be worth considering like having, you know, an SOPP, if  
21 you will, that, if we're this far out from the last assessment,  
22 then we would really like to see a new assessment. That at least  
23 was the sentiment that we got from the review of the last red  
24 grouper interim. I've got red drum down here on 2026, a data  
25 evaluation for red drum using data through 2024, and just a  
26 question-mark on the timeline, and so anything else to add?

27  
28 **CHAIRMAN NANCE:** Katie, please.

29  
30 **DR. SIEGFRIED:** I just wanted to comment on the red drum thing,  
31 and I reviewed Louisiana's last assessment, and Jason Adriance  
32 asked the Science Center to help, and there's a lot of comments  
33 back and forth, and we talked about sort of teaching them SS, to  
34 help with that process, but I do think that the Gulf States is a  
35 good place to get all those data together, but there's quite a bit  
36 of modeling work already done, and so I don't think there's a big  
37 jump from whatever the Gulf States meeting would be. The other  
38 thing I wanted to ask, Ryan, is are you to 2025 yet?

39  
40 **MR. RINDONE:** We are wherever we need to be.

41  
42 **DR. SIEGFRIED:** I'm sorry, but I've got too many things going on.  
43 I don't think you're going to be able to have two research tracks  
44 going on simultaneously in 2025, and I was looking at the SEDAR  
45 website, and it's not agreed upon yet, right, and that's one of  
46 the things in our guidance for RTs and OAs that --

47  
48 **CHAIRMAN NANCE:** We've got two in 2024, also.

1  
2 **DR. SIEGFRIED:** Well, I think the reason that was okay is because  
3 the shrimp data folks are all different from the reef fish data  
4 folks.

5  
6 **CHAIRMAN NANCE:** Isn't that also 2025?

7  
8 **DR. SIEGFRIED:** That's my problem, is --

9  
10 **CHAIRMAN NANCE:** I see. It's amberjack and tilefish.

11  
12 **DR. SIEGFRIED:** Gray triggerfish is supposed to start at the  
13 beginning of 2025, which means -- Sorry. 2024, which we actually  
14 need to start planning, and I saw about a year of overlap, the  
15 entire year of 2025, for both of those research tracks.

16  
17 **MR. RINDONE:** So, I mean, that's -- We've gone around a little bit  
18 at the SEDAR Steering Committee about this, but that's -- You know,  
19 it's what we have on that blocked-off calendar that Julie has up  
20 there. I am not blaming that on Julie. I mean, we asked for it  
21 to be on there, and so, if we need to talk about spacing for this,  
22 then we can certainly do that. We've got our next SEDAR Steering  
23 Committee meeting in May, and so we can nail that down for 2025  
24 there, as far as when to start amberjack. I am sympathetic to the  
25 overlap, and so, as far as that is concerned, you know, that  
26 concern is noted.

27  
28 For the years that are absolutely locked down, it's basically like  
29 two years out from whatever point we're at at the present time,  
30 and so 2023 and 2024, insofar as it matters for this, you know,  
31 those are locked in place. There can still be some movement with  
32 2025, but, generally speaking, it's discouraged, because the  
33 Center is already looking at that and trying to plan for, you know,  
34 what comes next. 2026 and 2027 have lots of flexibility, and so  
35 -- But we will revisit the timing of those research tracks with  
36 you guys after the May SEDAR Steering Committee meeting.

37  
38 **DR. SIEGFRIED:** Or at it. Is that when it was going to be decided,  
39 because that's what I was asking, because the little Tetris thing  
40 on the SEDAR website says it's still blue, and does that mean that  
41 we -- Am I speaking out of turn? Has this already been agreed  
42 upon?

43  
44 **MR. RINDONE:** No, you're -- We haven't nailed that down entirely  
45 yet, because that was a concern of you all's that has been  
46 expressed, but it also hasn't been changed yet either, and so,  
47 once we can figure out where to put the Tetris blocks, then we can  
48 change it from accepted to final, but that's why it's not listed

1 as final yet.

2  
3 **DR. SIEGFRIED:** Okay.

4  
5 **MR. RINDONE:** Because there is still some movement.

6  
7 **DR. SIEGFRIED:** It looks like good timing for triggerfish, given  
8 all the research going on, and I wondered -- I was waiting on pins  
9 and needles for Sean's presentation about the greater amberjack  
10 count, because, when I went to one of the visioning workshops and  
11 talked to Mark, you know, it seems like, the more time we give  
12 them to finish, the better, but I'm only talking about my shop's  
13 workload.

14  
15 **MR. RINDONE:** Yes.

16  
17 **CHAIRMAN NANCE:** Okay. So moving amberjack to --

18  
19 **MR. RINDONE:** Well, yes, and starting the research track when we  
20 were, like waiting until 2025, was predicated on the availability  
21 of the great amberjack count information, because it would be kind  
22 of foolish to start it without that information being available,  
23 and so -- If it needs to be moved to accommodate that, then, by  
24 all means, and that was the paramount reason for the timing in the  
25 first place.

26  
27 **CHAIRMAN NANCE:** Julie, please.

28  
29 **DR. JULIE NEER:** Ryan basically addressed everything I was going  
30 to say, and, yes, the South Atlantic amberjack is scheduled for  
31 the following year as well, because of that, and we got a little  
32 out of sync with some things, but, yes, the 2025 schedule will be  
33 determined and finalized at the -- Hopefully at the May steering  
34 committee.

35  
36 **CHAIRMAN NANCE:** Okay. I'm glad you brought it up, Katie. Thank  
37 you. Any other changes, from the SSC's perspective? Okay. Let's  
38 go ahead and move on to --

39  
40 **MR. RINDONE:** The interim analyses, and so that's the other one,  
41 Jess, and it's 9(b). Okay, and so this list is a little more  
42 fluid. Well, it's a lot more fluid. These interim analyses are  
43 -- Essentially, they represent relationships between the  
44 cooperator and the analytical body. In this case, or in most  
45 circumstances, it's the council and the Science Center.

46  
47 For 2023, we already had red grouper, and that was ultimately done  
48 just as a health check, for the reasons that are all detailed in

1 the last meeting's summary, and gag is going to be attempted for  
2 -- Is that still for July, Katie, for the July SSC meeting?

3  
4 **DR. SIEGFRIED:** The last letter we got from the council said  
5 September.

6  
7 **MR. RINDONE:** September? Okay. That's going to look at using the  
8 combined video index with -- Yes.

9  
10 **DR. SIEGFRIED:** It's not the combined video index. It's going to  
11 be truncated version of G-FISHER that matches what was used in the  
12 assessment, but you can't fit that in that little box, and so I  
13 don't care what you want to say.

14  
15 **MR. RINDONE:** Well, I can do something there.

16  
17 **DR. SIEGFRIED:** Can you say "truncated G-FISHER"?

18  
19 **MR. RINDONE:** I can say that.

20  
21 **DR. SIEGFRIED:** Lane snapper is iTarget, and I don't know if you  
22 want to say that or not.

23  
24 **MR. RINDONE:** I can say that, too. That's just fine. Technically,  
25 the index is the headboat CPUE, for lane snapper, and so I could  
26 just say that. That one is my fault. That was copy-and-paste.  
27 Then vermilion snapper, and do you know what you guys are going to  
28 use for that yet?

29  
30 **DR. SIEGFRIED:** I am still checking. Sorry. I will be right back.

31  
32 **MR. RINDONE:** I will just put "...". We still have the annual  
33 request for red grouper, and so, until get the stock assessment,  
34 which we'll expect to get, again, in 2024, and we would still  
35 expect to get that interim analysis with the NMFS bottom longline,  
36 as a health check, in early 2024.

37  
38 We are requesting an interim for gray triggerfish, because it's  
39 been a while since we've had one, but, again, just looking at that  
40 as a health check, because we're quite a ways out from the last  
41 time that we had a stock assessment done. Greater amberjack, the  
42 same thing. We're not so far out from the last time the assessment  
43 was done, but we have it listed as a health check, mostly because  
44 of just some uncertainty about the ability to use a fishery-  
45 independent index for doing an interim analysis for greater  
46 amberjack, and I think that's one of the things that the Center is  
47 looking into.

1 King mackerel is another one that is a question-mark. I had  
2 talked, at one point, with John Walter about a Frankenstein  
3 approach, using effort indices, but most of that was in Google  
4 chat, and I know that I didn't save it, and I kind of wish that I  
5 did, because I thought we had a decent idea, but that's something  
6 that the Center is going to have to have to look at as well,  
7 because any of the individual fishery-independent indices are kind  
8 of weak to look at for an interim analysis, and the larval survey  
9 is the only one that's included in the stock assessment, and it's  
10 one of those things where it's like any one thing by itself isn't  
11 quite enough, but several of the indices together make up enough  
12 to generate a signal that can be examined.

13  
14 The frequency with which we're doing these things is very  
15 malleable, and it can be readdressed, based on council need, and  
16 one of the things that I wanted to try to get out of you guys with  
17 this though was relating back to red grouper and that interim  
18 analysis and what happened there.

19  
20 Is there a certain amount of time, beyond the completion of the  
21 last stock assessment, when you guys are feeling like you kind of  
22 want to push back on continuing to do interim analyses, revising  
23 catch limits, based on one representative index of abundance, or  
24 is it very, you know, situational? Is it very, you know, species  
25 specific? You know, a discussion about that is something that you  
26 guys could certainly have, and I know that the council would  
27 probably appreciate it and have a better idea of what to expect  
28 with interim analyses that are reviewed by the SSC, and so I will  
29 open the floor on that.

30  
31 **DR. BARBIERI:** To that point, I think we had discussed, when we  
32 talked about the red grouper interim analysis, and I think we  
33 discussed that this would be another agenda item for an upcoming  
34 SSC meeting, so we could discuss a lot of these details more  
35 directly and specifically, right, and probably have to -- It's  
36 another one of those items that we probably will have to work in  
37 tandem with the Science Center, because, of course, if they are  
38 the ones conducting the analysis, right, and conducting -- Leading  
39 most of the stock assessments, then this timing is going to have  
40 to be coordinated between the two calendars, the SEDAR assessment  
41 calendar and the interim analysis calendar, so that we have some  
42 alignment there. Roy Crabtree.

43  
44 **DR. CRABTREE:** Luiz, I think you're right, because we have some  
45 things that we need to work out with the Center, in terms of the  
46 deliverables with an interim assessment, to allow us to change the  
47 catch limits.

1 In terms of how far out we're comfortable doing interim  
2 assessments, well, even if you get more years out than you're  
3 comfortable with, you're still better off with an interim  
4 assessment that you would be if you just did nothing, and so I'm  
5 not sure there is a time when you would say we don't want any more  
6 interim assessments, and it's more there's a time when you would  
7 say we need a new stock assessment, and that may not be doable,  
8 with the SEDAR schedules and workloads.

9  
10 **MR. RINDONE:** Sure, and I think more of what I was trying to get  
11 at was saying that, you know, beyond what point are the interim  
12 analyses examined solely as health checks, or is there such a  
13 point?

14  
15 **DR. CRABTREE:** Well, I don't know, because it's not quite clear to  
16 me what that means, a health check versus an interim assessment.

17  
18 **MR. RINDONE:** Essentially, the difference between the Center  
19 providing updated catch advice, you know, based on the results of  
20 the interim analysis or not, and so, for instance, in the past,  
21 when they've provided health checks for red grouper, as an interim  
22 analysis, they don't provide updated catch advice, or yield  
23 projections, and they just show you that this is where the index  
24 is, and this is where the landings have been, in relation to the  
25 ABC, and, you know, this is what the trends generally look like,  
26 but it's not used to derive catch advice, and it's just used to  
27 give you a snapshot of what the stock looks like according to that  
28 one representative index.

29  
30 **CHAIRMAN NANCE:** Well, it's just to keep an eye on the thing,  
31 without having to make a determination of --

32  
33 **DR. CRABTREE:** Well, and I come back to what Luiz said. I think  
34 there are a number of things that need more discussion than we're  
35 able to do right now on that, because I would want to talk about  
36 how valuable, really, is that, and is it worth the time commitment  
37 for a health check, if you're not going to be able to really make  
38 any changes anyway, and so --

39  
40 **CHAIRMAN NANCE:** Luiz.

41  
42 **DR. BARBIERI:** Right, and this is why I think that -- You know, I  
43 don't remember seeing whether this was included in our report,  
44 Ryan, but we had explicitly, during that discussion, made a point  
45 that this should be an item that we would be discussing in more  
46 detail, because there's all sorts of things -- For example, getting  
47 the interim assessment to provide both updates to OFL and ABC,  
48 depending on the situation, on whether the OFL estimate, you know,

1 had been stale already, right, is one thing.

2  
3 Another thing is, you know, looking at the buffer, basically the  
4 difference between OFL and ABC that we expect, as time goes by,  
5 that that buffer should be increasing over time, because  
6 uncertainty is larger, but, depending on the outcome of the interim  
7 assessment, that would not necessarily be the case, and so  
8 establishing some standard operating procedures, right, to help us  
9 guide those types of decisions --

10  
11 **CHAIRMAN NANCE:** We did talk about it last time, that we would  
12 like to do that, and this wasn't the meeting to do it, for sure,  
13 because we didn't have the time to be able to do that, but that  
14 does -- We want to talk about that, and I think we need to have a  
15 good discussion on it, so we're not all coming at different angles  
16 on this, and so we need to maybe set up, Ryan, some time, whenever  
17 is appropriate at an SSC meeting, to be able to spend maybe an  
18 hour in discussion of interim analysis, what it means, how  
19 comfortable we are with it, those types of things, I guess.

20  
21 **MR. RINDONE:** Well, we just made three hours in May, and so --

22  
23 **CHAIRMAN NANCE:** Okay.

24  
25 **MR. RINDONE:** By moving the Spanish assessment.

26  
27 **CHAIRMAN NANCE:** Okay. That's good.

28  
29 **MR. RINDONE:** We can do it in May, if you guys wanted to do it  
30 then.

31  
32 **CHAIRMAN NANCE:** I think it's time that we need to do it. Carrie  
33 and then Katie.

34  
35 **EXECUTIVE DIRECTOR CARRIE SIMMONS:** Thank you, Mr. Chair, and so  
36 we did briefly talk about, you know, other indices being included,  
37 when we're bringing these interim analyses, or other, you know,  
38 biological or catch information, size of the fish being included,  
39 when these analyses are requested, but, you know, again, we were  
40 reminded that there's a tradeoff to that, regarding staff time and  
41 it not being on the SEDAR schedule, and so I think we have to find  
42 the balance there, when we have this discussion.

43  
44 The other thing that, on the management side of the house, that we  
45 need to kind of work through is this delivery date, and I think,  
46 for red grouper -- I mean, it's an IFQ species, and we really  
47 should have had the SSC look at that, if we were going to make  
48 catch changes, in like June of the previous year, so we could try

1 to get something on the books for the IFQ program, whether it be  
2 an increase or decrease, in January of the following year, and so  
3 we haven't really figured out when those indices are going to be  
4 processed, and if it's going to be one or two years in arrears, in  
5 order to get something that we could act upon on the management  
6 side, and so that's the other thing we need to think about a little  
7 bit more cohesively, as far as that process.

8  
9 **CHAIRMAN NANCE:** Because I know that, right now, we have an interim  
10 analysis with a specific index that we look at, and then, as we  
11 get less comfortable with that being streamed out in time, and we  
12 talked about bringing other data streams into it, and, you know,  
13 almost get to the point of a mini-assessment, but, yet, that's all  
14 -- It takes a lot of time to be able to do that, to pull that data  
15 in, and so, hopefully, on these species that are on this interim  
16 analysis, that we have interim analysis for a given set of years,  
17 and then, in the SEDAR schedule, we're looking at these, to be  
18 able to get them into an assessment themselves. Carrie.

19  
20 **EXECUTIVE DIRECTOR SIMMONS:** Just one final follow-up. On the  
21 health check side of things, I mean, I think that's important for  
22 the management side of the house, and people come to the podium  
23 all the time, at the council level, you know, as you hear it  
24 throughout all the meetings we have, that, you know, this stock is  
25 recovering, or this stock is declining, and so I think it's a very  
26 useful tool for us to look at when we have a strong fishery-  
27 independent index that gives us an idea of, yes, that index is  
28 showing us what the fishermen are saying or, no, it's not showing  
29 us what the fishermen are saying, and so I think, if we have the  
30 time, and we can do it, I think it is important to consider that,  
31 without making catch changes every single time we do this exercise.

32  
33 **CHAIRMAN NANCE:** Thank you. Katie, please.

34  
35 **DR. SIEGFRIED:** That's a good point about the timing, what Carrie  
36 brought up, because the bottom longline can be available -- Like,  
37 for red grouper, it was available at the end of 2022, and it turned  
38 over very quickly, but anything video is going to take quite a bit  
39 longer, and so a lag, between when we get the interim to you and  
40 when the terminal year of data and then when you can do final  
41 action, is quite large. I don't know how to cope with that, but  
42 I acknowledge that that's an issue.

43  
44 Yes, vermilion is combined video, Ryan, and I looked that up, but,  
45 in May, we're also going to see the research that the South  
46 Atlantic assessment group has done on interims, sort of which  
47 species -- You know, four different species were examined, and  
48 they come up with some good conclusions about -- That the SSC could

1 potentially use to develop a recommendation for the time over which  
2 an interim is valuable and then after which it's not.

3  
4 One of them is around episodic events, and the South Atlantic group  
5 showed that species that are subject to episodic events are  
6 probably less -- The interim is probably less useful, as far as  
7 the accuracy, but you all will see that in May.

8  
9 The other thing that Luiz mentioned was the buffer, and we still  
10 need to finish that conversation too, because I didn't finish the  
11 Privitera-Punt method, and so it is all kind of coming together  
12 eventually.

13  
14 The other thing is, the way that -- This is just my personal  
15 opinion, and not the agency's opinion, but I would like interims  
16 to be in the SEDAR process, for the scheduling alone, the way that  
17 I'm trying to figure out when and how to do all of this, and then,  
18 if we want to include other data, like comps or landings, it would  
19 be sort of an interim-plus, something that would be much more  
20 appropriate to do in the SEDAR process, but, again, that will have  
21 to be decided at the steering committee meeting level, the steering  
22 committee level. I probably forgot something in there, but --

23  
24 **CHAIRMAN NANCE:** Is that slated to be discussed at the SEDAR  
25 meeting?

26  
27 **DR. SIEGFRIED:** We started the discussion of whether interims  
28 should be included, and I didn't think that we finished it, and do  
29 you all think that we finished it?

30  
31 **MR. RINDONE:** No, I don't think we finished it, and, I mean, I  
32 think that we have pretty good communication in the Gulf, and so,  
33 you know, if there are things that need to be moved around, you  
34 know, we tend to be reflexive to that. It's -- You know, the  
35 interim analysis process is not something that has been started in  
36 the South Atlantic yet, and so it's not a product that they have  
37 started using yet, and it's something that we've been using now  
38 for a few years, and so our familiarity with it, and our experience  
39 with it, is, obviously, going to be different from theirs, no  
40 matter what.

41  
42 I think there's probably pluses and minuses to tying it to the  
43 SEDAR process, the plus being the little bit more certainty in the  
44 scheduling, but, you know, even then, some things still get wiggled  
45 around a little bit, the minus being that the freedom with which  
46 to wiggle is substantially less, once it's tied into the SEDAR  
47 process, and so, you know, tradeoffs will be associated with  
48 anything, but hopefully we can talk about that more with all the

1 requisite totem pole heads at the steering committee.

2  
3 **CHAIRMAN NANCE:** Yes, Luiz, please.

4  
5 **DR. BARBIERI:** Thank you, Mr. Chairman. Just quickly, to one of  
6 Katie's points, regarding the truncated G-FISHER data being used  
7 for the combined video, right, and that is already, I'm told, an  
8 issue for the gag and vermilion snapper interim analyses that are  
9 supposed to be delivered by September of this, because data through  
10 2022 is most likely not going to be -- You know, the videos are  
11 not going to have been read in time for data through 2022 to be  
12 incorporated into this analysis. They are just now, I think,  
13 beginning to read 2022 data, and, with the intense field season  
14 coming up, it is unlikely that they're going to have that completed  
15 in time for the interim analyses to be completed by September.

16  
17 **MR. RINDONE:** Okay, and so what are we looking at then on timing  
18 for -- Should we back the terminal year up one year for any of the  
19 video survey ones, and is that essentially what -- For any of the  
20 combined and the truncated G-FISHER?

21  
22 **DR. BARBIERI:** I mean, that would be the only guarantee, you know,  
23 with the idea that -- That was the other discussion we were having,  
24 about whether to use the terminal year or not, right, in making  
25 these decisions, and, if we have something for some species that  
26 happens to have been completed, by all means, and we will have the  
27 most up-to-date, but guaranteed is that we're going to have data  
28 through 2021, is what I understand.

29  
30 **MR. RINDONE:** So, if -- I guess so when is a reasonable delivery  
31 data for a terminal year of 2021? I mean, obviously, at this  
32 point, like we're talking September anyway, but that's based on  
33 our communication with the Science Center, and so for -- If I'm  
34 looking at 2025, what should I be looking at there for -- If I  
35 know my terminal year is 2023 for gag, for an interim in 2025,  
36 what's a reasonable delivery date?

37  
38 **DR. BARBIERI:** I don't mean to speak for the Center, but I will  
39 tell you that, you know, right now, all of this process, and the  
40 G-FISHER project itself, and the way that we are trying to  
41 coordinate, FWRI, coordinate with the Center, in terms of trying  
42 to increase capacity and trying to develop more efficient, you  
43 know, processes for video reading and all of that, is that this is  
44 discussion that's being had right now, and I don't think we are  
45 ready to make those decisions at this point. I am thinking that  
46 we can talk about this year, the interim analysis for this year,  
47 and perhaps for next year.

1 **MR. RINDONE:** Okay. Well, I'll just -- For the sake of having  
2 something there, then I will just leave them at September for now,  
3 and so, knowing that this is a very malleable schedule.

4  
5 **CHAIRMAN NANCE:** John.

6  
7 **MR. MARESKA:** Luiz, thank you for bringing that up, and so, as  
8 part of the SEAMAP subcommittee, we've been talking about the G-  
9 FISHER process, and I guess I was confused about when the combined  
10 video was going to be a truncated G-FISHER, because I thought the  
11 combined video was used in the stock assessment, and so I guess  
12 you can explain that a little bit, if that's going to give us  
13 something different, and I know -- I guess we can't change the  
14 terminal year, because G-FISHER is so new in its design, that we  
15 really don't have multiple years, if you're starting to back up on  
16 terminal years, and then, in the western Gulf, I know that G-  
17 FISHER is running into all those nepheloid layers, and all the  
18 vertical structure issues, that have to be addressed, and so, you  
19 know, using the combined video going forward --

20  
21 I don't know if that's going to be G-FISHER, going forward, or  
22 combined video, and then, with the greater amberjack count, is  
23 that video that is transpiring, and is that going to be somehow  
24 incorporated into these combined videos going forward, because,  
25 with greater amberjack, I'm not sure that the stationary cameras  
26 on the bottom are doing what they need to do to get a good index  
27 on greater amberjack.

28  
29 You mentioned, and was it the lane or the vermilion that would  
30 also be using the truncated G-FISHER, and, again, that goes back  
31 to the stock assessment, what was in the stock assessment, and how  
32 much is this going to be truncated, and are you just using the  
33 fixed stations from G-FISHER or -- Can you explain what the  
34 truncated is? I would really like some more information on that.

35  
36 **DR. SIEGFRIED:** Sure, and so it's just for gag. In the gag  
37 assessment, SEDAR 72, the combined video index was not used. It  
38 was -- There is two of the -- The Panama City video index, which  
39 now is with G-FISHER and has some FWRI stations, and the Pascagoula  
40 portion, and so please, Luiz, jump in any time I misspeak, but the  
41 G-FISHER is all three of them combined now, which will be the  
42 combined video, and that will be G-FISHER, moving forward.

43  
44 If combined video is used in the assessment, then that's what we'll  
45 use, and the reason that we're changing for gag is because it's  
46 the panel explicitly rejected using a combined video, because of  
47 the different selectivity, the different selectivities from each  
48 of those three sampling groups, and a difficulty figuring out how

1 to assign one selectivity to the index.

2  
3 Then I thought there might be some, you know, epiphany during the  
4 procedural workshop on combining fishery-independent series, but,  
5 as far as I understand, there wasn't some answer for gag, and so  
6 we would truncate G-FISHER to the areas that were sampled by Panama  
7 City, what used to be just Panama City, and Pascagoula, and that's  
8 what we would try, and we don't know which one would be better for  
9 gag, and so we would -- Right now, we're talking about providing  
10 SSC consideration for the interim.

11  
12 **MR. MARESKA:** So, basically, we're going to have to review this  
13 truncated before we can even consider it for an interim.

14  
15 **DR. SIEGFRIED:** The same sampling universe that was used for --  
16 We'll put that in the working paper that you all will get in the  
17 briefing book, and it's the same sampling universe that was used  
18 previously. Luckily, FWRI did sample in 2020, when the feds  
19 weren't able to, and so we have data from 2020 and 2021, thanks to  
20 FWRI. Otherwise, the Panama City video index would have been done  
21 at the end of the gag assessment, but it is -- I could give you  
22 the -- I could send this email to you about the sampling universe,  
23 but we have it down to which zones are collected by Panama City,  
24 versus Pascagoula, versus FWRI, before it became G-FISHER, and  
25 that's all we would be doing, is using those sampling zones to  
26 create the index for the interim.

27  
28 **MR. MARESKA:** You don't need to send it to me, and I think I've  
29 seen that in a presentation.

30  
31 **DR. POWERS:** To your point, John, we're doing a lot of work, in  
32 the greater amberjack count, looking at different video gear and  
33 seeing if we can calibrate one to the other to better define  
34 selectivities and all of those things, and so Mark and I will talk  
35 to you about some of the preliminary results, but Ted has also  
36 been doing a lot of work, at FWC, with multiple different types of  
37 baited and unbaited drops and things like that, and so maybe we'll  
38 be able to give some guidance, because, yes, the western Gulf is  
39 always going to be limited, if you go with video, and then a lot  
40 of us use ROV surveys, compared to stationary cameras that are  
41 changed.

42  
43 **CHAIRMAN NANCE:** Okay. Thank you. Katie.

44  
45 **DR. SIEGFRIED:** To follow-up on what Ryan was asking, it's a two-  
46 year lag for the terminal year, most likely, for all things video.

47  
48 **MR. RINDONE:** Got it. I have made that adjustment.

1  
2 **CHAIRMAN NANCE:** So, basically, for 2023, it would be 2021, the  
3 terminal year.  
4

5 **MR. RINDONE:** For lane snapper, are we going to be able to use  
6 2022 for the headboat CPUE?  
7

8 **DR. SIEGFRIED:** I think so, if it's delivered in September. I can  
9 double-check.  
10

11 **MR. RINDONE:** Okay.  
12

13 **DR. SIEGFRIED:** That's not video, and so I think that's --  
14

15 **MR. RINDONE:** Right. Well, Mr. Chair, I'm square on my interim  
16 analysis schedule, if you want to move on to the next thing.  
17

18 **CHAIRMAN NANCE:** Okay. Thank you. Let's go ahead and do the red  
19 grouper operational assessment terms. I think we have time for  
20 that one, or should we put that off until tomorrow, Ryan?  
21

22 **MR. RINDONE:** No, I think we can do it.  
23

24 **CHAIRMAN NANCE:** Okay. Well, let's go ahead and do that then.  
25

26 **REVIEW OF RED GROUPER OA TERMS OF REFERENCE AND PARTICIPANTS**  
27

28 **MR. RINDONE:** Okay, and, again, I've got a Word version of this.  
29 We're going to review the operational assessment TORs for SEDAR  
30 88, and we're getting closer to a hundred, and I wonder if we'll  
31 have a celebration or something, or maybe we'll all cry.  
32

33 This assessment is also going to consider the SRFS landings data  
34 for the recreational private vessel fleet for red grouper and do  
35 some updated red tide mortality modeling, and we're going to  
36 request volunteers for the topical working groups, which are  
37 specifically going to address incorporating SRFS and the new ride  
38 tide data, and they're going to do that via webinar.  
39

40 You guys should look at the proposed terms of reference and offer  
41 recommendations, and then anyone that wants to participate in the  
42 topical working group should volunteer, and they're going to meet  
43 virtually between this fall and next spring, and you should --  
44 Whoever volunteers, essentially, we're going to have you  
45 participate in both, in both the incorporation of SRFS information  
46 and the red tide data, and so we'll start with the terms of  
47 reference, and so, Jess, if you can bring those up. Yes.  
48

1 **DR. SIEGFRIED:** I'm sorry, and this is a little out of turn, but  
2 I have Skyler set to do scamp tomorrow, and I saw that something  
3 is cancelled in the morning.

4  
5 **MR. RINDONE:** Yes.

6  
7 **DR. SIEGFRIED:** Is she expected to be ready at 8:30, or can anybody  
8 else go -- It's a logistics issue for her to plan.

9  
10 **CHAIRMAN NANCE:** Okay, and so we could put Steven first, if that's  
11 okay.

12  
13 **MR. RINDONE:** Steven, do you feel like going first?

14  
15 **CHAIRMAN NANCE:** Steven Saul. We can move him up, when we start,  
16 and then we can have Skyler after that.

17  
18 **DR. SIEGFRIED:** Thank you. I just wanted to let her know.

19  
20 **CHAIRMAN NANCE:** No. Perfect. I'm glad you brought that up now.  
21 Thank you.

22  
23 **MR. RINDONE:** Okay. We'll make sure there's some coffee for Steve  
24 in the morning. All right. Update the red grouper SEDAR 61 base  
25 model with data through 2022, and also use the SRFS information to  
26 inform private recreational landings data, if all the requisite  
27 calibrations have been completed by that point, which I think is  
28 expected, and document any changes or corrections made to model  
29 inputs, and these are a lot of the typical things that we include.  
30 Update life history information, if warranted, and consider the  
31 treatment of recreational harvest, including consider inputting  
32 recreational catch in weight, i.e., pounds, instead of in numbers  
33 of fish.

34  
35 You guys might recall that APAIS collects catch, natively, in  
36 numbers of fish, and then, based on a sample, there is a conversion  
37 to weight from there.

38  
39 Reevaluate error estimates for the recreational landings, and this  
40 was something that was discussed during the last assessment, and  
41 explore the effects of changes in mean weight estimation procedure  
42 between SEDAR 61 and the 2021 red grouper interim analysis, and,  
43 if using numbers of fish as the input for -- As the input unit for  
44 recreational catch, compare the mean weights estimated by the model  
45 with that reported by the SERO ACL monitoring dataset or explore  
46 fitting to the SERO mean weights, and, again, this is -- The use  
47 of some words in here is purposeful, like "explore", and so, if  
48 something doesn't work, we're not bound to it, but we should at

1 least poke around with it a little bit.

2  
3 Explore the potential effect of red tide with consideration of  
4 past red tide events and more recent events in 2108 and thereafter.  
5 I guess, also, 2021, and now this year, and so this year is not  
6 great. Explore age-specific episodic mortality of red grouper due  
7 to red tide, and so this is, basically, looking at a similar  
8 approach as was used for gag recently in SEDAR 72. Dave, since a  
9 lot of that looks to you, any edits there?

10  
11 **DR. CHAGARIS:** No edits there, but, you know, just a heads-up that  
12 the satellite data are changing, and so the availability and how  
13 long we can extend that mortality time series, you know, will be  
14 -- That will have to be determined.

15  
16 **MR. RINDONE:** Okay.

17  
18 **CHAIRMAN NANCE:** What's changing, David?

19  
20 **DR. CHAGARIS:** Well, the MODIS satellite is -- You know, it's no  
21 longer really being maintained by NASA. I mean, they're still  
22 providing products. Right now, I just checked on our data up until  
23 -- It looks like there's some available for March, but there's  
24 going to be a new satellite product that replaces that.

25  
26 **CHAIRMAN NANCE:** Okay. Okay.

27  
28 **DR. CHAGARIS:** It's out of my control.

29  
30 **CHAIRMAN NANCE:** 3G, huh? Is it going to provide -- This will  
31 provide newer-type data, or do you know, the new satellite?

32  
33 **DR. CHAGARIS:** The new satellite has been deployed, and it just  
34 doesn't have the normalized florescent line height product that we  
35 use to identify harmful algal blooms. Chuanmin Hu, at USF, has  
36 been developing, you know, these red tide products from the new  
37 satellite, and so there will be something coming down the line,  
38 but I just don't know the exact timing of that.

39  
40 **CHAIRMAN NANCE:** Thank you.

41  
42 **MR. RINDONE:** Okay. Evaluate model parameter estimates and their  
43 variances and uncertainties and estimates of stock status and  
44 management benchmarks and provide the probability of overfishing  
45 occurring at specified future harvest and exploitation levels.  
46 Provide commercial and recreational landings and discards in  
47 pounds and numbers, and so MSY, or its proxy, would be the yield  
48 at F at MSY, or F rebuild, if the stock is overfished. MSST is

1 defined as 50 percent of the spawning stock biomass at MSY.  
2 Maximum fishing mortality threshold is defined as  $F$  at MSY, or its  
3 proxy, and OY at 75 percent of  $F$  at FMSY, or its proxy. If  
4 different status determination criteria are recommended, then  
5 provide outputs for that.

6  
7 Unless recommended, use the geometric mean of the previous three  
8 fishing years fishing mortality to determine  $F$  current, and this  
9 is generally what's been done for all of our past assessments. If  
10 an alternative approach is recommended, provide justification and  
11 outputs for that alternative, and provide yield and spawning stock  
12 biomass streams for the overfishing limit. Yes, John.

13  
14 **MR. MARESKA:** To that point, as I recall, when we were looking at  
15 calibration, Florida wanted to request -- Was it 2020 or 2021 that  
16 the effort was markedly down, and so, if you're trying to use three  
17 years, determine if you wanted to remove one of those years, and  
18 do you want the most current two years?

19  
20 **MR. RINDONE:** Well, I think that would fall within the alternative  
21 approach, right?

22  
23 **MR. MARESKA:** It could. It's kind of already on the record that  
24 there was issues with one of those years.

25  
26 **CHAIRMAN NANCE:** Which state?

27  
28 **MR. MARESKA:** Florida.

29  
30 **MR. RINDONE:** It was Florida.

31  
32 **CHAIRMAN NANCE:** No, I don't think so. I thought it was --

33  
34 **MR. MARESKA:** Yes, and the survey effort for determining catch was  
35 the --

36  
37 **MR. RINDONE:** It's 2015 to 2019 and 2021. They excluded 2020.

38  
39 **MR. MARESKA:** I thought the terminal year was 2022 for this.

40  
41 **MR. RINDONE:** For this, it's 2022, but, to your point about the  
42 calibration stuff, you're right. They did exclude it, originally.  
43 It was 2020.

44  
45 **CHAIRMAN NANCE:** 2020, yes.

46  
47 **MR. MARESKA:** I thought I would just bring that point up. We can  
48 consider it later.

1  
2 **CHAIRMAN NANCE:** I think it was Mississippi that was 2019 and 2021,  
3 and I know Alabama was okay with 2020 and 2021. Luiz.

4  
5 **DR. BARBIERI:** Thank you, Mr. Chairman. I have a couple of minor  
6 comments here on the status determination criteria, Ryan.

7  
8 **MR. RINDONE:** Sure.

9  
10 **DR. BARBIERI:** Do we need to be more explicit about the MSY proxy  
11 there?

12  
13 **MR. RINDONE:** We can put it in there, and that's fine. These are  
14 just canned, and so, for red grouper, it's 30 percent SPR.

15  
16 **DR. BARBIERI:** Right, just because -- You know, I guess it would  
17 be easier to be at the workshop and not have to look at the  
18 amendment that lists, right, what the proxies are, and then OY  
19 should be the yield at 75 percent of FMSY, right?

20  
21 **MR. RINDONE:** Yes. I will put in there that the proxy for MSY is  
22 F 30 percent SPR for red grouper.

23  
24 **CHAIRMAN NANCE:** Carrie.

25  
26 **EXECUTIVE DIRECTOR SIMMONS:** Thank you, Mr. Chair, and so Tom asked  
27 me to bring up a question about the proxies, and so, for scamp, I  
28 think, whenever that is, tomorrow, you're going to look at the  
29 projections, I think for an F SPR at 40 percent, and I think we  
30 did that for gag, and I remember we used to ask for like a range,  
31 but, since the council has a current proxy on the books, maybe we  
32 just want to note that and then consider a different proxy, or  
33 perhaps we want to come back to this, after the Harford  
34 information, and I'm not sure how you want to handle that, Mr.  
35 Chair.

36  
37 **CHAIRMAN NANCE:** Yes, we may want to do that, only -- Last time,  
38 we got a little bit of -- Where Jessica ran the analysis at the  
39 last meeting.

40  
41 **MR. RINDONE:** Francesca.

42  
43 **CHAIRMAN NANCE:** Francesca. Thank you. I don't know why I said  
44 Jessica. Yes, Francesca, and -- Then we went back and had her  
45 rerun -- Because we had specified one in the TORs, and they ran  
46 that.

47  
48 **MR. RINDONE:** If you guys want to consider 40 percent SPR also --

1  
2 **CHAIRMAN NANCE:** My only thing is do we -- By specifying a single  
3 thing in there, are we -- Do we set ourselves up for -- We're not  
4 very flexible.

5  
6 **MR. RINDONE:** Well, that would be what they would provide, is 30  
7 percent SPR, and, if they felt compelled to provide something else,  
8 they would provide justification for doing so. If you guys wanted  
9 to pick something else, in advance, for them to also present, it's  
10 certainly your prerogative to ask for it, and it's easy enough for  
11 me to put in here, and so, right now, I have a bullet, under OY,  
12 and, Jess, if you'll scroll up, that just says that the current  
13 proxy for FMSY for red grouper is F 30 percent SPR, and I could  
14 put in something that says to also provide estimates using an MSY  
15 proxy of F 40 percent SPR. Then you guys can acknowledge what the  
16 current one is and consider your other one, and if -- You know,  
17 based on whatever justification you ultimately use, you can choose  
18 to maintain the ones that's currently on the books, or you can  
19 choose to recommend the council adopt something different. Katie.

20  
21 **DR. SIEGFRIED:** Thanks. Speaking of the Harford presentation, it  
22 might be a good idea to hear that before we hard-code anything in  
23 the TORs, but I would prefer, and I've talked to Ryan about this,  
24 to just put, for reference, what's on the books is this, but then  
25 leave everything as "or a proxy or MSY proxy". That way, whatever  
26 we come up with, we meaning we present and then you all come up  
27 with, for best practices for recommending proxies could be  
28 accommodated.

29  
30 It might even be good, and I know I should have said this at the  
31 beginning of the meeting, but I didn't think of it, that scamp go  
32 after the Harford presentation, because that's another thing  
33 that's being discussed during those projections, is that the proxy  
34 should be.

35  
36 **CHAIRMAN NANCE:** Let me ask -- I think that's a good way to do the  
37 TORs, and I think that's a great way, and would it be beneficial  
38 then to have Dr. Harford -- Would he be able to do it first?

39  
40 **MR. RINDONE:** He'll be here, and so --

41  
42 **CHAIRMAN NANCE:** Okay. Great. So, instead of Dr. Saul first, we  
43 could have Dr. Harford first and then scamp, and I think that would  
44 be -- Then we can put -- Then we can put Steve after that, and I  
45 think that would be a good way to do it.

46  
47 **DR. SIEGFRIED:** I didn't mean to bump Steve, and we can start with  
48 Steve, but I just meant that Bill should go before Skyler.

1  
2 **CHAIRMAN NANCE:** All I'm saying is, if we want to have scamp as  
3 the second thing, when Skyler is ready to do it, Dr. Harford -- I  
4 think it would be beneficial to have him first.

5  
6 **DR. SIEGFRIED:** She will be here as of when she's supposed to be  
7 here, and then the rest of the day, and so there's no need to push  
8 Harford to first thing, if you want to leave Steve where he was.

9  
10 **CHAIRMAN NANCE:** Okay.

11  
12 **DR. SAUL:** It doesn't matter to me. Do whatever works for  
13 everybody.

14  
15 **CHAIRMAN NANCE:** Thank you, Steve. Roy.

16  
17 **DR. CRABTREE:** So there's a lot of discussion, and so the statement  
18 here that MSY is the yield at F rebuild, that's coming out, because  
19 I don't believe that MSY would ever be the yield at F rebuild,  
20 unless F rebuild happened to be equal to FMSY. F rebuild could be  
21 conceivably zero, and MSY would not --

22  
23 **CHAIRMAN NANCE:** Doesn't that say depending on where the stock is?

24  
25 **DR. CRABTREE:** An overfished stock can't produce MSY. That's why  
26 it's overfished.

27  
28 **CHAIRMAN NANCE:** Let's say the assessment shows it not overfished.

29  
30 **DR. CRABTREE:** Then it would be the yield at FMSY.

31  
32 **CHAIRMAN NANCE:** Yes, and I think that's what that's saying, is  
33 that you can use FMSY -- Depending on the status of the stock.

34  
35 **DR. CRABTREE:** What I'm saying is that FMSY would never be the  
36 yield at F rebuild, unless F rebuild equaled FMSY.

37  
38 **MR. RINDONE:** The way that we've interpreted this, in the past, is  
39 that MSY, or its proxy, is equal to the yield at FMSY, and I could  
40 put a comma in there, so it's, comma, or we use -- Or a semicolon.  
41 F rebuild, if the stock is overfished, but the --

42  
43 **DR. CRABTREE:** I think that's incorrect and shouldn't be in here.  
44 MSY would not be the yield at F rebuild if the stock is overfished.

45  
46 **MR. RINDONE:** It's not that it would be. It's that, if the stock  
47 is overfished, we're using F rebuild until the stock is no longer  
48 overfished, and then it reverts back MSY.

1  
2 **DR. CRABTREE:** In that case though, it would not be a proxy for  
3 MSY.

4  
5 **MR. RINDONE:** Right.

6  
7 **DR. CRABTREE:** The way it's written, I don't think that's what it  
8 really says.

9  
10 **MR. RINDONE:** I mean, we can add a bullet, if that makes it easier,  
11 and so I can just say, if the stock is overfished, provide  
12 projections at F rebuild. All right?

13  
14 **CHAIRMAN NANCE:** Yes.

15  
16 **MR. RINDONE:** So yield to be provided annually for five years and  
17 under a constant catch scenario for both three and five years and  
18 for the equilibrium yield at F at MSY, when estimable, and write  
19 a book report. Any other edits to the red grouper terms of  
20 reference?

21  
22 All right. Are there volunteers for the topical working groups?  
23 These are going to meet virtually between later this fall and into  
24 late spring of 2024. The schedule is up right now, so you guys  
25 can kind of see how things are going. There could be some movement  
26 to some of these, just based on availability of folks and whatnot,  
27 and so, again, the main topics for these topical working groups  
28 are evaluation of the State Reef Fish Survey for private vessels  
29 for red grouper, provided by FWC, and red tide, and so volunteers?

30  
31 **DR. TOLAN:** I would like to be part of the red tide working group.

32  
33 **MR. RINDONE:** Well, you would be a part of all of them.

34  
35 **CHAIRMAN NANCE:** Do we have volunteers to participate in these  
36 technical working groups? Would you be able to, David?

37  
38 **DR. CHAGARIS:** Yes.

39  
40 **CHAIRMAN NANCE:** Okay. I think your input is invaluable on some  
41 of these, for sure.

42  
43 **DR. CHAGARIS:** I think I will be at the meetings either way.

44  
45 **CHAIRMAN NANCE:** Okay.

46  
47 **MR. RINDONE:** We weren't looking to give him a lot of choice on  
48 that.

1  
2 **CHAIRMAN NANCE:** Okay. Well, I didn't want to break his arm right  
3 here, but anyway. Anybody else?  
4

5 **MR. RINDONE:** Jim and Dave. Luiz, it's your house's information.  
6

7 **DR. BARBIERI:** Right, and so I'm looking here -- Sorry.  
8

9 **MR. RINDONE:** Julie says that she will provide hot coffee and --  
10

11 **DR. BARBIERI:** Guava pastries?  
12

13 **MR. RINDONE:** Yes.  
14

15 **DR. BARBIERI:** Well, now you're twisting my arm. Yes, sign me up  
16 for the topical working group.  
17

18 **DR. NEER:** I am totally listening.  
19

20 **CHAIRMAN NANCE:** Thanks, Julie.  
21

22 **DR. NEER:** I emailed with Bev Sauls, and she said that she and  
23 Tiffani are -- I wanted to make sure they were aware of the workload  
24 that would be on them, for the SRFS one at least, and they said  
25 yes, but I don't know who -- If you appoint them now or how that  
26 works.  
27

28 **MR. RINDONE:** It's a virtual, and so it's -- There's not really a  
29 limit, as far as like who the state would want to send to  
30 participate in it, and so Luiz could just say that these people  
31 are coming too, and that's good enough for us. State  
32 representatives are automatically easy to fold into this process,  
33 and so that's no stress. Any other SSC members want to be a  
34 participant in the topical working groups for red grouper?  
35

36 **DR. KARNAUSKAS:** I was going to appoint someone, if I could. Is  
37 that --  
38

39 **MR. RINDONE:** You can volun-told.  
40

41 **DR. KARNAUSKAS:** Can I volun-told someone? I was going to suggest  
42 Brendan Turley for the red tide.  
43

44 **MR. RINDONE:** Anybody else? All right.  
45

46 **CHAIRMAN NANCE:** Thank you.  
47

48 **SOLICITATION OF VOLUNTEERS: SEDAR 74 RED SNAPPER RESEARCH TRACK**

1 **REVIEW WORKSHOP**

2  
3 **MR. RINDONE:** All right. The last one, Mr. Chair, is solicitation  
4 of volunteers for the review of the SEDAR 74 red snapper research  
5 track.

6  
7 **CHAIRMAN NANCE:** Okay. That is September?

8  
9 **DR. SIEGFRIED:** I wanted to inform you about the dates.

10  
11 **CHAIRMAN NANCE:** Okay.

12  
13 **DR. SIEGFRIED:** So it's very likely that it will get pushed back  
14 into the fall. There is two weeks that SEDAR has identified, along  
15 with council staff, as possibilities, and I can find them here,  
16 really quickly. Julie probably can say them really quick as well,  
17 but I --

18  
19 **MR. RINDONE:** I think, right now, we're looking at the week of  
20 December 11.

21  
22 **DR. SIEGFRIED:** December 11 is one or the week of November --

23  
24 **DR. NEER:** 6 through 10.

25  
26 **CHAIRMAN NANCE:** Okay.

27  
28 **MR. RINDONE:** It's this year, in this room.

29  
30 **CHAIRMAN NANCE:** It has to be in-person. Steven, you would be  
31 willing to do that? Okay. Dr. Saul. Ryan, I would be willing to  
32 serve as the chair on that. So Sean on that, Michael on that.

33  
34 **MR. RINDONE:** Hold on.

35  
36 **CHAIRMAN NANCE:** Roy.

37  
38 **MR. RINDONE:** Sean, Roy, Steve, Jim as chair.

39  
40 **CHAIRMAN NANCE:** Josh, did you have any desire? It's going to be  
41 really kind of an SSC type of -- Excuse me. An SS, and so, if we  
42 can have some individuals that are pretty competent in SS, and so  
43 I know Steve is certainly involved in that.

44  
45 **DR. SAUL:** I built the model at some point.

46  
47 **CHAIRMAN NANCE:** Okay. Good. You'll be able to find all the stuff  
48 then. What's that, Carrie?

1  
2 **EXECUTIVE DIRECTOR SIMMONS:** Katie, is the plan still, during the  
3 review workshop -- I think we talked about this during the steering  
4 committee meeting, but I'm not sure it was really solidified. If  
5 that gets pushed back, it's not going to be the full SSC for the  
6 review workshop, but, at that time, would you bring draft  
7 operational assessment terms of reference, statement of work,  
8 whatever we're calling it?

9  
10 **CHAIRMAN NANCE:** Julie, please.

11  
12 **DR. NEER:** No, and the draft terms of reference will come to the  
13 SSC when it reviews the assessment, and not at the review workshop,  
14 which is still part of the assessment process.

15  
16 **CHAIRMAN NANCE:** Thank you. Any other volunteers?

17  
18 **DR. BARBIERI:** Well, let me ask a question.

19  
20 **CHAIRMAN NANCE:** Okay. Luiz. Members of the ADT cannot --

21  
22 **DR. BARBIERI:** Cannot? That was going to be my question.

23  
24 **CHAIRMAN NANCE:** Members of the ADT cannot serve on the -- Katie.

25  
26 **DR. SIEGFRIED:** I think, just to clarify Carrie's question, we  
27 would bring -- So I would have the team, and the rest of the group,  
28 put together a draft TORs to help the SSC at the January meeting,  
29 because, either way, you're going to be taking a look at it at the  
30 January meeting, and that would be expeditious, right?

31  
32 **EXECUTIVE DIRECTOR SIMMONS:** Excellent. Thank you.

33  
34 **CHAIRMAN NANCE:** Okay. Thank you. Thanks for doing that. We'll  
35 go ahead now, before we -- We need to have public comment, and so  
36 we'll open up the floor for public comment, and we'll see who is  
37 volunteering to do that. Okay. We will go ahead and, I guess,  
38 end this meeting for today, and we'll see you all back here at  
39 8:30, and it will be a surprise who goes first. Okay, and so,  
40 anyway, it was a good meeting today. Good participation.

41  
42 (Whereupon, the meeting recessed on March 7, 2023.)

43  
44 - - -

45  
46 March 8, 2023

47  
48 WEDNESDAY MORNING SESSION

1  
2 - - -  
3  
4 The Meeting of the Gulf of Mexico Fishery Management Council  
5 Standing and Special Reef Fish, Special Socioeconomic, Special  
6 Ecosystem, and Special Shrimp Scientific and Statistical  
7 Committees reconvened on Wednesday, March 8, 2023, and was called  
8 to order by Chairman Jim Nance.  
9

10 **CHAIRMAN NANCE:** We will go ahead and call our meeting to order.  
11 We appreciate everyone being here in-person and online. For our  
12 first item of business this morning, we're going to do Item Number  
13 XV, which is Incorporating Socioeconomic Data into Stock  
14 Assessments and its Effect on Status Criteria Determination, and  
15 Dr. Steven Saul is with us, and he'll be able to present that, and  
16 I'm looking forward to our discussion. Dr. Saul, we'll go ahead  
17 and turn the time over to you. Ryan, would you do the scope of  
18 work for that?  
19

20 **INCORPORATING SOCIOECONOMIC DATA INTO STOCK ASSESSMENTS AND ITS**  
21 **EFFECT ON STATUS DETERMINATION CRITERIA DETERMINATION**  
22

23 **MR. RINDONE:** So we dragged Dr. Saul all the way from Arizona out  
24 here for this, and he's going to present on some recent work  
25 completed by his teams. During stock assessments, fishery-  
26 dependent observations are often used to develop indices of  
27 abundance, or biomass, from catch per unit effort and contribute  
28 catch-at-size or age information.  
29

30 However, fisher behavior, rather than scientific sampling  
31 protocols, determine the spatial and temporal locations of these  
32 fishery-dependent observations, and so Steve's research developed  
33 a bioeconomic agent-based model to generate simulated fishery  
34 data, which were used to populate an age-structured stock  
35 assessment, and so comparison of stock assessment results with  
36 simulated fish population dynamics showed that management advice  
37 from the assessment models, based on fishery-dependent data, could  
38 be biased, and so Steve is going to present to you guys and explain  
39 simulation model structure, how the stock assessment models were  
40 developed using the simulation inputs, and discuss the results of  
41 the study and their management implications. Be sure to ask lots  
42 of questions.  
43

44 **DR. SAUL:** Great. Good morning. Thank you, Ryan and members of  
45 the SSC and the Science Center and participants. I appreciate the  
46 time, and so my research -- Well, one track of my research has  
47 been, for a while, trying to better understand how fisher behavior  
48 kind of interacts with the data that we collect, right, because we

1 use a lot of fishery-dependent data in our stock assessments, and  
2 how that information propagates through the system, through the  
3 stock assessment models, to inform, ultimately, our management  
4 recommendations, and so, today, I would like to talk with you all  
5 a little bit about -- I will give a quick, two-minute general  
6 introduction to why human behavior is important to understand, and  
7 how it relates to uncertainty within fisheries assessment and  
8 management, and I will talk a bit about agent-based modeling and  
9 how that can be used to understand interactions and feedbacks  
10 within a system, particularly systems that are coupled human-  
11 natural systems, and the bidirectional feedbacks that occur within  
12 such systems.

13  
14 I will then talk about the Gulf of Mexico agent-based simulation  
15 model that has become a large part of my career, and it started  
16 out as my PhD work, and it's sort of evolved since then, and so I  
17 will kind of explain where that's come from, where it is now, and  
18 where it's going.

19  
20 I will talk a bit about the results of the simulation model and  
21 then talk about how I used those results to develop some Stock  
22 Synthesis assessment models to try and understand, again, how this  
23 idea of the way fishers behave, the way fishers fish, interact  
24 with the dynamics of fish populations. I will talk about some  
25 implications for those results, a brief introduction on -- Very  
26 briefly, some other applications of agent-based models in  
27 fisheries and future research directions.

28  
29 This is not new news to anyone in the room here, but resource  
30 users, obviously, sometimes respond in surprising ways to the  
31 policies that we put in place, right, and so we sit around the  
32 room here, and we try to think about what some of the best  
33 management strategies might be for particular species, based on  
34 the scientific evidence that's presented to us. However, we're  
35 not fishers, right, and fishers are inherently extremely  
36 intelligent, innovative, and are often able to work with the  
37 regulations that we provide and find innovative solutions to  
38 continue fishing in ways that we may not have anticipated, despite  
39 introducing or putting those regulations in place.

40  
41 Most research, to-date, has focused largely on the biological side  
42 of things, of stock assessments and fisheries science, and so  
43 understanding how population dynamics operate, and less time has  
44 been focused on trying to understand the implications of human  
45 behavior on these coupled human-natural systems, although that is  
46 increasingly changing over the past ten or fifteen years, which is  
47 great.

1 A large degree of uncertainty is incorporated into assessments and  
2 management decisions, due to human behavior, and human behavior  
3 really determines the spatial and temporal location of fishery-  
4 dependent observations, right, and so fishers are not scientific  
5 samplers, and they are out trying to optimize their time and  
6 resources to -- Essentially, to make money, or, in other parts of  
7 the world, for food security purposes, and that's not just to blame  
8 them, and that's their job, of course, and so -- However, we often  
9 use observations from directed fisheries directly in stock  
10 assessment, with the underlying assumption that these observations  
11 are unbiased, right, and so there are various ways that we try to  
12 get around that, and try to correct these biases, like  
13 standardizing CPUE, and I will talk a little bit about that later  
14 on.

15  
16 However, the data that does come from the fishing industry, and  
17 from recreational fishers, is reflective of the choices that those  
18 fishers make on the water, the places they generally go and fish,  
19 the times they fish, and the gears that they use, species they  
20 target, et cetera. The data that we do use is essentially a  
21 reflection of these choices and decisions, which are baked in, a  
22 way, to -- They're baked into the datasets in ways that I think  
23 we're still working to understand.

24  
25 In order to better understand this, I developed a simulation model  
26 of the Gulf of Mexico to try and reproduce some of the fish  
27 population dynamics that we see and some of the fishing fleet  
28 behavioral dynamics. I then allow the two to interact across space  
29 and time, under fairly realistic state conditions, and then what's  
30 done is then I take -- The simulation model generates data typical  
31 to what we collect for stock assessments, and so logbook-style  
32 data, catch-at-length observations, to mimic the sort of TIP  
33 sampling program, and then that information is put into stock  
34 assessment models, to see if the outcome of the stock assessment  
35 models is consistent with the status of the stock at the terminal  
36 year of the simulation model.

37  
38 Tools like agent-based models are very well suited to trying to  
39 understand these sort of complex social and biological dynamics  
40 and the way that they interact, and I will explain a little bit  
41 more of that in a moment.

42  
43 As a professor, I will give you all the two-minute 101 crash course  
44 on agent-based modeling, as it's not very -- It may not be familiar  
45 to all of you, and it's more of a bottom-up approach, where what  
46 you do is you try to define the behavior and the characteristics  
47 of individuals, and so, in our case, individuals are going to be  
48 individual fish agents and individual fishing boat agents, and you

1 then try to formulate theories about the way these individuals  
2 interact within the simulation, and you develop those theories  
3 within your code, and you test them and implement them within the  
4 computer simulation.

5  
6 Theories that do not reproduce the sort of patterns and dynamics  
7 that you observe in the natural system are discarded, and then you  
8 maintain those theories that do, and then you try to observe the  
9 sort of emergence of what are called system-level patterns, and  
10 so, again, this bottom-up approach, where you look at the  
11 interactions of the agents that have these sort of lower-level  
12 parameterizations, and then you observe the emergence of system-  
13 level patterns from all of these individual interactions within  
14 the system under different and changing state conditions. State  
15 conditions, by that, I mean changes in weather, changes in the  
16 financial structure, things like fuel price or fish price, changes  
17 in regulations, et cetera.

18  
19 Briefly, what's an agent, right, and James Bond is obviously an  
20 agent, and what does James Bond do well? He has a clear goal,  
21 typically, right, to assassinate so-and-so for this purpose, and  
22 he is fairly autonomous in his decision-making around that goal,  
23 and, you know, agencies may tell him one thing, but he may deviate  
24 and do something else, right, because on-the-ground conditions  
25 change in real time rather quickly, and agents need to be adaptable  
26 to these changing conditions, and so they need to make on-the-fly  
27 decisions and change the way they operate to reflect different, or  
28 changing, state conditions. Agents in simulation models are no  
29 different, and the idea is that they should have these sort of  
30 characteristics.

31  
32 If you think -- So traditional models, equation-based statistical  
33 models, I have nothing against those at all, and I continue to use  
34 those as extremely useful tools. However, the way they operate is  
35 they define aggregate behavior, right, and then they generate  
36 responses to the different shocks that we present them, and so our  
37 stock assessment models are configured and developed based on  
38 historical data, and we then try to impose a shock, meaning a  
39 change in fishing mortality, and then forecast, or project, forward  
40 what might happen in response to that shock.

41  
42 Statistical and mathematical models tend to be a bit statistically  
43 brittle and rigid, right, and so some of these important  
44 components, and feedbacks, that I was mentioning earlier are a bit  
45 lost, or are essentially aggregated at a higher level, right, and  
46 so F, fishing mortality, there is a lot baked into that parameter,  
47 to that value, and so fishing behavior is in there, and the  
48 movement of fish stocks is baked into that parameter, as well as

1 a number of other different processes that we don't explicitly  
2 parse out, or separate, because it's hard, and, often, it's not  
3 doable within the timeframes that we have for assessments.

4  
5 Agent-based models are very useful when you have these sort of  
6 bidirectional feedback mechanisms in place, where you have agents  
7 interacting with the environment, policies, and then you see how  
8 those -- How environmental conditions and policies, in turn, affect  
9 the agent.

10  
11 As a quick simple example, think about -- We all live in, or most  
12 of us live in, places that have horrible traffic, and so think  
13 about a car as an agent, and you driving that car, right, and we  
14 could model the flow of traffic as using something like fluid  
15 dynamics as an equation-based sort of process, right, and that  
16 would be one way to sort of try to understand the way traffic moves  
17 and ebbs and flows under various conditions, during rush hour,  
18 when there's construction, when there's an accident, et cetera.

19  
20 Another way to think about traffic, more modeling traffic, is as  
21 agents in an agent-based model, and so let's define a car, right,  
22 and let's say a car has two very simple properties, and it can  
23 accelerate, if there is space, right, and, here, obviously, even  
24 if there was a little bit of space, here, or in Miami, you zoom  
25 into that space, and grab that spot, and then, if there's a car in  
26 front of you, you better stop, or you are going to rear-end them,  
27 and you'll be at fault, right, and so let's say that those are the  
28 two properties that control, or make up, how a car operates.

29  
30 If we do that, if we apply these two properties to traffic, to a  
31 car -- So, if we look at what happens if we apply these two  
32 properties to traffic, traffic piles up at certain places, and the  
33 average speed of those cars is, you know, rather slow, right, and  
34 so you have these sort of bottlenecks, which is not atypical of  
35 what happens in a typical highway, right, and so what you can do  
36 then is you can validate that with real-world observations, and so  
37 you can -- Essentially, this is just showing a real-world example  
38 of what would happen if you apply those two principles to cars in  
39 traffic.

40  
41 Let's say that we impose a simple policy, like a speed limit,  
42 right, and not too far out there to this, and there will be more  
43 -- Once you impose a policy, a speed limit, and you look at what  
44 happens with traffic, traffic flows fairly evenly, and there is a  
45 fairly consistent, or a constant, speed, and so agent-based models  
46 are useful, if you sort of think about this very simple sense, to  
47 exploring different policies and looking at the impact of those  
48 policies on human behavior and how that changes different things.

1  
2 Taking that and applying that to fisheries, again, human and fish  
3 population dynamics are inextricably linked, and so, as humans, we  
4 are essentially an important part of the ecosystem, as a top  
5 predator, and we -- So agent-based models in fisheries try to, or  
6 at least my work has tried to, couple the components, important  
7 components, of the natural system with the social system with the  
8 objective of trying to look at these interactions as a way to  
9 inform policy decisions and such.

10  
11 The other thing I will mention is that I'm going to talk about a  
12 lot of these things at a fairly high level, particularly when we  
13 start getting into discussing the way that the simulation model  
14 has been developed, but I have explicit references, on all the  
15 slides, to the papers, where you can go to see how that process  
16 was calculated, the details of how it was validated, and I'm not  
17 really going to go into that, because I want to get to the punch  
18 line, in a little bit, of the talk, which talks about how these  
19 processes affect stock assessments.

20  
21 I am going to talk about a lot of these things at a fairly high  
22 level, but, again, know that the references are provided, and you  
23 can ask me questions later about some of the details about how  
24 things are -- How some of these processes have been developed and  
25 how they've been validated.

26  
27 The Gulf of Mexico agent-based model currently has two versions,  
28 and the initial version is a West-Florida-Shelf-only model, and  
29 that's sort of the legacy version, if you will, and it represents  
30 the pre-IFQ time period, and that's the sort of model that I  
31 developed as part of my -- Or started developing as part of my  
32 thesis research, and then, since then, I have developed a more  
33 comprehensive version of the model, which I will talk about going  
34 forward, and so, as I present the material, I will talk about how  
35 the legacy model is parameterized and then how we have  
36 parameterized the full Gulf model.

37  
38 The second version expands the spatial extent to the entire Gulf,  
39 updates it with current information, includes an IFQ sub-model,  
40 and it also includes additional species, and you will kind of see  
41 the difference as we talk through this, going forward.

42  
43 Since all of us are intimately familiar with this ecosystem and  
44 these fisheries, it's really, really tempting to look at this and  
45 say, oh, well, that doesn't really represent what's going on 100  
46 percent, or, you know, oh, those trends are not the actual trends  
47 that we see in stock assessment, or in the population, but do keep  
48 in mind that the purpose of -- At least the initial purpose of the

1 first version of the model that was developed was not -- It was to  
2 capture important, realistic components of the system and  
3 represent them, but not to essentially build every little detail  
4 into the model and not to directly represent what exactly is going  
5 on in the system.

6  
7 The main purpose of building the simulation model was to build a  
8 simulated environment, right, where fishers operate with some  
9 realistic components of their behavior, where fish populations are  
10 operating with some important components, realistic components, of  
11 their behavior, and look at how the two interact, and so, again,  
12 the trends here -- It's very tempting, because we're all very  
13 familiar with this, and, in a little while, I'm going to show CPUE  
14 trends from the simulation, Kobe plots from the assessment, but,  
15 again, they are reflective of the simulation model dynamics and  
16 not necessarily the dynamics that are going on in the actual Gulf.

17  
18 Having said that, I will also show some figures, later on, that do  
19 demonstrate that some of the realism that was built into the model  
20 can be validated against some of the realistic patterns that we do  
21 observe here in the Gulf of Mexico.

22  
23 The model contained -- It explicitly represents, as agents, the  
24 handline and longline fishing fleet, and so each agent is a fishing  
25 boat. Across the Gulf of Mexico, the usual suspects, in terms of  
26 fish species, are included. The West Florida Shelf model includes  
27 the four species shown on the top row, and so red grouper, red  
28 snapper, mutton, and gag, and then the full Gulf model adds gray  
29 triggerfish, tilefish, vermilion, and yellowedge grouper as well.

30  
31 Again, boats are represented as individual agents, and fish are  
32 represented as individual agents, technically, quote, super  
33 agents, where each dot represents -- Or it starts out as  
34 recruitment representing twenty-five fish, but that quickly  
35 deteriorates, as mortality is imposed, and so, each you, kind of  
36 dot, or agent, is typically -- After a year or two, it's really  
37 only two, three, four, or five species, and I will talk about the  
38 spatial extent in a moment, but the agent-based model has three  
39 main layers to it.

40  
41 It has sort of a structural layer, which has bathymetric data,  
42 sort of a model grid and the different sectors, and, by sectors,  
43 I don't mean like sector separation that we often talk about in  
44 the SSC, but sectors meaning spatial sectors, which I will show a  
45 map in a moment to better define what I mean, and there is a  
46 calendar that keeps track of daily conditions, things like wind  
47 speed and changes in fuel price, fish price, market conditions, et  
48 cetera, various metrics like that.

1  
2 Then there's an ecological layer, which contains the species  
3 parameters, the actual animals, simulated animals, that are  
4 running around, and how abundance is simulated, and it represents  
5 all the life history characteristics of those organisms, their  
6 growth, maturity, recruitment, et cetera.

7  
8 There is also a migration, ontogenetic migration, represented in  
9 the model, and so I will talk about that in a little bit, and then,  
10 lastly, the human layer represents the vessel characteristics,  
11 sort of a cognitive model that helps the vessel decide, on each  
12 given simulation day, if they're going to take a fishing trip, and  
13 then, if they do decided to take a fishing trip, where they're  
14 going to fish.

15  
16 Once they're out fishing, every day they have the opportunity to  
17 decide whether to stay out fishing or return to port, and, within  
18 a given day, they have the opportunity to select multiple fishing  
19 sites. The ex-vessel prices are in there, and then there's also  
20 -- In the full Gulf model, the ITQ system is represented as well.

21  
22 In terms of space, how space is stratified, a couple of ways, and  
23 so, if you look at the -- Here, the squiggly lines represent  
24 twenty-meter depth bathymetric intervals, and so those vertical  
25 lines that bend around as the coastline bends, going from north to  
26 south to east to west, are twenty-meter bathymetric intervals, and  
27 the vertical lines, and horizontal lines, that are straight  
28 represent the NMFS statistical grids.

29  
30 The intersections of those, and the polygons that are created by  
31 those intersections, were used to estimate spatial catch per unit  
32 effort and distribute fish abundance within each of those polygons,  
33 and then, and I will talk about that in a moment, and then, within  
34 each of those polygons, there is a grid of about one-minute-by-  
35 one-minute, and so it's roughly 1.8 square kilometers, and that's  
36 the spatial resolution of the model, and within each grid cell  
37 resides the fish, and that's -- Within each grid cell is where the  
38 interaction of fish and fishing boats occur.

39  
40 Again, I will talk about kind of how the legacy model, version of  
41 the model, the West Florida Shelf model, is parameterized, which  
42 is -- The results of which were used for the sort of stock  
43 assessment exercise, and then I will talk about how the full Gulf  
44 of Mexico model is parameterized and some of the improvements that  
45 we've made to develop that model, and so species abundance was  
46 spatially distributed, as I mentioned, initially by catch per unit  
47 of effort across the different polygons that make up these spatial  
48 strata when you intersect the NMFS statistical grids with twenty-

1 meter bathymetric intervals, and then that determines sort of a  
2 coarse distribution of where to put fish within each of those  
3 polygons.

4  
5 Then, within each polygon, for the legacy version, we fit  
6 variograms to the video survey data and used those to simulate  
7 sort of patchy dynamics that would be sort of representative of  
8 the patchy dynamics that you find in the Gulf of Mexico, where you  
9 have these sort of clear hotspots with higher abundance, and then  
10 other places with a lower, or no, abundance, depending on the  
11 habitat structure, if there's artificial reef structure there,  
12 whether someone has dropped a car, or a washing machine, in that  
13 location to fish on, et cetera.

14  
15 That gave us sort of a realistic pattern for the fishers to fish  
16 on. Now, this process was stochastic, and so, every time you reran  
17 the simulation model, you would get a slightly different pattern  
18 of abundance within each of these polygons, and that was  
19 intentional, to sort of test the robustness of the sort of  
20 patterning approach. However, again, it's not to say that, oh,  
21 yes, there is a hotspot right in the middle, where you see all of  
22 that red, but it's to say, okay, here's a somewhat realistic  
23 pattern of how abundance might be distributed within each of these  
24 polygons.

25  
26 We have since, for the full -- For Version 2 of the model, we've  
27 since improved on that approach greatly, by applying a suite, or  
28 an ensemble, of machine learning models and techniques, also to  
29 the video survey data, in conjunction with the habitat data, and  
30 that's publicly available, and that's the data from the dbSEABED  
31 database that Chris Jenkins and others at the University of  
32 Colorado has sort of cobbled together from a variety of different  
33 datasets that have existed for a while.

34  
35 Obviously, that's not the best habitat data, but it's what we sort  
36 of have available to work with, and I have approached the oil  
37 companies a couple of times, and they're not interested in sharing  
38 their information with me, unfortunately, but maybe one day in the  
39 future I can beg them enough, but, anyway, this approach developed  
40 much better spatial distributions for some of these species.

41  
42 Again, I'm going to gloss over a lot of the details of that, and  
43 you can find them in the paper that's referenced below, and this  
44 is what sort of the distribution of red grouper looked like after  
45 going through this process, as an example, and this shows you how  
46 red snapper came out, or were spatially distributed, as a result  
47 of going through this process.

1 We feel that this is a much better representation of the spatial  
2 distribution for some of these species, and this was done for all  
3 eight reef fish species. Is it perfect? No, and, again, all --  
4 What is it, that all models are wrong, but some are useful, and  
5 certainly that applies to my simulation model, as well as these  
6 statistical models here, but we've kind of given it our best effort  
7 to try and figure out how to spatially distribute these animals  
8 across the Gulf.

9  
10 A couple of points about the ecological layer, and the abundance,  
11 population demographics, and so the starting numbers at-age in the  
12 simulation model, the starting abundance numbers, recruitment  
13 parameters, natural mortality, and life history parameters were  
14 all pulled from the most recent stock assessments from these  
15 species, and so I obtained the Stock Synthesis base model files  
16 for these from the most recent assessment, thanks to the Southeast  
17 Fisheries Science Center, and then I used the parameters that were  
18 used and the resulting estimated abundance and age structures as  
19 inputs to the simulation model, just to sort of start, or spin-  
20 up, the model.

21  
22 Now, one major weakness, so far, of the model that needs to be  
23 addressed in future iterations of this is the fact that  
24 recreational fishing mortality is not explicitly represented as  
25 agents, and it's modeled here simply as a uniform  $F$ , or a fishing  
26 mortality value across space and time, which I recognize is a god-  
27 awful terrible assumption. Future work will try to incorporate  
28 the recreational fleet as individual agents, or at least a  
29 spatially-structured fishing mortality that is much better  
30 representative of the patterns that recreational fishers  
31 demonstrate, or use, when out fishing in the Gulf.

32  
33 The time step of the simulation is daily, and so every day  
34 represents a time step, and recruitment occurs for all of these  
35 species at the start of the year, and I recognize that that's not  
36 the most realistic, especially for things that have particular  
37 spawning seasons, like gag, but it's a simplifying assumption that  
38 we apply to stock assessments, and I applied here as a simplifying  
39 assumption, and recruitment is just represented by the Beverton  
40 and Holt recruitment function, and that parameter is fit in each  
41 stock assessment, and the way it's done in the simulation is that,  
42 at the end of each year, spawning stock biomass is aggregated  
43 across all the individual fish, objects, or agents, and then that  
44 goes into the formula and spits out your number of recruits.

45  
46 Those recruits, the newly-recruited age-zero recruits, are placed  
47 in nursery habitat, which I defined as between zero and twenty  
48 meters of water, as, again, a gross assumption, and it's probably

1 not 100 percent realistic, and then when these fish -- They kind  
2 of sit there statically in nursery habitat. Once they become  
3 mature, as per the maturity schedule, then they start -- Then they  
4 ontogenetically migrate offshore to offshore habitat.

5  
6 Now, when a fish is recruited, it's given a pre-destined location  
7 to migrate to, based on the maps of where we think spatial  
8 abundance is located. There's, of course, mortality, where some  
9 of those are picked off, either from natural mortality or from  
10 fishing mortality, either as juveniles or as they're migrating  
11 offshore, and the purpose of sort of baking in this sort of  
12 ontogenetic migratory process was to explicitly try to represent  
13 the way fishing mortality interacts with animals as they mature  
14 and move around and move offshore.

15  
16 Once they're adults, they just sort of sit within their habitat  
17 cell, and there's no adult movement in the model now, and that's  
18 something else that I would like to change, because, as we know,  
19 these animals do move around as adults, but it's really -- I don't  
20 think we have a clear understanding, for some of these species,  
21 with respect to how they do, although, if people do have  
22 information on that, it would be great to chat about that, and  
23 that's something that I think is important to include in here,  
24 especially for things like gag grouper that seasonally migrate to  
25 spawning aggregation sites, and so the abundance does move around  
26 quite a bit, and so that is something that, in the future, I would  
27 like to better represent and incorporate as more realism in the  
28 model.

29  
30 Migration of fish is represented as a biased random walk, where,  
31 again, they have this sort of predestined adult location, where  
32 they're going to end up, and they're dumped into juvenile habitat,  
33 which I'm defining as that dark-green spot, as you can see on the  
34 snapshot from the visualization of the simulation here, and then  
35 they kind of wander offshore, once they reach maturity.

36  
37 In the Version 2 of the model, we have greatly improved on the  
38 migration algorithm, where, instead of sort of having -- Where  
39 we're using turning angles, instead of this sort of predetermined  
40 fit about having a predetermined location, and there is a roughness  
41 parameter that you can adjust within this algorithm that will  
42 specify the degree, or the amount, of sort of random wandering  
43 that the fish would do between its -- The time of the start of its  
44 ontogenetic migration and when it reaches its ultimate adult  
45 habitat destination. Again, I can talk about -- This has not been  
46 published yet, but I can talk with you all later about some of the  
47 details of this.

1 We've also -- The Gulf is, obviously, curved, right, from Florida  
2 all the way around to Texas, and so, before, I dealt with that by  
3 having fish only be able to migrate -- Limiting them to migrating  
4 offshore to within the same NMFS statistical grid or one grid above  
5 or below, north or south or east or west of them, but that kind of  
6 made things a bit rigid, and so we've made changes to allow these  
7 animals the ability to migrate along a parametrically-defined  
8 curve, so that they can actually migrate -- You know, make the big  
9 bend, at the Big Bend across where Florida is, and the same thing  
10 around Texas, and it can kind of accommodate the nonlinear  
11 coastline that we have in the Gulf.

12  
13 In addition, both the legacy version of the model and the current  
14 version has an algorithm to get fish that have been recruited to  
15 places like Tampa Bay out of Tampa Bay, so that they don't get  
16 stuck in Tampa Bay, just kind of bumping into the coastline, and  
17 so we built in an algorithm to properly get fish migrating out of  
18 those sort of environments and offshore. Again, this is high  
19 level, and we can talk more about the details of some of these  
20 later on, if people are interested.

21  
22 Moving on to the human layer, so I took the commercial logbook  
23 data and the vessel characteristic data that we have and combined  
24 that with a bunch of other publicly-available state data, and so  
25 information on wind speed, information on fuel price, fish price,  
26 and market conditions, and some other information on policies,  
27 expected catch, allocations, and such, and I developed what is  
28 called, in behavioral economics, a panel dataset, to which I then  
29 fit discrete choice modeling.

30  
31 Discrete choice models are binomial or multinomial logistic  
32 regressions that attempt to capture the decision-making of  
33 individuals across time, and also and/or space, and so I fit three  
34 sets of models, a binomial model to represent the decision of  
35 whether or not an individual will take a fishing trip on a given  
36 day, multinomial choice models to represent the decision of whether  
37 or not -- Of where an individual will choose to go fishing, and so  
38 I defined fifty broad fishing locations, again using the  
39 intersection of depth strata and the NMFS statistical grids, and  
40 so fishers would choose one of those polygons to fish in when  
41 they're making their -- Once they decided to take a fishing trip,  
42 then, within that polygon, they were initially randomly placed,  
43 and then they had the opportunity to sort of look around and see,  
44 okay, well, what do I know about this area, and there's a bit of  
45 learning, and sort of memory kept by each fisher agent, and then,  
46 from that, they can make general decisions and move around  
47 accordingly, once they're placed in that polygon.

1 Then these are the variables that were used to inform the  
2 development of these choice models. I also conducted a survey,  
3 and so I visited a whole bunch of the fish houses across the west  
4 coast of Florida and interviewed a number of the fishing captains.

5  
6 I learned an immense amount about the fishery from this exercise,  
7 and it has really improved my ability as -- When I worked for NMFS  
8 as a stock assessment scientist and my capacity on the SSC to  
9 really understand how fishers operate, how they make different  
10 decisions, and, you know, they showed me their boats, and they  
11 showed me their gear, their freezers, all that good stuff, and I  
12 really got a good sense of the industry and how individuals make  
13 different choices under different sets of conditions. I also made  
14 a lot of good friends and drank a lot of beer.

15  
16 When you look at -- If you want to see the full set of parameters,  
17 and how they were estimated, you can go to the paper that's  
18 referenced here on the slide, but just to give you a sense of how  
19 a few of these parameters look, these are partial probabilities on  
20 the left-hand, on the Y, axis. That's why they don't sum to one,  
21 because there are other factors in these models, of which all the  
22 probabilities together sum to one, but, if you look at things like  
23 wind speed, it's fairly intuitive that, as wind speed increases,  
24 the probability of going out and taking a trip decreases, right,  
25 which makes logical sense.

26  
27 Seasons make a difference, right. In the fall hurricane season,  
28 there is a lower probability of taking a fishing trip, because of  
29 either low pressure centers around, causing rough conditions, or  
30 hurricanes in the Gulf. As your fish hold starts to fill up, you  
31 have a more -- A higher probability of returning to port, and  
32 that's what the lower-right-hand panel is showing, and then fuel  
33 price has some influence on where you fish, but I was expecting  
34 this to look more -- Where the red dots are further offshore,  
35 indicating negative signs for those parameters, indicating that  
36 you would be less likely to fish offshore, the higher the fuel  
37 price, but that didn't really come out that way, interestingly.

38  
39 That was for the legacy model, and we repeated the exercise, so to  
40 speak, for the full Gulf, and this also has not been published  
41 yet, and I have to push this out at some point.

42  
43 We broke up the time series into three discrete time bins, one  
44 that I'm calling the pre-period, which is the pre-IFQ, the years  
45 2007, 2008, and 2009, and then this sort of Deepwater Horizon  
46 period, which is 2010 through 2012, and I was interested to see,  
47 or learn, if there are changes in fishing patterns that could be  
48 detected right after the Deepwater Horizon, using these discrete

1 choice models, and then this sort of IFQ period, where that is  
2 further away from Deepwater Horizon, where hopefully those effects  
3 have been resolved.

4  
5 I need to do a little bit more work on this, to get this paper out  
6 and to really try to understand what happened with Deepwater  
7 Horizon, and see if I can parse out anything from this, by pulling  
8 the data apart a little bit more, but the parameters that were  
9 estimated for each of these time blocks were, again, used as --  
10 They're used as inputs in the Version 2 of the model, the full  
11 Gulf model, to drive the decision-making, or help drive the  
12 decision-making, behaviors of the fishing agents.

13  
14 Now, the fishing agents use the fitted parameters, right, and so  
15 let's say that wind speed is a fitted parameter, and the parameter  
16 is like negative-1.5 or something like that. In the simulation  
17 model, there are changing wind speeds every day that are  
18 essentially -- They were pulled -- Which are realistic wind speed  
19 patterns across multiple years in the past that are used to  
20 essentially forecast forward.

21  
22 There are also realistic fuel price changes that are reflective of  
23 trends that happened in the past, and there are realistic changes  
24 in fishing, in the cost of fish, or the price of fish rather, et  
25 cetera, and so, as fishing -- As simulated fishing vessels apply  
26 these parameters, they multiply them times the realistic, or the  
27 state conditions rather, that are going on in the simulation model,  
28 or that are present that given day, and they also look at their  
29 past catch history, and sort of their economics, and so, you know,  
30 are they in the black, or are they in the red, and they use all of  
31 this information together to estimate a probability, essentially  
32 using the discrete choice model formulas.

33  
34 Once they have that probability of taking a fishing trip, or  
35 probabilities across all the sites that they might select, they  
36 then toss a weighted coin and make a decision, based on that  
37 probability and that random sort of coin toss, and that's how they  
38 choose whether or not to make a fishing trip on a given day, and,  
39 if they do decide to make a fishing trip, where to go and fish.

40  
41 The ITQ model that's been coded into the Version 2, the full Gulf  
42 model, is essentially directly adopted from the work that Rich  
43 Little and others did in 2009 to develop an ITQ model within an  
44 agent-based model, and that's a fairly simple model, where expected  
45 profit, marginal profit, is a function of the ex-vessel price, the  
46 costs, your expected catch, and your expected catch with respect  
47 to what you would expect to catch in other areas and at different  
48 times. Again, details are in his paper, and we had a couple of

1 conversations with him when we were working to code his approach  
2 into the simulation model.

3  
4 Okay, and so, as I mentioned, there's a limited amount of learning  
5 that goes on. Vessel agents keep a record of their personal CPUE.  
6 Their initial -- At the start of the simulation, they use the sort  
7 of CPUE by area that they've had from the logbook data, and that's  
8 sort of what essentially sets up the initial conditions, or their  
9 initial history, but their catch history, going forward, is  
10 reflective of what they've caught in the simulation model in prior  
11 simulation years, and so they use their catch history as one  
12 component for making decisions of where to go fishing, and to help  
13 make those site-choice decisions.

14  
15 There is also, as folks know, a number of charter vessels that  
16 also hold commercial permits, and so they may not -- In the logbook  
17 data, it's reflected that they don't take a lot of fishing trips,  
18 but it's hard to parse out who, you know, is necessarily a charter  
19 boat captain that has a commercial permit, and takes some  
20 commercial trips, versus someone who is more of a serious  
21 commercial fisher and only makes dedicated commercial fishing  
22 trips, and so we also included a component, to try and represent  
23 that, which has to do with the frequency that individuals take  
24 fishing trips per month over time, and that's also used, or fit  
25 in, as a decision-making point for the fishing vessels.

26  
27 One limitation is that, in some sense, fisher behavior is a little  
28 bit statistically rigid, or fixed, because they are beholden to  
29 using the parameters that come out of the choice model. However,  
30 as I said, those are multiplied against the sort of state  
31 conditions that are occurring at the moment, on that simulation  
32 day, across space and time in the model, and so there is kind of  
33 some flexibility there for fisher behavior.

34  
35 Okay, and so, when you spin this thing up, and if we run it for  
36 twenty years, for a twenty-year projection going forward, again  
37 keep in mind that this was based on data, and parameterized with  
38 data, from the 2005-2006 state of the fishery, and that's before  
39 IFQ systems were in place, and so things were quite different then,  
40 but, again, the point of this exercise was, again, not to develop  
41 a projection tool that could be used by the Center, and that's a  
42 future research goal of mine that I'm starting to work on, and  
43 search for funding to achieve, but this exercise was predominantly  
44 to generate fairly realistic, or somewhat realistic, data that's  
45 representative of the types of fishery-dependent data that's  
46 collected, such that we can use that data in a stock assessment  
47 and then compare stock assessment results to what happens in the  
48 known system, meaning the simulation system.

1  
2 There are a couple of places where human behavior can enter into  
3 stock assessments, and sort of a create a potential bias within  
4 stock assessment models, and the first is through the catch per  
5 unit effort indices of abundance that are calculated from fishing  
6 operation data, and so logbook data and such, and those CPUE  
7 indices -- We tried to standardized, specifically standardize, in  
8 an attempt to remove some of that bias from anything that is not  
9 related to abundance. However, we often don't have the right  
10 parameters that are reflective of human behavior to be able to  
11 parse out that variance.

12  
13 I have made a preliminary attempt to develop an improved CPUE index  
14 that tries to account for some of those variables, which I will  
15 talk about a little later, and I will share kind of the  
16 implications and the results of that.

17  
18 The other place where fisher behavior can impact stock assessments  
19 is in the length data that comes from fishing observations, and so  
20 the trip interview program data, right, and those length  
21 measurements are a direct reflection of the where -- Of the fish  
22 population, where commercial vessels, or recreational vessels,  
23 were fishing, and it's not representative of the length  
24 distribution across the entire universe, in the same way that CPUE  
25 is not a direct reflection of the abundance trends across the  
26 entire universe, or the entire spatial area, of the Gulf of Mexico,  
27 and it's representative of the locations where people are fishing,  
28 and it's biased to the locations where people fish more, or where  
29 fishing effort is more intensive, both across space and time.

30  
31 Typically, we include a couple of variables in CPUE  
32 standardization, typically just those that have been readily  
33 available within the logbook data, things like gear, area, month,  
34 days away, for the binomial component, and, you know, we don't  
35 often explain much of the deviance, or the variability, by  
36 incorporating these few variables.

37  
38 I tried to expand that list quite a bit, by incorporating these  
39 other variables into CPUE standardization, and so year, what I'm  
40 calling new area, which are those polygons that intersect the NMFS  
41 statistical grids with the twenty-meter depth strata, and so I  
42 tried to get a finer spatial resolution baked into the CPUE indices  
43 standardization. Then month, the number of locations fished, as  
44 a way to sort of understand, again, is this vessel a full-time  
45 commercial boat, or are they also doing charter operations as well.

46  
47 Travel time, and so how far you had to travel, or how long you had  
48 to travel, to get to your fishing location on that trip, the price

1 of the various fish species, and so gag, red grouper, mutton  
2 snapper, and red snapper are the four species in Version 1, the  
3 West Florida Shelf version.

4  
5 Cruise speed, and so how fast your vessel moves, right, and, the  
6 faster you move, the more locations, in theory, you can visit to  
7 go fishing. Vessel length, as a proxy for fishing power,  
8 essentially, and the red snapper allocations throughout the time  
9 that it was in place, this kind of three-tiered limit, where you  
10 had the 2,000-pound, 200-pound, or zero-pound per trip allocation  
11 for red snapper, and so I put that in CPUE standardization, as a  
12 policy. Then fish hold capacity of the vessel, as well as the  
13 number of days away that the vessel spent on that trip.

14  
15 Now, when you fit these two CPUE -- When you standardize CPUE,  
16 again using the typical sort of approach in Lowe et al. that we  
17 all use, where you fit separate binomial and lognormal models and  
18 then combine them in the respective variance structures and pull  
19 out the means by year, and associated variance, and combine that  
20 at the end to develop your index, and I applied that same exact  
21 approach, the same exact code that we use for stock assessments in  
22 the Gulf, to this, and the bars here on this graph -- The purple  
23 bars represent the sort of typical CPUE standardization that  
24 includes, you know, the few factors that we have readily available  
25 in the logbook data, and then the blue bars represent what I am  
26 calling the extended standardization, and that includes all the  
27 other parameters that I just showed in that table on the previous  
28 slide.

29  
30 The Y-axis, on these figures, represent the fraction of deviance  
31 that was explained in each of these models, CPUE standardization  
32 models, for all the species and for the separate models by gear  
33 type, and so what you will see is that, in some cases -- For  
34 example the top-left panel shows the handline binomial model, and  
35 the fraction of deviance was not really -- I didn't really explain  
36 much more of the variability by loading in all of the additional  
37 factors.

38  
39 However, if you look at the bottom panel, which shows the lognormal  
40 model for the proportion positive, in that case, for most species,  
41 and not so much for mutton snapper, but, for most species,  
42 incorporating additional variables explains a lot more of the  
43 variability in these CPUE models, which is not too surprising,  
44 right, and, if you incorporate more explanatory variables, you  
45 should capture, or be able to parse out, more of that variability  
46 that is not attributed to trends in abundance. The same pattern  
47 sort of holds for the longline, simulated longline, fleet, which  
48 are the upper and lower-right panels.

1  
2 When you actually look at the trends, the indices trends, I was  
3 personally surprised that you don't see much difference, and so,  
4 on these graphs, the black line, which is labeled, in the legend,  
5 as perfect information, represents the biomass trend, just  
6 standardized to match the standardized CPUE indices, and so  
7 standardized by its mean across time, and so that's sort of what  
8 I am calling perfect information, and so the trend in biomass that  
9 actually happened in the simulation model across the entire spatial  
10 and temporal extent of the simulation model across the twenty years  
11 that were simulated.

12  
13 The dashed lines represent the extended catch per unit of effort  
14 index, and the trends that you would get from that, and then the  
15 solid line represents the trends that you get from the typical  
16 standardization index that just incorporates a handful of factors  
17 that are readily available in the logbook data.

18  
19 What you notice is that there's not -- You don't get much different  
20 -- Although you explain more of the variability by loading in more  
21 of these factors, you don't get a very different picture, in terms  
22 of trend over time. What is a little bit disturbing, to me, is  
23 the fact -- Are the differences you see in some of these plots  
24 between the CPUE indices and the black line, which represents the  
25 actual biomass trend. That shouldn't be, right?

26  
27 If we hold onto the assumption that CPUE is a direct reflection of  
28 biomass in the system, then those lines should all match perfectly.  
29 For things like mutton snapper, it matches really well with some  
30 -- You know, with some noise in there, but, for most species, there  
31 are these inconsistencies, especially at the beginning of the time  
32 series, and that's a little bit troubling to me.

33  
34 When you look at the Euclidian distances between the perfect  
35 information index and the typical, or extended, indices, there's  
36 not a whole lot of difference between them, and so the lines, as  
37 you see on the graph, are fairly close, which makes sense. There  
38 are some differences, which do, I think, matter, and, when I show  
39 the assessment results in a minute, we'll see kind of how those  
40 matter, but there's not a whole lot of difference between those  
41 trends.

42  
43 Okay, and so, when you take the output data from the simulation  
44 model, I then built Stock Synthesis models for the four different  
45 species that were in the Version 1 of the simulation model. Of  
46 the Stock Synthesis models, for each species, I developed four  
47 different Stock Synthesis models. The first Stock Synthesis model  
48 represented, or used rather, the catch-at-length data from the

1 fishing vessels, and so like as simulated as trip interview program  
2 sampled, and so directly from the fishery, together with the  
3 typical standardization CPUE index.

4  
5 The second, and I'm sorry that I don't have this on the slide, but  
6 the second Stock Synthesis model that was developed also used the  
7 catch-at-length data directly from the simulated fisheries,  
8 together with the extended CPUE index that I just talked about,  
9 and the third Stock Synthesis model for each species that was  
10 developed, again, used the length data from the commercial fishery  
11 and used the perfect information trend, and so, essentially, I  
12 directly fed Stock Synthesis, the biomass trend that happened in  
13 the simulation, as an index of abundance for both the handline and  
14 longline indices.

15  
16 Then the fourth Stock Synthesis model incorporated both the length  
17 distribution of the population, and so not from the fisheries, and  
18 I took observations from the actual population, and the length  
19 distribution from the simulated population-at-year, and put that  
20 into Stock Synthesis, together with the perfect information, or  
21 the direct biomass trends, at indices of abundance. Doing so, you  
22 should get back exactly what the simulation -- What the status of  
23 the stock was in the simulation at the end of the twenty-year run.

24  
25 I will show you Kobe plots in the next slide, but this plot shows  
26 the difference between the population demographic structure at-  
27 length, which are the points within the simulation model, and what  
28 we can see is that, at the end of the twenty-year run, there was  
29 some kind of recruitment overfishing that was starting to happen  
30 for some of these populations, where there were not a lot of young-  
31 of-the-year sort of being moved into the population, for everything  
32 except for red snapper, and then the solid lines that you see are  
33 the length distributions that the stock assessment model  
34 predicted, using the perfect information CPUE index of abundance,  
35 and so, again, with baking in the known biomass trend into Stock  
36 Synthesis.

37  
38 The dashed line, which, if you don't see the dashed line, it means  
39 it's laying underneath the solid line on this graph, but that  
40 represents the predicted length distribution of the population,  
41 based on -- Coming out of Stock Synthesis, based on incorporating  
42 both the perfect information index of abundance that directly  
43 tracks biomass together with the length distributions of the actual  
44 population and not from the simulated fishery.

45  
46 There is, as you can see, quite a mismatch between those, and I  
47 have some ideas as to why, but this is another area of research  
48 that I am starting to dig into and plan to explore in much more

1 depth, sort of trying to understand why some of these length  
2 distributions are not being properly represented in Stock  
3 Synthesis when sort of recreating the demographics of the  
4 population.

5  
6 When we look at Kobe plots from the Stock Synthesis runs, the  
7 symbols on these Kobe plots -- So the diamond, and it's really  
8 hard to see, and I realize that, and I apologize, and hopefully  
9 you can open it up on your own computers to see, and you can't see  
10 this at all on the screens, but the diamond represents the stock  
11 status from the simulation model, and so that's what the actual  
12 stock status was after the twenty-year simulation period, and then  
13 the other symbols represent the different Stock Synthesis  
14 configurations that I had just mentioned, and so the dark circle,  
15 the filled circle, represents the model that just has your typical  
16 standardization in there, together with your length observations  
17 directly from the simulated fishery, and then you have the open  
18 circle is the perfect information index, together with your length  
19 observations from the simulated fishery.

20  
21 The circle that is gray, shaded gray, has the extended CPUE index  
22 in it, but with the length observations directly from the fishery,  
23 and then the filled triangle, the dark triangle, has the perfect  
24 information CPUE index, together with the length distributions  
25 from the actual simulated population, and so you can see that, for  
26 all of the these species, in very occasions was the stock  
27 assessment model able to exactly match the benchmarks coming out  
28 of the simulation model, or the -- Yes, the metrics that the  
29 simulation model generated, and so the status of the stock at the  
30 end of the twenty-year run.

31  
32 When you look at things like the -- When you incorporated more  
33 parameters into catch per unit of effort, you did, in most cases,  
34 get closer to the diamond, which is, again, what actually happened  
35 in the simulation, and so that did improve things slightly, for  
36 some of these species, and, obviously, incorporating perfect  
37 information, with perfect length, which is the triangle, in most  
38 cases, gets you closer, but not in all, and what's particularly  
39 problematic is the fact that, for some of these, the points sort  
40 of straddle the dashed lines, which represent, you know, whether  
41 or not you're overfished and whether or not overfishing is  
42 occurring.

43  
44 The fact that a lot of these estimates are kind of on either side  
45 of those lines is a little disconcerting, because we use that,  
46 obviously, to determine, or state, that, okay, yes, this fishery  
47 is, or is not, overfished, or experiencing overfishing, and then  
48 we decide whether or not to base policies, or to develop policies,

1 based on that feedback.

2  
3 To me, the fact that I was not able to essentially directly match  
4 the status of the stock coming out of the simulation, in any of  
5 these runs, is problematic. Now, the points are fairly well  
6 grouped, which is good, but, again, straddling a lot of these sort  
7 of management lines that can influence what we, as an SSC body,  
8 what the council, and the advice, or recommendations, from the  
9 Science Center might be.

10  
11 When you look at the percentage contributions from the partial  
12 loglikelihood for catch per unit of effort and for the length  
13 distributions from the Stock Synthesis models, what you see is  
14 that the length observations contribute quite a bit of the  
15 loglikelihood sort of variability to the loglikelihood function,  
16 particularly for the two grouper species. For the snappers, not  
17 as much. CPUE does contribute quite a bit, but not, you know, on  
18 the order of -- On the most, 10 to 15 to 20 percent, depending on  
19 which index you put into these stock assessment model.

20  
21 So what's going on here? Why are we seeing this mismatch? Again,  
22 remember this is from a simulation and not reflective of, you know,  
23 what's going on, necessarily, on the water, in reality.

24  
25 In the simulation, what happened was, over time, what you see is,  
26 as these graphics iterate, is that fishing effort -- People go  
27 essentially to, more or less, the spots that they know, right, and  
28 they often go predominantly to the spots they know where they can  
29 catch fish, and so there is a sort of clustering in space, across  
30 time, or at least there was in the simulation model, of fishing  
31 effort in particular locations, and that, which is shown on the  
32 left panel, and, as you animate this through, I will do that again.

33  
34 If you look at the right panel, what you will see is the change in  
35 spatial biomass over time that results, and so you sort of get  
36 this sort of local depletion effect happening, and this carving  
37 out of biomass in certain locations, and the preservation of  
38 biomass in other locations across the West Florida Shelf in the  
39 simulation model, and so sampling that is going into the stock  
40 assessment Stock Synthesis model is essentially predominantly  
41 representative of what's going on essentially on the Florida Middle  
42 Grounds, mostly, where the majority of the fishing effort was  
43 concentrated in the simulation model.

44  
45 As a result, the stock assessment model cannot clearly see the  
46 entire picture of what's going on elsewhere in the Gulf of Mexico,  
47 or, sorry, on the West Florida Shelf in this simulation model.

1 There is sort of biased spatial sampling across the range of the  
2 stock distribution in the simulation, and a changing size  
3 distribution, that is predominantly reflective of what's going on  
4 in key areas where fishing activity is highest, and it's probably  
5 being more preserved in areas where fishing activity is not as  
6 high, and there is clearly local depletion happening, and that we  
7 know, from numerous studies, papers, et cetera, over the past ten  
8 or twenty years, has an important impact on CPUE, and this idea of  
9 the clustering of fishing effort I think is fairly realistic, from  
10 speaking with fishers, and interviewing them, and from surveys.

11  
12 They pretty much said, hey, look, here's my logbook, and I, you  
13 know, go through it and pick the spots I know, and, you know, I  
14 get a request for 10,000 pounds of red snapper from a restaurant,  
15 or a fish broker, and I have to provide that, and I know I can go  
16 get it here, here, and here, and so, to maintain efficiency, and  
17 not have to waste fuel exploring, I will just go to the spots where  
18 I know that I can get it, get what I need, and go back to port and  
19 make some money, which makes total sense.

20  
21 In the survey, responses suggest that exploratory fishing only  
22 occurs a fraction of the time. Maybe, about 25 percent of the  
23 time, people sort of guesstimated, and I don't know if that's  
24 accurate, and that seemed a little high to me, but, you know, there  
25 is some explanatory activity that goes on, but, anecdotally, from  
26 talking with folks, even from newer captains, and also talking to  
27 folks who own a handful of vessels, and sort of manage the captains  
28 that operate those vessels.

29  
30 What I was told is that, in some cases, and it, obviously, depends  
31 on the owner of that group of vessels, the owner of that fish  
32 house, et cetera, but, in some cases, they would provide their --  
33 The owner would provide the new captain sort of a logbook, either  
34 a complete logbook of places where they know they can get certain  
35 fish or a partial logbook and say, okay, here's something to get  
36 you started, and you need to learn the rest, and so that kind of  
37 varied depending on who I spoke with, but, in either case, people  
38 are at least -- Even if they are new, or green, starting out, they  
39 are given some information at the start, which they can use to  
40 base their decision-making on.

41  
42 Then, obviously, as captains become more and more experienced,  
43 then they're able to -- Their personal logbook expands, and they're  
44 able to more efficiently select places to go fishing, where they  
45 know they're guaranteed to catch what they need. Again, a lot of  
46 this is, I think, market-driven, where I was told, repeatedly,  
47 that, oh, you know, typically, we get a request for X amount of  
48 pounds of this species, red grouper or red snapper or whatever it

1 is, and we have to fulfill that within X number of days, and  
2 there's not time to go goofing off and looking around, and so I  
3 need to go to the places where I know I'm probably going to get  
4 that and go get it and come back and fulfill the order and complete  
5 -- You know, and make some money.

6  
7 Trip duration, in the simulation model, and, also, we saw in the  
8 discrete choice models, was often limited by hold size, at least,  
9 again, pre-IFQ, and I imagine that these dynamics have probably  
10 changed, post-IFQ, and some of the preliminary simulation model  
11 runs I've done with the full Gulf model shows that, that some of  
12 these dynamics are changing, where prices are higher because of  
13 the IFQ system, and more stable over time, and you don't have that  
14 boom and bust at the start of -- When one season is open at the  
15 start of the year, and so people don't necessarily have to fill up  
16 their entire hold to make a trip successful, or worthwhile.

17  
18 Fishing effort is also spatially and temporally impacted by things  
19 like weather and fuel price, regulations and such, and that's  
20 important to keep in mind, because that impacts where and how --  
21 Timing and placement of the fishery-dependent observations that we  
22 use in stock assessment, and what I found is, so far, incorporating  
23 additional variables into the CPUE standardization process does  
24 not really guarantee that you will get an improved index, and I  
25 was a bit personally surprised. I was hoping that what I got out  
26 would better match the biomass trend, but it didn't. It did not.

27  
28 Improved spatial resolution is needed in the commercial logbook  
29 data, and I think we have this now, with the onset of VMS data,  
30 and I think more work is needed to try and link the two, VMS  
31 observations to logbook observations, so that we can do a much  
32 better job standardizing CPUE and taking into account some of these  
33 spatial effects that I think are, in some sense, real in the  
34 fishery, but are not well accounted for in the indices that we  
35 generate, and we also need to ensure that the trip interview  
36 program is measuring landings that are best representative of,  
37 yes, the fishery, but also the temporal and spatial distribution  
38 of the stock itself as well, and that's tricky to do, obviously.

39  
40 Some -- Before I go there -- Well, I will talk about  
41 recommendations in a moment, but, as I kind of hammered, this is  
42 a simulation model, and it doesn't necessarily reflect the reality  
43 of dynamics in this system, but I was pleased to see that, by  
44 baking in a fair amount of realism into the simulation model, I  
45 was able to somewhat match some of the spatial patterns of catch  
46 that you see in the real system, and so the panel on the left is  
47 a graph that I grabbed, and I think it was from Andy Strelcheck,  
48 from a presentation that he gave that shows VMS catch observations

1 for red grouper, and then on the right represents what the  
2 simulation predicted, in terms of spatial catch for red grouper,  
3 and there is some similarity there, obviously.

4  
5 There was also one generated for gag grouper, and it's not quite  
6 as apparent, but you do see some overlap with respect to where  
7 catches match in space,

8  
9 Certainly mine is not the only fishery agent-based model out there,  
10 and there are quite a few fishery agent-based models that exist,  
11 and not a lot, but it's sort of a growing component of the fisheries  
12 science field, and one that I am attempting to push forward.  
13 Another project that I have helped work on was to develop a --  
14 What we're attempting to do is to develop a generalizable piece of  
15 agent-based modeling software that we've labeled Poseidon, which  
16 is this long recursive algorithm, that I am not even going to waste  
17 your time reading, on the left.

18  
19 This model simulates fisher behavior, and fishery outcomes, and  
20 the biology is presented at a very simplistic level, and it uses  
21 machine learning and analytical tools to try and model fisher  
22 behavior and fisher decision-making, and so there's a little bit  
23 more flexibility in the way that fishers make decisions, based on  
24 machine learning algorithms, and there are a number of management  
25 levers baked into the model as well. There's a higher emphasis on  
26 human and spatial dimensions, as I said, with much more simple  
27 biology.

28  
29 We initially used the west coast groundfish fishery as a testbed  
30 for this, and I don't think -- There's a little eye candy video on  
31 the right, and I don't know if it will play or not, but that's  
32 fine if it does not, which shows just kind of how the vessel agents  
33 were running around across the west coast, and what we found was  
34 that -- So this graph represents what's called -- What we're  
35 calling validation error, which is the distance between the  
36 simulated outcomes of things like catch and average profits, days  
37 out, distance from port, the duration and such, and so different  
38 metrics that we compared -- That the simulation generated and that  
39 we compared with the realistic observations from that fishery.

40  
41 What we found was that the adaptive agents, which are the three  
42 sort of algorithms that you see above the dashed line here on this  
43 figure, performed better, in terms of validation error, meaning  
44 they were better able to recreate some of the real-world dynamics,  
45 or the real-world observations that we see in this fishery,  
46 compared with when we provided either perfect information, which  
47 is that large error bar in green, or we developed discrete choice  
48 model logit models, or we sort of sort of statistically locked

1 those agents in certain ways to force them to perform the way that  
2 we were told that vessels in the groundfish fishery operate.

3  
4 This shows a lot of promise for this approach, and there's still  
5 a lot of work to do on the Poseidon model, to get it ready for  
6 primetime and sort of use, and that work is coming along, and so  
7 this just shows some of the -- That we were able to come close to,  
8 or matching, some of the realistic values, which are the red-  
9 dashed lines that you see from the output of these simulations for  
10 the west coast groundfish fishery.

11  
12 This is for simulated versus real quota attainment for some of the  
13 species that were modeled, and we're currently using this model,  
14 in cooperation with IATTC, to represent the fishery aggregation  
15 device fisheries for tuna across the tropical eastern Pacific Ocean  
16 and to represent boat movement, and that graphic is not going to  
17 play, I guess, and, if not, it's fine, and it's more just eye  
18 candy, and to represent boat movement as well.

19  
20 In this approach, we have abandoned the sort of machine learning  
21 component, because it did not well represent the behavior of the  
22 tuna fleets that go out and fish, and so we had to do a lot of  
23 work, in cooperation with IATTC, to explicitly code in some of the  
24 behaviors that represent the fishing fleet for tropical tunas.  
25 This work is ongoing, and IATTC just agreed to adopt this model  
26 and start using it for a management strategy evaluation.

27  
28 In summary, agent-based models have a number of places in fisheries  
29 science and in stock assessment. I think that this is one of the  
30 ways of the future, so to speak, to try and understand and test  
31 different management policies that are under consideration, and  
32 interventions that are under consideration, trying to avoid  
33 surprises, right, and so, as managers, we do our best to try and  
34 develop, or put in place, or recommend policies that we think would  
35 best -- That would improve fisheries that are undergoing  
36 overfishing or are overfished and need to be rebuilt, but we --  
37 But fishers are extremely smart, and extremely innovative, and are  
38 able to essentially either innovate around those policies, which  
39 targets changed gears, and, I mean, a classic example is buoy gear.

40  
41 Yes, we'll ban bottom longline, no problem, and then they said,  
42 okay, we'll just, you know, create buoy gear to get around that,  
43 and, you know, that was a really clever way around that policy,  
44 and a very effective way for catching groundfish as well and  
45 reducing turtle bycatch.

46  
47 There are a lot of methods and ways for collecting data on fisher  
48 behavior, and lots of modeling -- A handful of modeling tools that

1 can represent fisher decision-making, and different kinds of  
2 information can also be synthesized and solicited from the data  
3 that we currently have, and so we can use the logbook data,  
4 observer datasets, questionnaires and surveys, do experiments with  
5 fishers, and we now have quite a time series of VMS data that we  
6 can use, and there are other sampling initiatives that we can use  
7 to sort of get at, and better understand, the decision-making  
8 process and the fishing patterns that commercial, and hopefully  
9 one day recreational, fishers use. Again, not as a way to share  
10 trade secrets, but as a way to greatly improve our ability, and  
11 our capacity, to estimate the status of stocks.

12  
13 Models used to represent fisher behavior should be best identified,  
14 and best practices developed, to define when and how to apply each  
15 of these tools, and work is needed to better incorporate some of  
16 this information on fisher behavior into assessments and fisheries  
17 management.

18  
19 Some ideas I have are finding ways to combine, or embed, discrete  
20 models, or link them to stock assessment models, where the stock  
21 assessment model is running together with a discrete choice model  
22 that's being fit over time, and that, obviously, greatly increases  
23 your parameter space of these multiple equation models that we  
24 have that are already have -- They have a heavy, or large, number  
25 of parameters that need to be estimated, and I think the red  
26 snapper SS model has over a thousand parameters that need to be  
27 estimated, which is not an easy task for a computer to do, and it  
28 results in a lot of statistical tradeoffs as that's being  
29 estimated, where you're up and down-weighting different things,  
30 either manually, or the model is sort of considering all these  
31 different things at once and trying to sort of thread the needle  
32 between them, and so adding more parameters is not ideal. However,  
33 it could help parse out some of the ways that fisher behavior  
34 enters into stock assessments.

35  
36 There also, I think -- I think there's more work to be done in  
37 trying to explore other ways to parameterize the standardization  
38 of catch per unit of effort as well, and so I incorporated those  
39 handful of other parameters, and I didn't get quite the response  
40 that I was hoping for, but I think there are other things that can  
41 -- Even more things that can be incorporated, like environmental  
42 variables from satellite imagery, other economic components that  
43 might help us better explain some of this variability, and so  
44 there's more work to be done there.

45  
46 There's also a lot more work that I need to do to explore the  
47 impact of length, incorporating length distributions, from the  
48 fishery into Stock Synthesis, or stock assessment models, and, in

1 general, explore the sensitivity of length observations within a  
2 stock assessment model as a way to better understand how those  
3 distributions push and pull stock assessment models and affect the  
4 estimation of status criterion coming out of those models.

5  
6 Then, finally, I have sort of pipe dreams of developing agent-  
7 based models that could be used as an actual stock assessment tool,  
8 where there is a wrapper, of sorts, that fits the empirical data,  
9 and then an overlying agent-based model that sort of takes that  
10 empirical data that's being fit simultaneously and tries to also  
11 reconcile the dynamics across space and time.

12  
13 I think we're a long way from that, but I think that's something  
14 that could be done, and is sort of -- It would be a really novel  
15 and innovative approach towards improving stock assessments.  
16 Again, you would combine your sort of estimation of parameters and  
17 likelihood with the sort of agent-based modeling framework, all in  
18 one kind of coupled -- Under one coupled approach, or tool.

19  
20 With that, there are many folks to thank, many folks within the  
21 commercial fishing industry, folks that I became good friends with  
22 as well throughout this process, and a lot of folks shared a ton  
23 of information with me, and they let me on their boats, and they  
24 showed me their gear, and they showed me their fish house. They  
25 explained -- They took time away from their jobs, and their  
26 businesses, to show me, and teach me, kind of what they do and how  
27 they do it.

28  
29 They provided access to their crew members, and to their vessel  
30 captains, to talk with and to interview, and they filled out my  
31 extremely long survey, and they just were really, really helpful  
32 in helping me conceptualize the fisher behavior component of the  
33 simulation model, and they really helped me learn about how the  
34 fishery operates and what their concerns are, what their sort of  
35 visions are, and also how they perceive biomass and abundance when  
36 they're out fishing, and how that informs their own decision-  
37 making, and so it was really a fascinating exercise to do and to  
38 really see firsthand how these folks work.

39  
40 A special thanks to Glen Brooks, David Krebs, Jason Delacruz, and  
41 Bobby Spaeth, who spent a lot of time with me, talking to me and  
42 sharing some of their personal data with me, and piloting the  
43 survey and helping me develop, you know, what's a good or a crappy  
44 question to ask, those kind of things.

45  
46 Then funding for this work has been from a number of sources, from  
47 GOMRI, Sea Grant, the Southeast Fisheries Science Center, the  
48 University of Miami, and CIMAS as well, over the past fifteen

1 years, and so this project is moving, but moving slowly, but I --  
2 A lot of it stalled out at the start of the pandemic, because we  
3 were kind of wrapping up the GOMRI work then, and that kind of  
4 came to a screeching halt, because I decided to prioritize time  
5 with my three-year-old son, to help him get through, or I think he  
6 was two at the time, to help him get through the whole situation,  
7 but I am currently searching for additional funding, at the moment,  
8 to take this tool and make some needed adjustments.

9  
10 Like there are some weird interactions between the IFQ component  
11 of the model and the fisher behavior decision-making that I need  
12 to reconcile, and that's why I haven't published things yet,  
13 because I'm like super anal-retentive, and I don't publish things  
14 until I have satisfied myself that, yes, this is working the way  
15 that it should, and I completely understand it, and I'm not quite  
16 there yet, and so those two components need to be cleaned up.

17  
18 Then future work is going to be to hire a programmer to take this  
19 model and make it operational, in the sense that we can use this  
20 to explore management interventions, and that will probably  
21 involve de-agentizing the biology, and so using the agent-based  
22 part of the model to inform a sort of grid, or matrix, of numbers  
23 of fish, and biomass of fish, which will speed up how fast this  
24 model runs.

25  
26 It takes about four or five hours to run twenty years, but that is  
27 multi-threaded, or across multiple pours, on a \$10,000 computer  
28 that I have, where the agents are dispatched across a whole bunch  
29 of different processors, and then the whole thing is serialized,  
30 at various points, for updating purposes, and that's not ideal for  
31 making decisions, and we need something that's going to run, you  
32 know, in minutes, and so, if we downgrade, in a sense, the biology  
33 component, in the sense that we represent fish as numbers-at-age,  
34 and so essentially three-dimensional matrices within each of those  
35 grid cells, and then we use the migration algorithm to inform the  
36 movement of numbers of across -- You know, kind of as a diffusion  
37 type approach across space, and that's a way to greatly speed up  
38 and make this thing computationally efficient.

39  
40 There also needs to be added a module for policy exploration, and  
41 that contains levers that can be easily pulled and parameterized  
42 to say, okay, we want to implement this policy, and we push the  
43 button and parameterize it as you want and hit go, and then the  
44 model does it, and so that's where I'm headed with this work. It's  
45 going to take a grant, and some years, to get there, but I am  
46 highly optimistic that I will, and I'm grateful for any input,  
47 feedback, from this body, and others, data sources, basic  
48 information that folks might have, and the wealth of experience in

1 this room, to help guide that approach.

2  
3 With that, I greatly thank the SSC, council staff, and the  
4 Southeast Fisheries Science Center staff, and participants for  
5 being present and listening to the presentation, and I'm happy to  
6 take any questions and discussion at this time. Thanks very much.

7  
8 **CHAIRMAN NANCE:** Dr. Saul, thanks for that presentation. It was  
9 very stimulating, and we put together, for this meeting, several  
10 of these, and they're not only to have a discussion and to ask  
11 questions of Dr. Saul, but also to stimulate, amongst ourselves,  
12 discussions around these topics, so that we can kind of feel our  
13 way through these things as we maneuver, but, anyway, we'll go  
14 ahead and take questions now. David, please.

15  
16 **DR. GRIFFITH:** Dr. Saul, thank you very much for that presentation.  
17 It was very fascinating, and I too am very interested in agent-  
18 based modeling, and I'm especially interested in your -- In this  
19 idea of developing an agent-based model-like program to look at  
20 these interventions and how fishers might respond to them, and so  
21 I'm really fascinated with that.

22  
23 It seems, to me, that you kept saying, you know, the simulation  
24 doesn't reflect reality, but it seems, to me, that you are  
25 capturing a lot of fisher behavior, even though the groundtruthing  
26 doesn't quite work out, and it still seems, to me, that you're  
27 identifying a lot of fisher behavior that is really important, in  
28 terms of how they make decisions that then affect stock  
29 assessments, and so I would just say that I certainly wouldn't  
30 underestimate the model based on that lack of fit between the  
31 simulation and what is happening on the ground, and so -- But,  
32 anyway, I just want to thank you for introducing this and getting  
33 the ball rolling, and I think it's a very interesting method  
34 myself. Thank you.

35  
36 **DR. SAUL:** Great. Thank you, David, and feel free to call me  
37 Steve. The PhD crap just means that I spent way too much time in  
38 school. I grew up in New York too, and so I also respond to "hey,  
39 you".

40  
41 **DR. ISAACS:** Of course, the big question is why Pierce Brosnan and  
42 not Sean Connery or Roger Moore.

43  
44 **CHAIRMAN NANCE:** That's because he's young.

45  
46 **DR. SAUL:** Exactly. Yes.

47  
48 **DR. ISAACS:** I really liked what you're doing here, and, I mean,

1 it's exciting. It's very data intensive, and probably the major  
2 criticism that I could have is that it makes me look like a chump,  
3 because, I mean, you're doing all this really interesting modeling,  
4 but you could maybe give me an education afterwards or something,  
5 and that would be how do we handle like the distribution of cost  
6 on trips where there are multiple species caught in the same trip,  
7 and that should be interesting to see, how you could handle like  
8 intentional targeting of fish, versus kind of incidental, the, oh  
9 gosh, we just happened to come across these species of fish, and  
10 I'm sure you have ways of dealing with that, and I would like to  
11 know how you do.

12  
13 **DR. SAUL:** Good question, and thanks, David, for your comment as  
14 well. Just quickly going back to that, I tried to bake in as much  
15 realism as I could, to the point where, at some point, my PhD  
16 committee was like, stop, and you're never going to graduate, and  
17 I want to include even more realism, because I want this, again,  
18 to be something that is operational, that we can sit around the  
19 table together, all of us, and run fairly quickly and look at what  
20 might happen, and so thanks for that, but I also want to be  
21 cognizant of the fact that -- And I'm very well aware, again, as  
22 I said, that all models are wrong, and some are useful, and it is,  
23 at the end of the day, a model, and there are a lot of assumptions.  
24 To your question, Jack, which I totally lost my train of thought  
25 on, and what were you asking?

26  
27 **CHAIRMAN NANCE:** About what species --

28  
29 **DR. SAUL:** Okay, and so, in here, what I did was I summed up -- In  
30 the West Florida Shelf model, there is four species represented.  
31 In the full Gulf model, I have eight explicitly represented. For  
32 all the other species, I summed up the total catch of all of those  
33 other species that are caught in the logbook data, and I fit  
34 probability distribution to that catch, and so every day they  
35 sample, or they grab from that, to help full up the fish hold with  
36 those other species, and that's how I kind of handle that at the  
37 moment.

38  
39 There is discarding that happens, and so, at the time, there was  
40 a size limit in place, and the catch limit for red snapper, and so  
41 things that were under the size limit got tossed back, and there  
42 is discard mortality in the model. I forgot to mention that  
43 discards were put into the stock assessment model, and that was  
44 not on the slide, and I apologize about that, but so, yes, that's  
45 kind of how I handled the other catch, as a way of accounting for  
46 that, but, ultimately, I would like to load a ton more species in  
47 here, you know, like twenty or thirty of them.

1 It would be great to even have them interacting, at some point,  
2 across trophic levels, and I have a student who is building an  
3 Ecopath model, and I know we have several for the Gulf already,  
4 and the novelty of what we're doing is we've identified seventy  
5 functional groups, and so we're trying to develop a model, an  
6 Ecopath model, at the finest sort of resolution we can, and then  
7 I'm hoping that the two models can feed one another, right, and so  
8 results from the agent-based model can feed into the Ecopath model,  
9 and information from Ecopath can feed into the agent-based model,  
10 and they can inform one another.

11  
12 We've got the food web going, and we're now full fit, and the  
13 diagnostics look good, and now we're adding some threats in, and  
14 that paper is in review, or in revise and submit, with *The Journal*  
15 *of Food Webs*, but so that's how I sort of handled the multispecies  
16 issue so far.

17  
18 **CHAIRMAN NANCE:** Thank you. Will, please, Will Patterson.

19  
20 **DR. WILL PATTERSON:** Thanks, Jim. Steve, this is really  
21 interesting work that you're doing here, and I'm wondering if you  
22 could go to Slide 19 in your presentation. When this one came up,  
23 and the red grouper one before it, it really sort of piqued my  
24 interest. At first, I thought you were -- You said that the  
25 commercial catch was utilized to produce these spatial maps, but,  
26 obviously, it says their input data is the video survey and habitat  
27 data.

28  
29 For red snapper, one the things that kind of really jumped out at  
30 me was this hotspot of abundance off of Pensacola, and then, you  
31 know, a really, you know, dearth of abundance estimated off of  
32 Alabama, and I don't know what causes that, you know, hotspot off  
33 of Pensacola there in your data, the data utilized for this, but  
34 I assume that the reason you don't see the abundance off of Alabama  
35 that has been demonstrated in other fishery-independent sampling  
36 is that at least the NMFS camera survey only targets sites that  
37 are out toward the shelf break, known natural bottom habitats, and  
38 typically in deeper water, and they avoid artificial reefs, or at  
39 least historically did.

40  
41 Another thing that kind of stuck out to me here is that, you know,  
42 along the coastline there, you have really high red snapper  
43 abundance in the western Gulf, and in the north-central Gulf, all  
44 the way up to the coastline, and so I don't know what the kriging  
45 was, or the estimation procedure here in your machine learning  
46 model, to produce that spatial distribution, but I would go back  
47 and reconsider having that biomass so high close to shore, and  
48 then also at the shelf break.

1  
2 We see a drop-off at the shelf break, and I think this will be  
3 important if you're using this base map then to predict what --  
4 Part of the spatial distribution of effort and how that's changing.  
5 You know, I think there's some issues here, probably, with your  
6 base map, at least for red snapper.

7  
8 **DR. SAUL:** Will, thank you for that feedback and comments, and  
9 that reminds me of something that I forgot to say on this slide,  
10 to bring up, which is exactly the two points that you mentioned.  
11 One is that, for some species, like red snapper, the video survey  
12 is biased, right, and it's not capturing artificial reef habitat,  
13 and so you're not getting the best distribution possible.

14  
15 One thing that I would like to chat with you, and others, about  
16 is, if you have data on that, we can incorporate that into these  
17 machine learning models and update them with that additional  
18 information, and that should then help capture, or move around,  
19 abundance to the right spots, right, and so that's a really  
20 important point and a criticism that we, I think, reference in the  
21 paper.

22  
23 The other point you make is really good, about abundance near the  
24 coast, and that happens somewhat with the red grouper map as well,  
25 as well as maps for some of the other species, which, for the  
26 interest of time, I'm not showing here, and so I have a second  
27 paper that we're working on, if I can -- I am currently buried in  
28 a multispecies stock assessment for the entire country of  
29 Indonesia, this year, and I have get un-buried out of that to start  
30 getting on this again, and so that should be done by the end of  
31 this calendar year.

32  
33 That's been part of the delay of the past few years, and I've  
34 become a de facto assessment scientist for Indonesia, which is a  
35 great role, and there's lots of interesting work, but it's a shiny  
36 object distracting me from the Gulf, but we have an additional  
37 paper that I literally just need to go in and finish writing parts  
38 of it and submit it, where we've adjusted these maps to spatial  
39 fishing effort in the sense that we looked at where the -- Where  
40 fishing ports are located and where the majority of fishing boats,  
41 and the number of fishing boats that are located at each port, and  
42 we made adjustments to the biomass that you would see in the  
43 nearshore -- That's being artificially placed in the nearshore  
44 environment from this algorithm, to sort of say, hey, you know,  
45 that's not realistic, and those areas were out-fished ages ago,  
46 probably, and you're not going to get all that red snapper right  
47 up by Pensacola right off the coast.

1 What is driving that, to your other question, is largely the  
2 habitat data that we use, which is largely informing the spatial  
3 distribution of these fish, and that habitat data is this  
4 amalgamation of all the sort of publicly-available habitat data  
5 going back to the 1980s and 1970s to present, and it exists --  
6 Chris Jenkins, and others at the University of Colorado, have done  
7 the best job they could to integrate all these data sources and  
8 standardize them and make corrections, as needed, but there are  
9 still a number of issues, specifically the fact that the resolution  
10 for this data is a lot better in coastal areas than offshore.

11  
12 You get much finer granular resolution along the coast, which then  
13 artificially forces some of this fish biomass to be placed in those  
14 areas, and so that's an important bias that's in these models that  
15 needs to be addressed. Does that answer what you were asking?

16  
17 **DR. PATTERSON:** It does. Thanks. Jim, can I just ask one follow-  
18 up?

19  
20 **CHAIRMAN NANCE:** Yes, please.

21  
22 **DR. PATTERSON:** Certainly, Steve, and that definitely does, and  
23 one other sort of follow-up question I have though is, in the  
24 surveys, the video surveys, that exist in the Gulf, and even the  
25 ones that are stationary, they're slightly different methods, and  
26 I'm wondering how you accounted for the effective sample area of  
27 the gears.

28  
29 In the Great Red Snapper Count study, and work we're doing in the  
30 Atlantic to estimate red snapper abundance, and the amberjack work  
31 that I think we're going to hear about later in the Gulf, you know,  
32 this issue of effective sample area of video gear is critically  
33 important to try to estimate the spatial distribution of biomass,  
34 or even estimate abundance, and so I'm wondering, you know, given  
35 the disparate data sources, how you accounted for that effective  
36 sample area to standardize what the data show.

37  
38 **DR. SAUL:** Sure, and that's a great question, and that's all fully  
39 described in the manuscript, but I will give you the quick-and-  
40 dirty of that, which is what we did was we partitioned out -- We  
41 drew polygons around the areas where the video samples were taken,  
42 and we first estimated the distribution of biomass, or abundance,  
43 in those polygons, and so with the idea being that we would obtain  
44 a decent estimate of abundance across space, predicated on the  
45 habitat data, for those smaller polygons, where there is actual  
46 sample data, right, because, to your point exactly. If we do that  
47 for the whole Gulf, it's totally biased, and it's impossible.  
48 Then we -- So then we got predictions for these polygons, right,

1 gridded predictions that provided estimates of abundance and  
2 biomass for these polygon areas, and those gridded predictions  
3 then became the inputs to -- So machine learning algorithms  
4 determined those gridded inputs, and so we had all these postage-  
5 stamp sort of polygons across the Gulf, where there is video camera  
6 survey data.

7  
8 We then used that data as input to train the machine learning  
9 algorithms for the entire Gulf, and then we came up with a second  
10 generation of maps that initially estimated abundance and biomass  
11 across the whole Gulf. We then looked at things like the hotspot  
12 off of Texas that you saw.

13  
14 For example, if you flip back to the red grouper map, real quick,  
15 and I think it's the previous slide, the initial model for that  
16 put all of this biomass in the western half of the Gulf, and it  
17 was like, no, and, you know, we know there's not, you all this red  
18 grouper off of Texas, and so we then applied expert information  
19 and informed the model and said, look, you know, there are not  
20 observations here, or there are zero observations here, and let's  
21 incorporate the zeros and rerun the model.

22  
23 We took an iterative approach, and, over and over again, reran the  
24 machine learning models, this ensemble of machine learning models,  
25 and I think we had thirty-one models that we were running, to  
26 ultimate winnow down and generate a best estimate, and I don't --  
27 Like I said, as you commented, Will, there are clearly issues with  
28 this, and I think it's better than what I did before, which was  
29 sort of a simulated approach, but there are still issues that  
30 remain that need to be resolved.

31  
32 The other thing we've done, that I didn't talk about, was, for  
33 things like yellowedge grouper, that are not picked up with the  
34 camera survey, we used the bottom longline data, and so one other  
35 approach that I would like to consider is combining the bottom  
36 longline data with video survey data, or using bottom longline  
37 data to estimate like -- To generate a map of red grouper, and see  
38 if that improves our estimate, or combine it with the video survey  
39 data, and so there are a number of things that can, and should, be  
40 done to try and improve these maps, again with the ultimate goal  
41 of making this tool something that is operational, and as realistic  
42 as possible, for management strategy evaluation exploration.

43  
44 **CHAIRMAN NANCE:** Thank you. Steven Scyphers, please.

45  
46 **DR. SCYPHERS:** Thank you, Mr. Chair. Thanks, Steve. That was a  
47 great presentation, and I really also agree that this is super  
48 interesting work. I know the focus of the current work, and the

1 presentation, was on how ABM can help integrate socioeconomic  
2 information into stock assessment models, and look at things like  
3 biomass, or population dynamics, but it seems like it could also  
4 be a powerful approach to look at social and economic outcomes,  
5 and so kind of a two-part question is have you thought about  
6 looking at social, or economic, outcomes with the current model  
7 that you're building for the Gulf, and maybe a specific follow-up  
8 on that is, you know, do you think these models could be used to  
9 look at if regulations, or increased costs, or a disaster, forced  
10 vessels, or agents, to like leave the fishery, and I know you  
11 mentioned the management strategy evaluation potential of this,  
12 but I wondered about it on more of the social and economic  
13 outcomes. Thank you.

14  
15 **DR. SAUL:** Thank you, Steven, for that question, and so, yes, the  
16 full Gulf model tracks a lot more economic information, including  
17 costs and earnings and expenditures, and it writes all that  
18 information out, and so we are moving towards that, certainly, and  
19 to better understanding the economic impacts of policy, and that's  
20 critical, and I completely agree with you, and so, yes, a lot of  
21 that has been built into Version 2 of this model, and I didn't  
22 mention it here just for brevity, for time's sake. You had a  
23 second part to your question that I'm forgetting.

24  
25 **DR. SCYPHERS:** It was essentially if, you know, have the vessels  
26 working as agents in the model, does it -- Is it able to tell you  
27 something about if they live, if they exit, or do things get so,  
28 you know, disruptive?

29  
30 **DR. SAUL:** Okay. Perfect, and so, again, the exit and entry is  
31 not explicitly coded in the model, and that's something that I do  
32 need to add in. However, the Version 2 of the model, with the ITQ  
33 system, does allow vessels to stop fishing if they're not making  
34 a profit, and so they don't necessarily exit the fishery, like and  
35 sell their boat, but they pretty much stop operating, and they  
36 will, for a time, or permanently, depending on, you know, what  
37 their financial situation ends up being as time goes on.

38  
39 I need to include a component of, okay, you know, this person ends  
40 up picking up additional work in another sector, and has an  
41 additional income there, to help round-out that economic  
42 component, but, yes, that is sort of built much further into the  
43 second version, and it needs to be polished a little bit more,  
44 going forward.

45  
46 To your question about using the model to explore other outcomes,  
47 I have submitted a number of research proposals, and I haven't  
48 gotten them funded yet, to explore like red tide impact on the

1 fishing fleet, and to explore -- Certainly the oil spill is the  
2 other burning question that I need to finish, and publish.  
3 Preliminarily, it looks like -- The preliminary results seem to  
4 show that there was a short-term impact on the distribution of  
5 fishing effort, with all those closure, large closure, areas, but,  
6 after like a year or two, people seemed to just go back to business  
7 as usual and fishing the way they were before, and so it didn't  
8 seem to have the long-term impact on fisher behavior, and it did  
9 not seem to have that much of an impact on the biology of the  
10 species, but that --

11  
12 As I said, there are some issues with the interaction of fishing  
13 trips, the decision to take fishing trips, and the ITQ component  
14 that I need to adjust and fix, where the ITQ component is  
15 essentially dampening the number of trips people take to a level  
16 that's artificially low. I have to really dig in and figure out  
17 why that's happening in the simulation, and fix that, before I'm  
18 comfortable like doing proper runs and publishing stuff on the oil  
19 spill, but that is coming. Does that address your question?

20  
21 **DR. SCYPHERS:** Yes. Thank you very much.

22  
23 **DR. SAUL:** Thank you.

24  
25 **CHAIRMAN NANCE:** Thank you. Mike.

26  
27 **DR. ALLEN:** Thank you, Steven. I really enjoyed going through  
28 this and your presentation. I think it's really fruitful area of  
29 research. I wondered if, in your exploring of the model, have you  
30 played around with any scenarios of changing in the regulations?  
31 I know it's pre-IFQ, but, you know, area closures or, you know,  
32 have you just seen how it would respond to those kinds of things  
33 yet, and I know you probably want to do more of that, but I'm just  
34 curious.

35  
36 **DR. SAUL:** Thank you. Again, that's something that is on the near-  
37 term horizon, and I have not explored that too much, but that's  
38 something that I'm hoping to build in, and it's not hard to build  
39 that in. You can even develop a clickable interface, where you  
40 could -- We have that in the Poseidon model, and the Poseidon model  
41 -- Mike Drexler is here, and he was a large part of -- Ocean  
42 Conservancy was a large part of funding and developing that model  
43 as well, and we had an army of people behind that, and multiple  
44 coders, and so that thing moved a lot faster than me and a post-  
45 doc and a student trying to push this thing forward, but I'm hoping  
46 to get -- I'm pursuing funding to try and get a smallish army of  
47 folks behind this, but there are fairly easy ways to incorporate  
48 that and look at the effects of that, of closed areas.

1  
2 You know, all these different sort of -- Essentially, the nice  
3 thing about agent-based models is that they're extremely flexible,  
4 and so, almost anything you can dream up, you can code into this,  
5 or code a module that could support that, and so closed areas,  
6 size limits, changes in gear, ITQ processes, natural disasters,  
7 you know, like the hurricane last year that impacted southwest  
8 Florida, and I'm sure it took out a whole bunch of fishing vessels  
9 down there, and so, you know, what's going to happen with fishing  
10 effort there? Red tide, and how does that redistribute fishing  
11 effort, and all of these questions can be easily explored once  
12 this thing is -- Once sort of a policy module is built into it  
13 that can accommodate those sort of inputs.

14  
15 **CHAIRMAN NANCE:** David, please.

16  
17 **DR. CHAGARIS:** Thank you. Great presentation, Steve. Really cool  
18 stuff, and it's very impressive, and I'm excited about where this  
19 could go in the future. I think that it will be interesting to  
20 see how you handle the recreational sector, and I think that's  
21 going to be, I think, pretty critical, to have that in there.

22  
23 I see the utility of this, probably the strongest utility of this,  
24 as an operating model for either future MSE work, but, also, you  
25 could start looking at like survey design and how we actually  
26 conduct scientific surveys in the region, once you layer in those  
27 survey fleets, but I have a couple of questions, and Steve had  
28 kind of touched on it, as far as like attrition in the fishery,  
29 but is there also the possibility for the fishery to grow over  
30 time, and so is there some more capacity, and they, you know,  
31 invest more back into their capital, and so that might be  
32 important, as well as with the recreational sector, that seems to  
33 be, you know, ever increasing.

34  
35 Then I have one question about sort of the biological side, that  
36 I kind of thought about as Mike mentioned spatial closures, and  
37 so, with the -- With your numbers-at-age, does that model allow  
38 for different like population structures to emerge in different  
39 locations, and so, for example, if you were to put in a spatial  
40 closure, would you be able -- Would the model simulate like the  
41 buildup of older, larger individuals?

42  
43 **DR. SAUL:** Thanks for those questions. Yes, and so the quick  
44 answer is, yes, it does, and it would, and that's what happens,  
45 essentially, in the simulation that I showed you, is that you had  
46 all this kind of hidden biomass, or cryptic biomass, to the south,  
47 right, that was lightly fished, where you had age structure  
48 building up there, but you had complete attrition of age structure

1 in the heavily-fished areas, and so, yes, as soon as you close off  
2 an area, you will see that.

3  
4 Actually, I have the MPAs closed off to fishing in the West Florida  
5 Shelf model, and you do see a buildup. If you just kind of pull  
6 data from that area, and I didn't present that, but you do see a  
7 buildup of biomass, and you do see a change in the age structure  
8 there, when you compare it to the areas that are fished.

9  
10 To your point about surveying, yes, and so one thing -- So Clay  
11 and I have had numerous conversations about this, and I have  
12 started sort of down that road with these, by looking at, as I  
13 mentioned in the talk, different -- Playing with different  
14 assumptions about the length structure, right, and incorporating  
15 that into that stock assessment models, but a big question is is  
16 TIP sampling representative of the entire fishery, right, and  
17 that's kind of an open research question that I'm hoping to get at  
18 with using the model.

19  
20 In addition, another point that I forgot to mention is that,  
21 looking at this, and spatial distributions of fishing effort, it  
22 can help us inform where our fishery-independent surveys should  
23 occur with more intensity, right, and so we've got all this data  
24 from the fishing industry in these areas, and much less data over  
25 here, and we should, therefore, ramp-up our fishery-independent  
26 sampling in areas where we know less, right, and so to sort of  
27 counter-balance, or counteract, the spatial bias that we do have  
28 from fishery-dependent observations, and that would sort of, I  
29 think, help round out and better inform the stock assessment  
30 models, with respect to what's going on, and so, if we had size  
31 distribution data -- That's another thing I would like to explore,  
32 to like put in fishery-independent sampling, and, you know, ramp  
33 it up in certain areas, and reduce it in others, and see how that  
34 changes stock assessment outcomes.

35  
36 **DR. CHAGARIS:** Cool, and then just one more comment, and you  
37 mentioned that you've got some ongoing Ecopath modeling, and, as  
38 you know, there are existing models in the Gulf that I'm sure, you  
39 know, people would be willing to collaborate, if that helps you  
40 get over, you know, some of the humps that you want to do, and,  
41 you know, we could leverage that other work as well.

42  
43 **DR. SAUL:** Yes, and I would be thrilled with whoever is happy to  
44 collaborate, yes, and my student has graduated recently, but she's  
45 like gung-ho on continuing to work on this, and so, yes, any -- On  
46 both of these, anyone who is interested in collaborating, I welcome  
47 those conversations on both of these, the ABM and on the ecosystem  
48 modeling component.

1  
2 **CHAIRMAN NANCE:** Thank you. Akbar, please.  
3

4 **DR. AKBAR MARVASTI:** Steve, this is Akbar Marvasti from the  
5 Southeast Fisheries Science Center, and I missed the earlier part  
6 of your presentation, and Mike Travis alerted me to the  
7 presentation, and I want to applaud you for an excellent work, and  
8 I think it's comprehensive, as realistic as it can get, and it's  
9 very insightful.  
10

11 I am saying that as someone who has done some recent work on the  
12 topic myself, and my question, however, is about the CPUE. Reading  
13 some of the more recent stock assessment documents, it appears  
14 that they are somewhat critical of the use of CPUE, as not as being  
15 as useful, and it appeared, from the part of your presentation  
16 that I was able to listen to, that you are standardizing it and  
17 adjusting it, so that it takes into account some of the  
18 imperfections, and it makes it more realistic, and am I correct in  
19 that assessment?  
20

21 **DR. SAUL:** Thank you, Akbar. I appreciate the question. So, if  
22 we were in Alaska, we would not need to -- In the Alaska region,  
23 we would not need to deal with fishery-dependent CPUE observations,  
24 because they have a whole cadre of fishery-independent surveys  
25 that go fairly -- That are very comprehensive and go back in time.  
26

27 Other places, and regions, throughout the U.S. and the world, don't  
28 have that kind of coverage, temporally or spatially, including  
29 here in the Gulf, and so we are, for better or worse, stuck with  
30 CPUE, I think, for a while. To that end, I think our best efforts  
31 are to try and improve the way we can standardize CPUE, by  
32 accounting for spatial and temporal effects, and fisher behavior  
33 effects, in order to parse out as much of the variability that  
34 comes from these exogenous sources as possible, so that what we're  
35 left with is an index that best reflects abundance.  
36

37 I don't think we're going to get away from CPUE anytime within my  
38 career, at least not in the Southeast, and probably not in other  
39 regions across the U.S. or in other parts of the world, although  
40 that would be great. Does that answer your question?  
41

42 **DR. MARVASTI:** Yes. Yes, it does. Thank you.  
43

44 **DR. SAUL:** Sure.  
45

46 **CHAIRMAN NANCE:** Thank you. Tom, please.  
47

48 **DR. FRAZER:** Thanks, Steve, for the talk. Can we go to Slide 38?

1 I am interested in these Kobe plots, particularly the red snapper  
2 one, right, and so, I mean, essentially, that's based on  
3 information that was available for SEDAR 52, right?

4  
5 **DR. SAUL:** Right.

6  
7 **DR. FRAZER:** So, when I look at these data, I go, okay, well, we're  
8 overfished, and, I mean, the implication is that it's overfished  
9 and undergoing overfishing, and so can you help me just interpret  
10 this? I mean, does that mean we've got it really wrong?

11  
12 **DR. SAUL:** No. Again, remember that this is from -- Number one,  
13 this is from a simulation model, and, hence, the zillion times the  
14 sort of caveat, hard caveat, that I keep there. Number two,  
15 remember that this is from a simulation model of the West Florida  
16 Shelf, which represents a very small amount, a very small fraction,  
17 of the red snapper population, right, and so it's really not --  
18 Again, this exercise was exclusively to demonstrate how fisher  
19 behavior can sort of enter into stock assessments. This has no -  
20 - Do not -- It's very tempting, but do not, do not, do not take  
21 this and compare it with the SEDAR Kobe plots. Like don't do it,  
22 and it's like -- It's dangerous. Don't do it.

23  
24 **DR. FRAZER:** That's why I was asking.

25  
26 **DR. SAUL:** I can't emphasize that enough. Don't do it, period,  
27 full stop. It's not -- It's not comparable, because, like I said,  
28 you know, I'm probably representing 5 percent, and that's the  
29 Panhandle, and that's about it, where red snapper hang out in the  
30 West Florida Shelf model, and so I think, if I repeated this  
31 exercise with the full Gulf model, you would get something that is  
32 probably closer to what the stock assessment is saying, with the  
33 same caveats that it's a simulation model, but I think it would be  
34 closer.

35  
36 **DR. FRAZER:** Great. I appreciate that, and so both the way that  
37 these points on the plot are aligned, right, and, essentially,  
38 what that's saying is that it's sensitive to the fishing itself,  
39 right, and that's the, I guess, the important part of your work  
40 there. Okay. Thank you.

41  
42 **DR. SAUL:** Exactly, yes. Perfect.

43  
44 **CHAIRMAN NANCE:** Ryan, please.

45  
46 **MR. RINDONE:** It was just kind of to what Tom was saying, is that  
47 there seemed to be a lot more of a linear relationship in the  
48 difference between the different setups for red snapper compared

1 to the other three species, and so there was a strong influence of  
2 fishing mortality, especially for red snapper, but it seemed that,  
3 you know, perhaps for some of the other species, that some of the  
4 extra variables were having more of an influence on biomass, also,  
5 as opposed to just the behavior of the fishers. Is that correct?  
6

7 **DR. SAUL:** Yes. Yes, exactly, Ryan, and, like I said, for red  
8 snapper, I included it in here, because it's red snapper, and I  
9 already -- Even when I started this work, as a PhD student, I had  
10 this vision of building it out as I have started to, and am  
11 discussing with all of you, and these things take a while to  
12 conceptualize, build-out, test, validate, and make sure that, you  
13 know, that the dynamics are working properly.  
14

15 I personally take a while, because I don't want things to be wrong,  
16 right, because things -- There are broad implications for some of  
17 the conclusions that I'm mentioning here, and so I -- That's the  
18 same way that I perform stock assessments, is I take my time, and  
19 these things matter, and they affect people's livelihoods, but, to  
20 your question, you know, red snapper is not the greatest example,  
21 in this context, because, again, like you're representing like  
22 this much of the population, where it's probably only 5 percent,  
23 maybe, and it's like Pensacola and the Panhandle, and that's about  
24 it, and all the rest of it is west of that, pretty much.  
25

26 I mean, yes, there's some on the West Florida Shelf, of course,  
27 but the bulk is not there, and so I think what happens in the  
28 simulation is that, because there was not much there, yet the  
29 population dynamics going into the model -- They were from the  
30 east, and, if you remember, we used to have the eastern and western  
31 half, and so I did take the eastern half dynamics as input to this  
32 model, but that eastern half was extended all the way to the  
33 Mississippi River and not truncated at the end of Florida, and so,  
34 when you do that, and you only have --  
35

36 You're only representing a small part of the population, that's  
37 going to easily be fished down, and I think that's what happened  
38 in the simulation, is that it was essentially an easy target, pun  
39 intended, to be hammered down in the simulation, because there was  
40 not a lot of it, yet the recruitment relationship was based on a  
41 higher, you know, density of fish and a larger spatial area, and  
42 so there's a bit of a mismatch there, and so don't panic.  
43

44 **CHAIRMAN NANCE:** Thank you very much. We'll do ahead and take a  
45 break now, and we'll come back at 10:55.  
46

47 (Whereupon, a brief recess was taken.)  
48

1 **CHAIRMAN NANCE:** Okay. We're going to go ahead and start gathering  
2 back. We have moved the agenda around a little bit, to try to  
3 facilitate some discussion, and we're going to move up to Item  
4 Number XIV, which is Dr. Dave Chagaris and Evaluating Bottom  
5 Fishing Seasonal Closures in the Recreational Fishery, and we'll  
6 have that discussion before lunch.

7  
8 Then we'll break for lunch, and then we're going to -- After lunch,  
9 we will then have Dr. Bill Harford, who is here, and we'll have  
10 that discussion, and then, after that discussion, we'll go on to  
11 Item Number XV, which is -- No. Excuse me. It will be Item Number  
12 XIV, which is scamp. I think that will allow for us to have this  
13 discussion with Dr. Chagaris before lunch, go on to our discussion  
14 with Dr. Harford on, basically, maximum sustainable yield proxies,  
15 which is going to -- We'll have a good discussion on that, and  
16 then we'll go into our scamp discussion. Dave, we'll go ahead and  
17 turn the time over to you. Let's go ahead and have the scope of  
18 work, please, Ryan.

19  
20 **DISCUSSION: EVALUATING BOTTOM FISHING CLOSURES IN THE**  
21 **RECREATIONAL FISHERY**  
22

23 **MR. RINDONE:** Dave had a much shorter trip than Steve Saul did,  
24 and he's going to present on modeling temporal closures in a  
25 multispecies recreational fishery and the tradeoffs revealed  
26 associated with species seasonality and angler effort dynamics,  
27 and so seasonal closures are commonly used to reduce fishing  
28 mortality, especially in the Gulf, but may be less effective when  
29 effort is merely displaced to the open season on multispecies  
30 fisheries that continue to allow discarding, while other species  
31 are being targeted, and so Dave's team evaluated the utility of a  
32 complete bottom fishing closure, in addition to already mandated  
33 harvest closures, that would temporally prohibit recreational reef  
34 fish fishing as a means to control effort, reduce dead discards,  
35 and improve stock status for the species that are examined.

36  
37 The effect of closing any given month varied across species and  
38 resulted in tradeoffs, such as that some closures may result in  
39 positive effects on biomass of one species, but negative effects  
40 on others, and these might shift, these tradeoffs, when associated  
41 with seasonal availability patterns and the degree to which anglers  
42 might shift their effort to the open season.

43  
44 Closure scenarios that were most likely to reduce dead discards,  
45 without negatively impacting harvest, spawning biomass, or total  
46 effort occurred in the late winter and early spring, like March  
47 and April, and evaluating the seasonal fishery closures, gains in  
48 biomass, and reductions in dead discards have to be weighed against

1 the socioeconomic tradeoffs, or social and economic tradeoffs, and  
2 excuse me, since we are changing our vernacular there, in terms of  
3 lost effort-generated revenue at various spatial and temporal  
4 scales and angler dissatisfaction, and so you guys should ask Dave  
5 as many questions as you can imagine.

6  
7 **CHAIRMAN NANCE:** Thank you. Dr. Chagaris, go ahead, please.

8  
9 **DR. CHAGARIS:** All right. Well, thanks for allowing me to present  
10 this work. I've actually -- We have published this paper, and I  
11 will present it, and this is the first time that I've actually  
12 presented this study, but this was something that me and Mike  
13 worked on, along with Ed Camp, who is also at the University of  
14 Florida, and the idea behind this study, I think, came about  
15 probably sometime around, you know, 2014 or 2015, and I think was,  
16 you know, something that had been maybe put on the table, and so  
17 I'm not really presenting this to try to resurrect this specific  
18 policy option, but, instead, I want to, you know, just highlight  
19 the tradeoffs that, you know, we may not be thinking about, and so  
20 that's really the purpose of presenting this now, and I think it  
21 actually follows Steve's work pretty well.

22  
23 Again, a little bit more background and motivation, and all this  
24 work was done over two to three years, from 2016 to 2018, and it  
25 was commissioned by, and funded by, the Pew Charitable Trusts, as  
26 part of their U.S. Oceans Southeast Gulf Campaign, and the main  
27 goal of the study was to examine whether a bottom reef fish season  
28 for the private recreational sector would result in conservation  
29 gains and expanded fishing opportunities.

30  
31 As you all know, over time, the recreational harvest seasons have  
32 generally become shorter, and so the figure on the left shows the  
33 number of days that the season is open for six reef fish in the  
34 Gulf of Mexico, through 2016, and, as of 2016, there was little  
35 overlap among the reef fish open seasons, and so there was always  
36 something open, which is allowing the discarding to continue, and  
37 so we were really trying to figure out how can we better control,  
38 or consolidate, recreational fishing effort to reduce discards and  
39 increase allowable harvest.

40  
41 Just some terminology here, so that we're all on the same page,  
42 and a harvest closure is -- When I mention a harvest closure, that  
43 means it's illegal to possess a species during the closed season,  
44 but it doesn't necessarily limit effort, whereas a fishing closure  
45 is going to be prohibiting the use of all, or some, gear types  
46 during that closed season, and so what we're talking about, in  
47 this analysis, is mainly the bottom fishing closure, which would  
48 prohibit recreational hook-and-line on the seafloor in reef

1 habitats.

2  
3 There's a couple of pretty important considerations, and the first  
4 consideration, when evaluating these types of policies, is going  
5 to be the angler effort response, and there's -- The model, the  
6 way that we run this, is sort of long-term, twenty-year  
7 projections, and so there's two types of effort responses that we  
8 deal with in this approach, and the first is the short-term  
9 response, and so what happens within a year when you shut down a  
10 month, or several months, to fishing, and so will anglers just go  
11 fishing at different times of the year, and that would be the  
12 effort displacement, or would they target a different suite of  
13 species, and so would they stop bottom fishing and go pelagic  
14 fishing, or fish inshore, and so that's more of a species shifting,  
15 and so they're technically leaving the recreational reef fish  
16 fishery to target other species in other habitat.

17  
18 Would they just choose to take fewer trips, and so maybe they can't  
19 take all those trips that would have happened in the closed month,  
20 and maybe they don't have the capacity to take all of those trips,  
21 or they might take fewer during the open season, or would they  
22 just continue to fish anyway, in which case they would just be  
23 non-compliant?

24  
25 We addressed really the top -- The first three of those, where the  
26 effort displacement we address explicitly, and the species  
27 shifting, effort loss, and non-compliance are addressed kind of  
28 implicitly, with this lambda parameter that I will describe, and  
29 so that's the short-term response, what happens within a year when  
30 you close down fishing for a month, or two, or three.

31  
32 The long-term response then is how does effort change over time,  
33 as stocks become more or less abundant, and so this allows for  
34 effort to creep up, if you're rebuilding stocks, and so, if there's  
35 more vulnerable fish in the population, catch rates are higher,  
36 and word may get out, and anglers may -- More people may enter the  
37 fishery if fishing is good, versus if fishing is bad, and they may  
38 leave the fishery.

39  
40 That's a common assumption that is often made for recreational-  
41 effort-dynamic-type models, but it's probably not an assumption  
42 that would hold true in the real world, because recreational  
43 anglers are motivated to fish for a number of reasons, and they  
44 just want to get out of the house, and maybe it's not catch rate,  
45 and they just want a nice day on the water, and so there's a lot  
46 of attributes that might drive fishing effort besides stock size,  
47 and so that's an assumption that is in this model, but it is one  
48 that probably needs to be validated.

1  
2 The second big consideration with this are the seasonal patterns,  
3 and so the timing matters here, where you place the closure,  
4 because, as most of you know, some species may be more or less  
5 available, or easier to catch, or target, during certain months,  
6 and so, during the fall and early winter, gag move inshore, and  
7 they're easier to catch, and certain species may form spawning  
8 aggregations, in different years, and make them easier to target.

9  
10 One of the things that I will highlight, in this talk, is the  
11 contrasting patterns in groupers and snappers, and so you typically  
12 have higher catch rates for red snapper in the spring and summer,  
13 and lower catch rates towards the fall and winter, which is  
14 opposite of the pattern that we see with gag grouper, and so, when  
15 effort displaces, that's where these unintended consequences can  
16 come from. If effort piles into a month where there's a higher  
17 catch rate, you can have disproportionate impacts on different  
18 species.

19  
20 Then the other important aspect of the seasonal patterns is the  
21 effect on fishing effort and how that might impact the local  
22 communities that rely on that revenue, and so, for example, effort  
23 is always highest in Waves 3 and 4, and, on the right here, I have  
24 just some plots of estimated trips from the MRIP program, by state,  
25 and this is through 2015, and so I have all trips, and I have  
26 targeted reef fish trips, and then I have targeted species-specific  
27 trips.

28  
29 Most of the effort is occurring in the summer, as we know, and so  
30 a winter closure might be ineffective, because there's not a lot  
31 of effort that's going out anyhow, whereas a summer closure could  
32 have these broad, you know, socioeconomic consequences on fishing  
33 communities.

34  
35 All right, and so we built a model to try to address this question,  
36 and so the model that we built here is a multispecies age-  
37 structured projection model, and the species in this model are  
38 linked together through a common effort dynamic model, and I will  
39 go into a little bit more detail. We have six species in this  
40 model, and these are the primary reef fish that are targeted by  
41 anglers in the Gulf of Mexico, including gag, red snapper, red  
42 grouper, greater amberjack, gray triggerfish, and vermilion  
43 snapper.

44  
45 We inherited all the parameters, as far as biological, the stock-  
46 recruit parameters, and selectivity functions, from the SEDAR  
47 stock assessments themselves, and this allows us to implement  
48 closures of one or more months within a year, and then we can

1 estimate changes in population size, harvest, discards, and  
2 fishing effort.

3  
4 A couple of important limitations about the model and how we can  
5 address this, and, first of all, we're only modeling closures that  
6 are in addition to the existing species-specific harvest closures  
7 that were in effect from the period of 2012 to 2015, and this is  
8 because we rely on the catch rate data to adjust the fishing  
9 mortality within a year, and we don't have catch rate data for  
10 what would be an all-open scenario. We would have to go too far  
11 back in time, at which point it's no longer really representative  
12 of what were the current conditions at the time of the study, which  
13 was what we were trying to stay fixed on.

14  
15 Then the other, I guess, limitation is the single-species harvest  
16 seasons were fixed, based off of what was in place during that  
17 time period, and so what I mean by that is, if we put a seasonal  
18 closure during say the open season for red snapper, the model did  
19 not decide, okay, then we'll open another month for red snapper,  
20 and so that would require this sort of adaptive management  
21 decision-making process to be included in the model, which was,  
22 you know, kind of really beyond the scope of what we could do at  
23 the time, and so just keep that in mind, that, if a bottom fishing  
24 season falls in place, at the time that there is the open harvest  
25 season for a particular fishery, there is not another open season  
26 that is then turned on in the simulations, and so you'll see how  
27 that works out, but it's just something that I need to highlight.

28  
29 All right, and so a little bit of how we built the model, and so,  
30 basically, this is a numbers-at-age, projected for twenty years,  
31 using just standard annual age-structured equations, and so the  
32 recruits are predicted as using the Beverton-Holt stock-recruit  
33 function, and then the numbers-at-age, in the following year, are  
34 predicted as the numbers-at-age times  $E$  to the negative- $Z$ , and so  
35 we partitioned that total mortality and the natural mortality,  
36 using the natural mortality-at-age from the stock assessment, and  
37 then we further partitioned the fishing mortality from the  
38 recreational sector into an  $F$  for retained harvest and  $F$  due to  
39 dead discards, and we were able to parse that out from the  
40 selectivity and retention functions from the Stock Synthesis  
41 report files.

42  
43 For all the other fleets, all the commercial fleets and the for-  
44 hire fleets, the fishing mortality was just held constant at the  
45 terminal year of the stock assessment, and so the only part of the  
46 mortality that we're manipulating is the private recreational  
47 fishing mortality, and we parsed that out into discards and  
48 retained catch.

1  
2 We first had to generate a scaling factor, because our fishing  
3 mortality is going to be conditioned on fishing effort, and so we  
4 first got a baseline scalar catchability coefficient, just from  
5 taking the fishing mortality from the stock assessment and dividing  
6 it by the observed trips, which are used in the model, and so we  
7 had this baseline catchability coefficient, and then that  
8 catchability coefficient is modified for each month, based on the  
9 catch rates and discard rates.

10  
11 Then I mentioned that we have an annual population model, and then  
12 we have a monthly effort dynamic model, and, for the effort dynamic  
13 model, we had the long-term and short-term response, and so the  
14 long-term response is how effort will change from year to year,  
15 and that is predicted as a function of fish abundance in the prior  
16 year, and so we evaluated three different shapes of this, and one  
17 would be no response, and so the total number of trips doesn't  
18 change over time, as the biomass of the stocks change, and we also  
19 had a fast response, which is that steeper curve, and so, as you  
20 get a smaller increase in biomass, you would get an increase in  
21 fishing effort, and, also, that effort would drop off as biomass  
22 declined in any scenarios.

23  
24 To simulate a seasonal closure, we just assigned a month, each  
25 month, a status of either open or closed, and then that allows for  
26 the short-term response to be included, which, basically, we don't  
27 know how anglers would respond over the short-term, and so we had  
28 this parameter, and we call it lambda, and that basically  
29 determines what fraction of affected trips during the closed season  
30 are allowed to redistribute to open months, and so lambda is  
31 unknown, and a low value would imply that effort is lost, or  
32 species shifting, whereas a value close to one would be that all  
33 those trips that were affected by that fishing closure -- All those  
34 trips take place at another time of the year, in which case they  
35 are distributed proportionally to the effort in those open months.  
36 We evaluated all these closure scenarios, over different lambda  
37 values, ranging from zero to one, in increments of 0.25.

38  
39 We incorporated species seasonality here, and so we have the  
40 monthly catch, harvest, and discard rates for each of these six  
41 species, and these were based on the 2012 to 2015 MRIP intercept  
42 data, and so we just -- Instead of using -- It's very similar to  
43 how we might standardize an annual catch rate, and we just included  
44 month instead of year, and this is just from the dockside intercept  
45 data and not the -- It's not the phone or the mail-in survey, and  
46 I think, at this time, we still had the Coastal Household Telephone  
47 Survey. I believe this pre-dates the FES numbers.

1 Anyhow, we had the mean scaled monthly harvest and discard rates,  
2 and that's multiplied by those baseline Qs, so that we can get a  
3 monthly Q for each species, and so now we have trips and a monthly  
4 catchability coefficient, and that would get us our fishing  
5 mortality rate, and then we summed those up over months, and we  
6 have an annual fishing mortality rate that goes back into the  
7 annual age-structured model.

8  
9 All right, and so I will jump right to some of the results, and I  
10 will go through and highlight the example of gag and red snapper.  
11 Typically, we would see the spawning stock biomass would increase  
12 when the closures coincided with months that had high catch rates  
13 for that particular species and the lambda was low, which means  
14 that there's not going to be any effort displacement to where there  
15 would be a severe tradeoff, and we also saw that harvest was  
16 reduced, typically reduced, under seasonal closures, but not  
17 always, and that's because of the effort displacement, and so  
18 tradeoffs occurred in pretty much all of these scenarios, and we  
19 looked at scenarios -- We looked at individual monthly closures,  
20 and then we also evaluated these three-month kind of seasonal  
21 closures, and so what you see here is there is sixteen different  
22 scenarios that we ran, a bottom fishing closure for each month as  
23 well as one for -- In three-month periods, and so January through  
24 March, April through June, July through September, and October  
25 through December.

26  
27 The combinations are sort of endless, and so we had to put a box  
28 around what closures we would evaluate, at least for the purpose  
29 of the paper.

30  
31 What I will do here is highlight a particular tradeoff between gag  
32 and red snapper, because they have a pretty strong contrast in  
33 their catch rates, and so what I'm showing here is a spring versus  
34 a fall closure, and so, on the left, we have a closure in April to  
35 June, in those bar plots, and, on the right, we have a closure in  
36 October to December.

37  
38 Each of the bars, the different colors, are different values of  
39 lambda, and so the darker green and the darker red would be a high  
40 lambda, which means that all those trips that were affected by the  
41 bottom fishing closure would occur at another time of the year,  
42 and so what you see is that, with gag grouper, when you shut down  
43 fishing in April or June, and you have a high effort displacement,  
44 those trips then pile into the fall season, where gag are more  
45 accessible and available and catch rates are higher.

46  
47 You also see that -- So that's where you have the negative tradeoff  
48 there on the left, where the green bars are going down, and you

1 see that, also, you get better performance of the bottom fishing  
2 closure on red snapper when you have a lower lambda.

3  
4 On the other hand, if you look at the fall seasonal closure, that  
5 has a big benefit to gag spawning stock biomass, because that's  
6 when the bulk of the harvest occurs, and the catch rates are the  
7 highest, but it could also have a negative effect on red snapper  
8 if effort displacement is high, and so you see there's that small  
9 negative biomass on red snapper in that scenario.

10  
11 This is the same scenario, but looking at harvest, and so harvest  
12 actually increases for gag grouper when -- Under a spring closure,  
13 again, because effort piles into other months with higher catch  
14 rates, but it's drastically -- It's having a big effect on harvest  
15 for red snapper, and this is the point where -- Because we put a  
16 fishing closure in the time period when the harvest season is open,  
17 and so, in reality, you would adjust that harvest season to allow,  
18 you know, for some fishing to occur for red snapper, and so you  
19 see big declines in harvest for red snapper, under that spring  
20 closure, because that's when all the harvest takes place.

21  
22 When you close the fall closure, again, it's kind of the same story  
23 with gag grouper. You're shutting down the fishery at a time when  
24 catch rates are highest for gag grouper. If that effort displaces  
25 to other months, it could result in an increase in catch for red  
26 snapper.

27  
28 Then we could also look at -- Like we looked at harvest, we could  
29 also look at dead discards, and so, for example, when we --  
30 Discards mostly were reduced in both of these scenarios, except  
31 when effort displacement was high, and, again, it's that same  
32 tradeoff. Effort from April and June is piling into other months,  
33 when discard rates are a little bit higher, and the same could be  
34 said for the fall closure on red snapper.

35  
36 That's how these tradeoffs are working, and I'm just trying to  
37 highlight that, where you have these species with contrasting catch  
38 rate patterns, and whether or not effort moves to those months  
39 with higher catch rates, you can have these tradeoffs.

40  
41 If we look at this sort of combined over all species, and all  
42 scenarios, trying to identify what would be, you know, a good time  
43 -- Not a good time of the year, but what might be a feasible time  
44 period, within a year, that would reduce discards and improve what  
45 I'm calling harvest efficiency here, and harvest efficiency is the  
46 proportion of harvested fish to discarded fish, and so you want a  
47 higher harvest efficiency in the fishery.

1 You can see that harvest efficiency is improved most during that  
2 -- It looks like March and April period, and that's prior to sort  
3 of the red snapper season being open, and there's more -- The  
4 discarding rates are higher during that time period, and so the  
5 results suggest that that would be one particular period when you  
6 might be able to reduce dead discards and improve the harvest  
7 efficiency.

8  
9 The net increase in total abundance allowed effort to increase,  
10 depending on that long-term response parameter, and so, over the  
11 long term, the model estimated this did create more fishing  
12 opportunities over time, and so we're actually -- Some of the  
13 closures resulted in improved biomass, and that allowed for more  
14 fishing to enter -- More effort to enter the fishery, and so  
15 creating additional opportunities, but, if that effort response  
16 was really fast, then any gains in the spawning stock biomass would  
17 basically be, you know, exhausted by that fast response, and so  
18 you get a little bit of increase in spawning stock biomass, and it  
19 immediately attracts a lot of effort, and then it fishes it back  
20 down, and so that's kind of highlighting those long -- The fast  
21 versus slow long-term effort response.

22  
23 Just to kind of summarize what we've done, and think about, you  
24 know, what might be some overall conclusions, and maybe some  
25 recommendations, if this were to, you know -- If this type of  
26 analysis were to move forward.

27  
28 The first thing, obviously, is that the results are all very  
29 sensitive to the assumptions about the angler response, and, you  
30 know, primarily that lambda value, and how does effort redistribute  
31 within a year, and what species are going to be targeted when that  
32 effort goes to a different month.

33  
34 We don't understand what that lambda is, and so some choice  
35 experiments could be used to try to understand that decision-  
36 making process, and then that could actually be factored into this  
37 simulation approach. As I mentioned before, the timing of any  
38 scenario is likely to have disproportionate impacts across all  
39 species, and so you cannot expect that a closure during one time  
40 of the year is going to globally benefit all the species, and it  
41 could be exacerbated by effort displacement.

42  
43 It's really important to weigh the gains in biomass and reductions  
44 in discards against what might be potentially broad and intense  
45 social and economic tradeoffs, and it would be very prudent to  
46 conduct regional economic impact analyses around these types of  
47 policies and, also, generate some stakeholder buy-in, because it's  
48 likely that anglers could be very dissatisfied with many of these

1 particular options.

2  
3 We were asked to, you know, try to find when might be reasonable  
4 times for a bottom fishing closure, and I think, if you were to  
5 look anywhere, I would look first at that late winter and early  
6 spring period, and possibly a late summer and early fall period,  
7 and that -- Both of those time periods showed some potential to  
8 reduce dead discards, while minimizing those tradeoffs in harvest,  
9 spawning stock biomass, and the effort that might be lost.

10  
11 I think this model really just highlights those tradeoffs. I  
12 think, for it to be more, you know, tactical, or used operationally  
13 with management, we would have to be able to kind of evaluate these  
14 bottom fishing closures along with where would the single-species  
15 harvest seasons be, and those combinations are sort of endless,  
16 and so I think that would really have to be something that would  
17 be done with like management input, you know, to help define what  
18 those scenarios might be.

19  
20 We also have -- The landscape of recreational data has changed  
21 drastically since this study was done, and so we would, you know,  
22 need to update, you know, the data streams and try some way to  
23 blend all these different state data, and it's challenging now,  
24 because not all states have information on discards, and so we  
25 would have to, you know, take a really careful look at what could  
26 be done there.

27  
28 That's all I have, and I'm happy to take any questions, and thanks  
29 to Pew, that funded this study, as well as folks at the Science  
30 Center and FWC that provided some of the SEDAR report files and  
31 data. Thank you.

32  
33 **CHAIRMAN NANCE:** Thank you for that presentation. It was  
34 excellent. Questions? Trevor, please.

35  
36 **MR. MONCRIEF:** Dave, great presentation, and I think, you know,  
37 thinking through this kind of stuff, as a whole, and kind of  
38 wrapping our heads around, you know, potential distributions of  
39 seasons, with overlaps or not overlaps, as we continue to constrain  
40 various species' seasons more and more, I think this is an  
41 appropriate conversation to have, and I applaud you all's work.

42  
43 I have one question, and then I just wanted to have just a couple  
44 of things for input, and so the first one is, since you used the  
45 overall landings in everything else, is it fair to say that, since  
46 Florida has the largest proportion of landings in two of those  
47 species, they pretty much primarily occur in Florida, and the  
48 trends that you observe are kind of driven by that state, which

1 is, you know, completely fair, because they make up a large  
2 proportion of the fishery as a whole, and is that fair to say?

3  
4 **DR. CHAGARIS:** Yes, and, I mean, there's definitely -- You know,  
5 gag and red grouper are pretty much an eastern Gulf of Mexico  
6 species, yes, and most of the effort -- In fact, it's really red  
7 snapper, and I think greater amberjack, that had substantial  
8 landings outside the eastern Gulf, and so, yes, those -- Some of  
9 those species are primarily driven by fishing out of Florida.

10  
11 **MR. MONCRIEF:** I was thinking like -- So, if we look at it across  
12 the landscape, as a federal species, if we just go by red snapper  
13 and greater amberjack, you know, there's, obviously, a lot of  
14 variables at play, and, you know, there's weather patterns that  
15 basically keep our fleet, and Louisiana's fleet, and a fair amount  
16 of Alabama's, off the water during the time that you're suggesting  
17 the closures might be the most beneficial, right, and so we already  
18 have that depressed level of effort across-the-board that happens  
19 during that time. I think, you know, and I'm right there with  
20 you, as far as the designation of that time period, based on you  
21 all's analysis.

22  
23 The other part -- I mean, as this work -- You know, this work  
24 continues, or goes down, I just wanted to provide some insight on,  
25 you know, kind of our observations, not only within our fleet, but  
26 the fleets around us, and there seems to be a few key variables at  
27 play that really help describe or, you know, determine what happens  
28 within a fishery.

29  
30 The first one is kind of hard to look at, right, and so, if you're  
31 trying to forecast what's going to happen in the future, the first  
32 one is that, when you make regulatory changes, or you shift  
33 seasons, or you make a bag limit change or something else to the  
34 fishery, you create what I perceive, or what I kind of try to  
35 describe, as almost like an artificial derby, where folks stack up  
36 on the first month, the first two months, of that season, or no.  
37 Sorry. The first two weeks of that season, to really get out  
38 there, and that's what you see across all fisheries.

39  
40 That's kind of hard to predict, and you assume that, as consistency  
41 continues within that species, or that fishery, that that effect  
42 would gradually go down, and it's just impossible to predict a  
43 model, like what you kind of talked about.

44  
45 The other one is that the other variable is gas prices, right, and  
46 I think we all kind of have a good, clear understanding of that,  
47 especially what we've observed this past year, with an increase in  
48 gas prices and how it affects the fleet and everything else, and

1 then the last one that I wanted to point to, and I think this is  
2 uniform across-the-board, but it's not one that is really discussed  
3 a lot, is, during the fall, what happens, a lot of times, and what  
4 we hear from our guys, and what we've heard across-the-board, is  
5 the timing of schools coming back into session, and kids going  
6 back to school, has a very large impact on how anglers behave and  
7 their opportunities to go out.

8  
9 That's coupled with things like football season and hunting season  
10 and everything else, but it's not one that we really discuss from  
11 the social side, from what I've heard, but it would be interesting  
12 that like, as we move down this route, and we start looking more  
13 at, you know, potential optimization of seasons and everything  
14 else, you know, to start to look into some of these variables at  
15 play, and I'm not saying that you should do it, or anything else,  
16 and I think you've done a great amount of work, but, just as a  
17 group, you know, just start thinking about these variables that  
18 are kind of hidden, that we don't think about.

19  
20 Like we look at the direct economics and stuff like that, but the  
21 social aspects of it -- You know, some of these things are kind of  
22 overlooked, but they have a pretty profound impact on motivation,  
23 and so that's my rant. Great work, and great presentation, and I  
24 think everything was wonderful.

25  
26 **CHAIRMAN NANCE:** Thank you, Trevor. Ryan.

27  
28 **MR. RINDONE:** I will yield to Tom.

29  
30 **CHAIRMAN NANCE:** Okay.

31  
32 **DR. FRAZER:** So a couple of quick questions. You know, so, when  
33 you project these out, I mean, the first one is you just assume  
34 that the angler population is constant, and, I mean, you're  
35 capturing the fishery dynamics, but are you capturing the  
36 demographic, right, or the dynamics of the angler population  
37 itself, and is there a projection of what four-million anglers,  
38 for example, in the Gulf of Mexico is going to look like twenty  
39 years from now, and is it going to be six-million, and so I just  
40 wondered if you ever thought about accounting for that in the  
41 model.

42  
43 The other thing I was interested in is do you need a complete  
44 seasonal closure to affect effort displacement, you know, or is  
45 there any work done on, you know, how effective are reduced bag  
46 limits, and kind of how low can you go to achieve that same effect?

47  
48 **DR. CHAGARIS:** So, towards your first question, the model does

1 allow for the total number of trips to increase, you know, assuming  
2 that could be more anglers or the same anglers taking more trips,  
3 and it doesn't really matter, and it's all about the unit of trip.  
4 That's a function of the vulnerable biomass in the system, and  
5 that could be replaced with, you know, a fuel price time series,  
6 or just some assumptions about future population growth, and so  
7 that could be easily changed in the model.

8  
9 The other question about bag limits and size limits -- We had early  
10 discussions about, you know, trying to layer that into this  
11 approach, but we just weren't able to do it across all species and  
12 all seasons, and we could have done a size limit, because we had  
13 those retention functions in there, but it would have been harder  
14 for us to do the bag limit, in combination with the size limit,  
15 and, also, we decided to keep those regulations the same, because  
16 we just wanted to isolate the effect of the seasonal closure for  
17 this particular study.

18  
19 **CHAIRMAN NANCE:** Ryan, please.

20  
21 **MR. RINDONE:** It's kind of piling onto what Tom's second question  
22 was, and I'm just scribbling this down, and maybe the idea of not  
23 necessarily considering things as a closed season, but maybe a  
24 constrained season, with one of the intentions being to reduce  
25 discards, and regulatory discards, especially like thinking about  
26 some conversations that we had with Steve yesterday at lunch, and  
27 talking about some of the temporal differences in the way in which  
28 gag are targeted, depending on the time of year, like deeper water  
29 and looking for cooler water in the summertime and shallower,  
30 cooler water going into the fall, and how that relationship ties  
31 into things like barotrauma and stress on release, especially in  
32 warmer surface waters and things like that.

33  
34 If we were talking about like, instead of calling it a constraint,  
35 or a closed season and calling it a constrained season, maybe, in  
36 this, and this doesn't have to be this, but it's just for  
37 discussion, and like a one-fish-per-vessel limit during a closed  
38 season, with the intention of, you know, the idea being that it  
39 wouldn't be enough to drive someone necessarily to go out and  
40 target that species, but, if they ended up interacting with it,  
41 then maybe they don't have to discard it, as long as -- You know,  
42 whatever that limit is, as long as they're at or under that limit,  
43 and then, during whatever the open season is, then it would be  
44 some more liberal amount than that, you know, one-plus-fish-per-  
45 person, or whatever is considered appropriate, given the biomass  
46 and the effort.

47  
48 Is that something that could be factored in, and, if it's not

1 something that could be factored in right now, like how would you  
2 envision that having an effect?

3  
4 **DR. CHAGARIS:** I mean, we -- It probably wouldn't be too difficult  
5 to do things like have, you know, variable discard mortality rates  
6 in different seasons and things like that, you know, because  
7 they're shallower, or something like that, and so that, I think,  
8 we could do.

9  
10 I think it gets difficult to -- Well, I think what would happen,  
11 in these sort of constrained seasons, is that you would still have  
12 a lot of discarding going on, and so that might negate, you know,  
13 the overall goal of reducing dead discards, and then we have to  
14 think about anglers high-grading their catch, you know, to keep  
15 that one fish, and there's just a lot that we don't know about how  
16 anglers would behave under that scenario, and so we could probably  
17 do something like that in the simulation framework, but would the  
18 assumptions be, you know, so far that -- Would the assumptions  
19 have to be made to the point that it's just not informative, you  
20 know, to where we just don't have enough information?

21  
22 I don't -- I can't say exactly, you know, whether or not we could  
23 evaluate that closure with any type of certainty just yet, and a  
24 lot of it is because we don't have catch rate data, and we don't  
25 -- Catch rate data for those types of scenarios, and, also, our  
26 lack of understanding of how anglers would respond, but there would  
27 be a lot of uncertainty around it, I think.

28  
29 **CHAIRMAN NANCE:** John.

30  
31 **DR. JOHN FROESCHKE:** Thanks. I have two questions and a comment,  
32 I guess. The question, and maybe I should have looked at the  
33 paper, but, when you say a closure, do you mean complete  
34 prohibition, or people would still be out there participating in  
35 catch-and-release fishing?

36  
37 **DR. CHAGARIS:** A complete prohibition.

38  
39 **DR. FROESCHKE:** Okay, and then so I guess the comment on -- That's  
40 what I thought, and the way I would see that working is, in year-  
41 one, you would have all this displacement, and, at least in  
42 Florida, every grunt would be picked off within nine miles of the  
43 coast in the first three years, and then you would have a big  
44 problem, because it doesn't seem like -- I don't know how you would  
45 model all those state-managed species and how that -- That seems,  
46 to me, where the displacement would go.

47  
48 Then the question is, in the years that you looked at the red

1 snapper, was that in the years with which we had the really short  
2 seasons, and which we really had the tightest regulations on red  
3 snapper, and would that -- How would that be different, a little  
4 more, with what we're doing now?

5  
6 **DR. CHAGARIS:** Yes, and, I mean, I think that you would probably  
7 see like what I showed with the spring closure, and you probably  
8 wouldn't see as drastic of an effect on red snapper, because there  
9 is -- At that time period, there was a very constrained harvest  
10 season, and so, when you plot the spring closure into the system,  
11 it had a very big effect on red snapper harvest, and so, if the  
12 season was extended, or there is more opportunities fishing in  
13 state waters, then you -- You know, they would still be able to  
14 harvest red snapper in other times of the year.

15  
16 **DR. FROESCHKE:** Could you consider a complete bottom closure to  
17 include state waters in this, because I guess that displacement  
18 thing seems like it would be a real deal.

19  
20 **DR. CHAGARIS:** So these data include state-water landings. I mean,  
21 it's all areas from the MRIP data, and so it does include state  
22 waters, but, if you're thinking about them shifting to other  
23 species complexes in state waters, nearshore species, then, yes,  
24 we would have to add more species in there and have that effort,  
25 you know, distribute, so that, when you shut down offshore reef  
26 fish fishing, then effort would increase in the nearshore  
27 fisheries.

28  
29 **DR. FROESCHKE:** Yes, and last follow-up, because I guess what I  
30 was thinking is those nearshore people would still be targeting  
31 porgies and grunts and things like that, but what you're saying is  
32 that would be --

33  
34 **DR. CHAGARIS:** Right, and so that would still be reef fish fishing  
35 that would be prohibited under these bottom closures. I was  
36 thinking that you were referring to like inshore snook and seatrout  
37 and red drum fishing.

38  
39 **DR. FROESCHKE:** No, and I was thinking that, if you closed federal  
40 waters, that they would just push in and catch the shallower,  
41 smaller species and all of that effort that was kind of spread  
42 from over the entire shelf would then be right in the coast, and  
43 then you would have just sort of a problem.

44  
45 **DR. CHAGARIS:** Okay, and I see what you're asking now, and so this  
46 was closing all state and federal waters. We would have to then  
47 partition F further into F retained and discarded in state and  
48 federal waters, which I don't think we can do. I mean, we would

1 come up with some, you know, ratio approach, with landings, but at  
2 least we have that information, and we could partition it to  
3 discards and landings from the stock assessment, but not by state  
4 waters and federal.

5  
6 **CHAIRMAN NANCE:** Jim, please.

7  
8 **DR. TOLAN:** Thank you, Mr. Chairman, and thanks, David. That's a  
9 really nice presentation, and I just wanted to echo something that  
10 Trevor brought up, because we have red snapper fishing year-round  
11 in Texas, and, when fall hits, dove season and deer season, our  
12 effort falls off the map, and that's what they do. Somebody was  
13 saying about hunting season or whatnot in Mississippi, and that  
14 certain carries over to us.

15  
16 When I read the presentation, the term "bottom fishing closure"  
17 just struck me, and it was like, wow, and the question I had about  
18 it has been answered, but it reminds me of something that Dr. Saul  
19 brought up in his presentation, that fishermen can be quite  
20 creative, and so I can't drag my bait across the bottom, but I  
21 will still go out fishing, and so it's got to be a complete harvest  
22 closure, I think, but thank you so much for the presentation.

23  
24 **CHAIRMAN NANCE:** Mandy, please.

25  
26 **DR. KARNAUSKAS:** Thanks, Dave. That's really great work, and I'm  
27 glad to see this, and I'm glad that we're having these  
28 conversations, because I think we need to start looking at some of  
29 these types of alternative management, to be able to deal with the  
30 discard issues that we have.

31  
32 I have two questions, and my first question is what is the spatial  
33 resolution of the model? Would you be able to tie it to some sort  
34 of regional economic impact model, where you look at, you know,  
35 specifically what ports, or what areas, would be advantaged or  
36 disadvantaged by various closures, and then I have another question  
37 after that.

38  
39 **DR. CHAGARIS:** The spatial resolution was the entire Gulf of Mexico  
40 for the model, but I think you could do the impact -- The economic  
41 impact analysis would be external, and you would just have to go  
42 to your specific regions and understand the fishing effort, you  
43 know, out of that particular location, external to any of the  
44 simulation modeling.

45  
46 **DR. KARNAUSKAS:** All right. Thanks. Then my next question is I  
47 don't know if you, or anyone else, has tried to model not closed  
48 areas, but open areas, and so like what would happen if you left

1 everything open all year, but you had specific areas where you had  
2 to fish in certain parts of the year, and you would then be able  
3 to know exactly where the effort is displaced, because it's only  
4 the open areas that are open at certain areas of the year, and I  
5 wonder if that would, to some extent, moderate like the derby-  
6 fishery-type issue that we have, where the effort would be sort of  
7 moderated, because, presumably, in these open areas, the fishing  
8 experience would decline, because it would be very quickly  
9 depleted, and the effort would sort of self-regulate over time,  
10 and I'm curious if anyone has looked into that.

11  
12 **DR. CHAGARIS:** I mean, I know I've done some exploration with some  
13 of the ecosystem modeling, at least for the West Florida Shelf,  
14 looking at marine protected areas, and I remember Call  
15 demonstrating some like rotating spatial closures, a long time  
16 ago, and, again, it kind of -- You know, people are supportive of  
17 -- What I remember from that work was that, you know, people might  
18 be supportive of a spatial closure, as long as it's not in their  
19 backyard, and so the rotating -- You know, the rotating closures  
20 was meant to sort of alleviate that.

21  
22 I don't recall like what sort of the biomass response was under  
23 that, and I believe that it tended to kind of balance out the  
24 tradeoffs, from what he showed, but, no, and, I mean, that's  
25 definitely an option to consider, but it's not something we can do  
26 with this particular model, without adding spatial resolution to  
27 it.

28  
29 **CHAIRMAN NANCE:** Thank you. Trevor, please.

30  
31 **MR. MONCRIEF:** Just a comment on that last bit of discussion, and  
32 I just kind of think the thing behind the scenes is forecasting  
33 something like a rotating closure and a spatial closure and  
34 assuming that -- Kind of what Dave talked about in the beginning  
35 of the presentation, and, you know, are anglers going to obey that,  
36 because, if you have just specific areas that are open, then you're  
37 going to have to have a law enforcement presence there, to make  
38 sure that they're not going outside of the boundary, and so I think  
39 that one would be kind of a hard one to think about.

40  
41 The other part I was going to bring up was what John was talking  
42 about with, you know, kind of the regional aspect of it, right, a  
43 full bottom closure, the multispecies stuff, the switch to state  
44 species. I mean, a lot of this stuff, if this conversation is  
45 carried further beyond this, and it's truly something to consider,  
46 is the -- I don't think that everyone has a great understanding,  
47 or a good understanding, of basically the different regional  
48 targets, right, and we've got a little bit of it with MRIP and

1 what's getting described at the dock, with primary targets and  
2 everything else, but, you know, Florida is going to have that issue  
3 that John described, where, you know, if you close off federal  
4 waters, they might switch to species within state waters, within  
5 that nine nautical miles, or three nautical miles, and really start  
6 to try to hone-in there.

7  
8 I mean, with Mississippi, we're talking about essentially a single-  
9 species fishery, when it comes to red snapper, I mean, and I think  
10 other states kind of fall in line a little bit with that, where  
11 the dynamics aren't quite the same, and the diversity of targets  
12 aren't the same, and so, as we continue to move down this road,  
13 there's that, you know, regional aspect of it, where we ask the  
14 question, during the Gulf States survey, of, you know, how many  
15 times do anglers -- How many times do our anglers fish outside of  
16 the red snapper season for reef fish, and, for 75 percent, it was  
17 less than two, and so, you know, we're a single-species fishery,  
18 and so a harvest closure of that species would pretty much end  
19 bottom fishing in the area, and a bottom fishing closure might go  
20 further to reduce discards and all that stuff, but it won't --  
21 It's not quite the same dynamic as a Florida approach, and so, if  
22 you go with that blanket federal closure, you kind of -- You know,  
23 there's some regional aspect to it, is all I'm trying to say, and  
24 that should be considered, if we continue moving down with this  
25 conversation.

26  
27 **CHAIRMAN NANCE:** Thank you, Trevor. Jason, please.

28  
29 **MR. ADRIANCE:** Thank you, Mr. Chairman. Thanks, Dave. Good  
30 presentation, and I wanted to echo a little bit of what Trevor and  
31 Jim said as well, about the fall. Once you get to the fall here  
32 in Louisiana, there's other pursuits that start to get in the way  
33 of offshore fishing as well, but then, to go pick at the MRIP a  
34 little bit, if you're looking at seasonal and regional -- I guess,  
35 if you -- If this -- If you were to update this analysis, or look  
36 more at -- Would you have to look into some of the things that  
37 have come out of this MRIP transition, in terms of the low-use  
38 waves, particularly the Wave 5 issues that Trevor has brought up  
39 in the past and things like that? I am just wondering what kind  
40 of consideration might need to be made for that sort of thing.  
41 Thanks.

42  
43 **DR. CHAGARIS:** I think, if we were to update this analysis, we  
44 would have to take an entirely fresh look at, you know, the  
45 recreational data that we're using, just because the data have  
46 changed so much. I think that, as far as low effort in Wave 5, a  
47 lot of that is already implicit in the model, because, where effort  
48 would be distributed proportionally to the effort in the open

1 months, and so, if there's naturally low effort in certain years,  
2 for whatever reason, whether it's hunting season or the kids going  
3 back to school or whatever that may be, that is implicit in the  
4 model.

5  
6 How variable those effort estimates are was not -- It was not  
7 included, and we just took the median estimate from the MRIP data,  
8 as far as the number of trips, and so, you know, there's  
9 uncertainty in that that we did not include in this analysis.

10  
11 **CHAIRMAN NANCE:** Thank you. Jim.

12  
13 **DR. TOLAN:** Just a quick follow-up on what Jason was saying, and,  
14 years ago, just for context, fall used to be one of the biggest  
15 months for winter Texans coming down and taking the headboats out  
16 for red snapper, and, since the 2000s, when the seasons just  
17 drastically changed, that's not really an issue anymore, and so  
18 it's really switched over just to the state waters, year-round,  
19 and then the winter Texan numbers have just fallen off the map,  
20 and so just some context for fall.

21  
22 **CHAIRMAN NANCE:** Thank you, Jim. Katie.

23  
24 **DR. SIEGFRIED:** Thank you, Mr. Chair. I just had a question about  
25 the displaced effort calculations, like if there was a way to look  
26 at the way they, so to speak, diversify their portfolio species  
27 that they target, because all of these species probably aren't  
28 targeted the same way by every fisherman, and so, if you're  
29 distributing the effort proportionally, based on catch rates, each  
30 individual unit that you're distributing might not be the same.  
31 Does that make sense?

32  
33 Like, when I've spoken to fishermen at assessment meetings, where  
34 they're saying, well, we can change what we fish for, based on  
35 area and gear and all these things, they may not choose to displace  
36 it to -- Even if you have a lambda that's high, to all the species  
37 with the catch rates that you have in the model, and would it just  
38 be a matter of displacing it with different catch rates or  
39 something like that?

40  
41 **DR. CHAGARIS:** Yes, and I think I understand your question, and  
42 so, when the effort gets displaced, the species that it's going to  
43 catch the most during that new month is based on the catch rates  
44 in the MRIP data, and so they -- The assumption there is that those  
45 monthly catch rates imply, you know, the targeting behavior for  
46 the fleet in that given month. Does that answer your question?

47  
48 **DR. SIEGFRIED:** Yes, and so it's sort of thinking that all private

1 fishermen are the same.

2  
3 **DR. CHAGARIS:** Yes.

4  
5 **DR. SIEGFRIED:** Okay.

6  
7 **DR. CHAGARIS:** Yes, and we could use an agent-based approach, and  
8 that would allow us to incorporate that individual, you know, kind  
9 of behavior.

10  
11 **DR. SIEGFRIED:** I have to corner Steve, during a break, to ask how  
12 we can estimate discarding based on changing agent behavior during  
13 rebuilding scenarios, but it seems like these two are really nicely  
14 linked. Thanks.

15  
16 **CHAIRMAN NANCE:** Perfect. Dave, thank you for that presentation,  
17 and thanks for the discussion. We'll go ahead and break for lunch,  
18 and we'll come back at 12:50 and resume our discussions. Thank  
19 you.

20  
21 (Whereupon, the meeting recessed for lunch on March 8, 2023.)

22  
23 - - -

24  
25 March 8, 2023

26  
27 WEDNESDAY AFTERNOON SESSION

28  
29 - - -

30  
31 The Meeting of the Gulf of Mexico Fishery Management Council  
32 Standing and Special Reef Fish, Special Socioeconomic, Special  
33 Ecosystem, and Special Shrimp Scientific and Statistical  
34 Committees reconvened on Wednesday, March 8, 2023, and was called  
35 to order by Chairman Jim Nance.

36  
37 **CHAIRMAN NANCE:** We'll go ahead and start, and we're going to do  
38 -- If I can do the Roman numerals correctly here, it's Item Number  
39 XVI, and we have a presentation by Dr. Bill Harford and Discussion  
40 of Decision Points for Evaluating Proxies for Maximum Sustainable  
41 Yield. Ryan, if you'll do the scope of work, and then we'll turn  
42 the time over to Dr. Harford.

43  
44 I think many of you remember that we had a -- I think we had a  
45 virtual meeting in July of 2019, and I think -- I don't think we  
46 were able to meet, but we had you online, on Zoom, or it wasn't  
47 even Zoom, and it was just a webinar, and I appreciate you coming  
48 back and being in-person. Ryan, please.

1  
2 **DISCUSSION OF DECISION POINTS FOR EVALUATING PROXIES FOR MAXIMUM**  
3 **SUSTAINABLE YIELD**  
4

5 **MR. RINDONE:** Thank you, sir, and so Bill is here to present a  
6 primer on selection of appropriate proxies for MSY applicable for  
7 fisheries in the Gulf, and you guys have contended with a lot of  
8 decision-making regarding changes in established MSY proxies  
9 recently, and Bill is here to discuss the kinds of biological and  
10 ecological factors that should be evaluated when estimating MSY,  
11 or designating a proxy, with attention paid to the ultimate goals  
12 for an individual species management.

13  
14 He's also going to review some of the generalized effects of making  
15 decisions more in favor of harvest over a resilient biomass, and  
16 you guys should, again, ask lots of questions and make any  
17 recommendations, as appropriate.

18  
19 **CHAIRMAN NANCE:** Thank you. Go ahead, please.  
20

21 **DR. BILL HARFORD:** Great. Thank you. Thank you, Ryan, and thank  
22 you, Mr. Chairman, and so, as mentioned, my name is Bill Harford,  
23 and I'm with a consultancy called Nature Analytics based in  
24 Toronto, and I'm going to discuss some work that was done while I  
25 was employed at the University of Miami.

26  
27 This work was published in 2019, with my colleagues Skyler Sagarese  
28 and Mandy Karnauskas, and, basically, the bulk of this discussion  
29 is going to highlight some of the findings from the paper, and so  
30 the way that -- The way that I would like to jump into this  
31 discussion is to show something pretty simple, and that is create  
32 a sort of simple representation of a fishery, a rather  
33 oversimplified representation, and I have represented it in three  
34 parts here, with the objective that we are going to talk about how  
35 to delineate MSY-based reference points, and these steps, these  
36 oversimplified steps, are going to lead us through how we thought  
37 about getting there in the paper, and hopefully to highlight some  
38 of the talking points, as we move along.

39  
40 If we start out with this idea that we have a decision to be made,  
41 and that is very simple, and we would like to fish at FMSY, we  
42 need -- To achieve that, we need some inputs, and that's  
43 highlighted under the thing called Needs, and life history,  
44 selectivity, and steepness are just a few of them, and, mainly,  
45 these would come from the stock assessment, in a data-rich  
46 assessment context.

47  
48 The effect, of course, of fishing at that level influences the

1 catches and the stock itself, and hopefully, after repeated  
2 application of that decision, we might achieve, in the long term,  
3 the desired outcome of MSY-level catches and biomass at the MSY,  
4 and so, again, that's the oversimplified system that I think that  
5 we all work with.

6  
7 Really, one of the main points that we're going to talk about is  
8 this problem of steepness, and so, in this example, we need  
9 steepness in order to estimate FMSY, okay, and the plot just shows  
10 some examples of different steepness values and how they affect  
11 the stock-recruitment relationship, and the X-axis just happens to  
12 say biomass over unfished biomass, and it could be any metric of  
13 reproductive health of the stock, and this is just used to  
14 highlight that different steepness values have an effect on the  
15 shape of the stock-recruitment relationship.

16  
17 Of course, we can follow this through and think about how they  
18 affect catches as well, and this is equilibrium catches, and so  
19 they affect the shape of what we call the surplus production curve,  
20 or the equilibrium catch curve, and the surplus production just  
21 means the excess biomass that is produced by the fish stock each  
22 year, and, if you remove just that excess, you stay at equilibrium,  
23 and this is the underlying concept behind MSY, and, ideally, we  
24 would like to fish -- Ideally, we would like to fish at a level  
25 that produces MSY.

26  
27 If we're to achieve that, we still need to know steepness, and so  
28 that's the problem at-hand, because that parameter tends to be  
29 highly uncertain, and what this plot is pointing out is simply  
30 that the shape of the curve, or the point at which the MSY occurs  
31 in relation to the unfished stock size, changes, depending on your  
32 assumed value of steepness, and so those little arrows on the plot  
33 -- They basically say pick any one of those colored lines, and one  
34 of the colored lines represent a species, and, if I create a  
35 simulation, using that species life history, what we end up with  
36 -- I make different assumptions, and the only difference in the  
37 entire simulation is steepness, and we end up with different  
38 reference points. Again, we're still dealing with this challenge  
39 of what do we do about that.

40  
41 All right, and so National Standard 1 Guidelines sort of give an  
42 opportunity to reshape that thinking a little bit, and what is  
43 provided for is an alternative to FMSY, which I have labeled as "F  
44 X percent SPR", or sometimes we know this as F 30 percent SPR, or  
45 F 40 percent SPR, and this is defined as the maximum fishing  
46 mortality threshold defining overfishing, and MFMT is the acronym.

47  
48 Okay, and so we have -- The important point here is we can calculate

1 that reference point without knowing anything about steepness, and  
2 so we can calculate a value of  $F_{30}$  percent SPR, knowing only about  
3 the life history and the selectivity of the stock, and so that's  
4 great, and so, in a way, we've sidestepped the steepness issue,  
5 but not quite, because, again, getting back to my simple example  
6 here, if we sidestep the issue, we start at the top of the diagram,  
7 and we say, look, we're going to make a decision based on some  
8 assumed  $F_X$  percent SPR, and we don't need steepness to get there,  
9 but I think that there's something lacking here, because, when we  
10 get to the bottom of the diagram, what we see is that we have this  
11 question about whether we've achieved our desired outcomes.

12  
13 Those outcomes are sometimes relabeled as the yield at  $F_X$  percent  
14 SPR, in replacement for MSY, or in replacement for BMSY, the  
15 biomass produced at  $F_X$  SPR, but the problem here is we haven't  
16 necessarily changed our fishery management objectives, and we've  
17 just changed some terminology on the slide, and so, again, we  
18 haven't -- We've made a step forward, in terms of working with an  
19 FMSY proxy, but we haven't sorted out whether that proxy will  
20 enable us to achieve our fishery management objectives.

21  
22 I am going to flip the script on this now, and I have relabeled a  
23 bunch of things and highlighted them, and so what if we took a  
24 different approach that says, okay, look, we're going to make an  
25 assumption about the FMSY proxy, and, in this case, I've assumed  
26  $F_{30}$  percent SPR. Great. We can get that without steepness, and  
27 what if we could then run a simulation and ask the question of how  
28 well does that proxy do in achieving our desired outcomes?

29  
30 Okay, and so we can ask how close does the FMSY proxy come to  
31 achieving MSY in the long term, let's say, over repeat application  
32 of that decision. Okay, and so, again, we've advanced the -- We've  
33 advanced the problem, and we haven't quite solved it yet. The  
34 reason for that is because, if you've noticed, in order to do the  
35 simulation, I have to make an assumption about steepness, and so,  
36 again, the outcome of the simulation, in terms of how well that  
37 proxy might perform in achieving our goals, is dependent on the  
38 assumed steepness in the simulation, and so there's something left  
39 to be desired there.

40  
41 Okay, and so, again, we're partway to the solution, or a solution,  
42 but not quite, and so the alternative, and I'm going to stay on  
43 this slide for a little while, and there's a lot to explain here.

44  
45 The solution that is -- Perhaps we could take a probabilistic  
46 approach and define a prior for steepness, and so, in other words,  
47 what we're trying to do is characterize our level of confidence in  
48 the values for steepness, and this is a subjective thing,

1 potentially, and it puts us in this realm of science where, as I  
2 pointed out, our choice of  $F$  proxies is going to affect catches,  
3 and so the decision stakes are high. It affects people's  
4 livelihoods, but uncertainty is high, and I am specifically  
5 speaking about uncertainty in steepness.

6  
7 That is high, and possibly unresolvable, and so this puts us in  
8 this sort of realm of decision-making where we may very well have  
9 multiple viewpoints about steepness, or its uncertainty, or, in  
10 more technical terms, the shape of that steepness distribution on  
11 the lower-right in the plot, and what can we do about it?

12  
13 Instead of making a decision about a point estimate of steepness,  
14 if we are able to characterize our degree of uncertainty in  
15 steepness, we can then produce a simulation where the results of  
16 a given proxy are not conditional on any single value, but,  
17 instead, performance is marginalized across the distribution,  
18 using what is known as probability rules, and so this is the only  
19 method slide that I have in this talk, and so I'm going to stay  
20 here for a few minutes, because there's a few things to point out  
21 here.

22  
23 First, there are four steps. I think this group is probably fairly  
24 familiar with simulation modeling, and we've talked about it all  
25 morning, simulating fish stocks, and so we what we do is we create  
26 a simulated fish stock, and we then make an assumption about  
27 steepness for that stock, in Step 2, and we produce a simulation  
28 that gives us a performance under an assumed  $F$  percent SPR proxy.

29  
30 We repeat that many times, for many values of steepness, and we  
31 then have the results that are conditional on that value, a given  
32 value, of steepness, right, and so then we want to make Steps 3  
33 and 4, which essentially make the results no longer conditional on  
34 a single value, but to reflect our degree of belief, according to  
35 that distribution, and one of the reasons that we took this  
36 approach -- By the way, Step 4 is generally what is called  
37 probability-weighted performance, and this is a very simple  
38 example of probability-weighted performance.

39  
40 In more complicated applications, we might refer to this as a  
41 Bayesian network, but the reason that we chose this framework was  
42 because, when I began working on this, I envisioned a tool that  
43 could be used in meetings like this, to help people think through  
44 decisions like this, and the reason we picked this framework is  
45 because Steps 1 and 2 are computationally intensive. They would  
46 typically be done ahead of a meeting like this, right, by an  
47 analyst.

1 However, Steps 3 and 4 could be done with a small chunk of code,  
2 some kind of toolkit, and we can get results instantly, at a click  
3 of the mouse, and why that's valuable, I think, is because then we  
4 can do two things. We can, in forums like this, change the shape  
5 of that prior and ask how does it change the output of our analysis  
6 on the fly, and I think that one of the things that is valuable  
7 about this is, and the reason we chose this framework, is because  
8 it then allows you to take the audience along on the journey with  
9 you through this science, right, and I'm talking about both  
10 technical audiences, experts like yourselves, but also non-  
11 technical audiences.

12  
13 We need to reach both, and, second, we can start to ask questions,  
14 because we're not going to resolve the shape of that distribution,  
15 right, and there are going to be multiple valid viewpoints about  
16 it, but what we can then do is start asking questions of how does  
17 the shape of that distribution change my decision about which proxy  
18 to utilize, and does it, and to what extent would we have to change  
19 that prior, manipulate it, in order to come to a different  
20 conclusion about the FSPR proxy that we might want to choose, and  
21 all of that can be done transparently in a setting like this. This  
22 just summarizes what I just said, and I'm going to keep moving.

23  
24 All right, and so, for that paper, we carried out this exercise  
25 for seventeen different species, I think ten of which are snappers  
26 and seven grouper species, and all this slide shows you is what  
27 I've already shown you, that changing the value of steepness  
28 changes your expectations about reference points, and it just is  
29 basically a list of the species that we included in the study.

30  
31 This is the same slide for groupers, and there were seven of those,  
32 and, just as a note, this work was done in 2018 and 2019, and so  
33 we used the life histories that were available from the stock  
34 assessments at the time, and these species were selected for  
35 inclusion, based on judgment by the authors that they had  
36 reasonable quality life history information, and usually that was  
37 based on there being a data-rich stock assessment.

38  
39 This slide gets back to the point that I made earlier, where  
40 there's potential -- Where uncertainty is high, and there is  
41 potential for multiple valid viewpoints on the state of nature,  
42 right, and so I'm showing you three different distributions that  
43 we used as examples to demonstrate this problem in the paper.  
44 Importantly, this is an opportunity to formalize subjectivity, to  
45 formalize expert judgement, and, in this case, it brings this  
46 particular key uncertainty to the forefront of the policy  
47 discussion, in this case the reference point discussion.

1 I am going to show you the results of what this looks like, and,  
2 now, there's a lot going on here, and so what I think is the  
3 easiest thing to do is to start on the top row, and so what we've  
4 done here is we've said that we're going to assume, with certainty,  
5 that steepness is 0.8, and we're going to go through that  
6 simulation exercise, and we're going to ask how the outcomes, in  
7 terms of long-term catches, relative to MSY, and so C over CMSY,  
8 and long-term biomass, B over BMSY, how both of those metrics align  
9 with our expectation, and the expectation is that, in this case,  
10 is that you are going to reasonably achieve those outcomes, and  
11 that is what is highlighted by that yellow -- By that line, that  
12 vertical line, on both of the plots.

13  
14 I am going to start on the top row in the center, and you can see  
15 there's a distribution with a peak right inside of that yellow  
16 bar, and the line is red, and that aligns with the reference point  
17 F 30 percent SPR, and so, for snappers, what we found -- This is  
18 aggregate data across all species that we simulated, and it's that,  
19 if you're willing to assume that steepness is 0.8, you will most  
20 likely achieve MSY, in the long-term, with a proxy of F 30 percent  
21 SPR.

22  
23 Now I want you to look at the second and third rows. The moment  
24 you start to acknowledge that there is at least a non-negligible  
25 probability in the other parts of the distribution, especially at  
26 lower steepness, generally speaking, the results suggest that F 40  
27 percent SPR is the way to go, in terms of having the highest  
28 probability mass centered around achievement of MSY and BMSY. It's  
29 a little bit hard to see on the slide, because there's a lot of  
30 lines on that plot, but I assure you that's what is happening  
31 there.

32  
33 **CHAIRMAN NANCE:** Luiz, please.

34  
35 **DR. BARBIERI:** Bill, sorry for interrupting.

36  
37 **DR. HARFORD:** No, no problem.

38  
39 **DR. BARBIERI:** Great presentation so far, but just, since you are  
40 on this topic right now, I mean on this slide --

41  
42 **DR. HARFORD:** I am going to go back to the -- There we are. There's  
43 the snapper slide I was on.

44  
45 **DR. BARBIERI:** Right. In terms of achieving that C over CMSY,  
46 right, and so you're achieving maximizing catch, right, and  
47 achieving that, and what is the timeline involved?

1 **DR. HARFORD:** Yes, good question, and these are the long-term  
2 equilibrium outcomes.

3  
4 **DR. BARBIERI:** How do you define "long-term"?

5  
6 **DR. HARFORD:** We just pushed the simulation forward until it  
7 reached a steady state, through repeat application of the proxy.  
8 I can't recall if it's fifty years or a hundred years, but it's  
9 just intended to -- I think it's a function of the life history.  
10 I think it's like four-times the maximum age of each life history  
11 is a reasonable rule of thumb for the length of projections to  
12 achieve stability in your outcomes.

13  
14 **DR. BARBIERI:** Got it. Thank you.

15  
16 **DR. HARFORD:** Okay, and so this is presenting the same results,  
17 but for the grouper set of species, and, again, just to simplify  
18 this, we can follow this same rationale, in terms of interpreting  
19 these plots, and, generally, what we find is that the F 50 percent  
20 SPR has the highest probability mass, centered around achievement  
21 of CMSY and BMSY.

22  
23 Okay, and so I'm going to transition a bit here into sort of some  
24 summary and conclusion slides, and I'm going to approach this in  
25 two parts. I'm going to talk about guidance in terms of where I  
26 think it's reasonable to apply the information in this paper and  
27 other scenarios where I am going to suggest that you should rethink  
28 the information that's in this paper, okay, and so the broadest  
29 conclusion that we want to make here is that, really, the paper  
30 highlights a methodology, and I think that is its strongest --  
31 It's its strongest attribute, and it provides a pathway to working  
32 through the problem, or at least part of a pathway to working  
33 through the problem, and I think there are other components, but  
34 we'll get to those in a minute, and so what it does is it provides  
35 a way to formalize knowledge in the form of a steepness  
36 distribution.

37  
38 It allows for exploration of degree of belief in steepness, and we  
39 talked about that and how you can manipulate that distribution,  
40 right, and ask questions about how it affects the outcomes, and so  
41 the last bullet point there says this paper emphasizes a process  
42 where inputs can be modified, meaning you can rerun this with  
43 different life histories, different fisheries with different  
44 selectivities, et cetera, et cetera, and you can fine-tune it and  
45 then use the framework to produce products of interest, and so I  
46 think that's a place where you can apply this guidance.

47  
48 I think the core result of 40 percent SPR for snappers, and 50

1 percent for groupers, as being most aligned, most likely to be  
2 aligned, with achievement of MSY is a good rule-of-thumb. Part of  
3 the reason why I think this makes sense is we've demonstrated it  
4 to be the case for, at least in 2019, most of the snappers and  
5 groupers that have been subject to data-rich assessments, and the  
6 results of this paper are consistent with most of the well-known  
7 other literature on this topic.

8  
9 Perhaps the most well-known paper is from Clark in 2002, who also  
10 identified  $F_{40}$  percent SPR as should be close to optimum  $F$ , and  
11 I think, in this case, "optimum" means close to  $F_{MSY}$ . Mace 1994  
12 suggested 40 percent as a target when the stock-recruitment  
13 relationship is unknown, and so they didn't do something like we  
14 did, but they said, look, we recognize this issue with uncertainty,  
15 and that's a reasonable target, and then Brooks et al. 2010 -- I  
16 think that paper is applicable to the Southeast region, and someone  
17 can correct me if I'm wrong on that, but it pointed out that SPR  
18 30 percent would only be appropriate for very resilient stocks,  
19 which I don't know what "very resilient" was intended to mean,  
20 but, if you think back to the example that I gave, where we assume  
21 that steepness was 0.8, that might be considered a resilient stock,  
22 and our results support that idea, that, in that case, you  
23 certainly could go with  $F_{30}$  percent, but, again, only for very  
24 resilient stocks, and, once we start to acknowledge uncertainty in  
25 productivity, it changes the viewpoint, or the conclusions of the  
26 paper, right?

27  
28 Okay. Selectivity, and so this paper made the assumption -- This  
29 paper did not use the real selectivity curves coming out of the  
30 assessment, and it make a blanket assumption across all simulations  
31 that selectivity occurs at the size-at-maturity for the species,  
32 and was that a reasonable assumption? So, if that assumption holds  
33 for the stock you're interested in, then I think that this guidance  
34 also holds.

35  
36 Was that assumption reasonable at the time? Generally speaking,  
37 it was, and this is at least information gathered as of 2019, and  
38 the length at the  $L_{50}$  parameter means the length at 50 percent  
39 maturity and then the federal commercial regulatory size limit for  
40 the species, if it exists, and there is reasonable alignment  
41 between these two things, and, in many cases, the federal limits  
42 are larger than the size-at-maturity, and I am going to talk about  
43 that case right now.

44  
45 Just to orient everybody here, the simulations assumed that  
46 selectivity occurred at the length-at-maturity, but what if, in  
47 reality, you have selectivity that is above the length-at-  
48 maturity, and could you apply this guidance? Well, yes and no.

1 Yes, in the sense that the guidance would provide similar, if not  
2 better, levels of protection for spawning biomass, but that, of  
3 course, comes at a cost to catches, right, and so recognizing the  
4 importance of the balance between the two, and, if you're in a  
5 pinch, this might work, but this is one of those places where it  
6 might be wise to rerun these simulations, in the case where  
7 selectivity does not align with maturity.

8  
9 Likewise, what if it was in the other direction? What if we  
10 assumed that selectivity and maturity were aligned, but, in  
11 reality, juvenile fish are being caught? Well, this is a place  
12 where I think that you should rethink the guidance, that you should  
13 pull back, because this is a rather dangerous circumstance. I  
14 think that there are other issues to explore here, in terms of why  
15 juvenile fish are being allowed to be caught, and I understand  
16 that there are reasons for that, but you may want to rerun this,  
17 and you may find that even more precautionary FMSY proxies may be  
18 required in this circumstance, and so this is -- Again, this is  
19 where I would rethink the guidance.

20  
21 This is a catchall, just to say that sometimes selectivity is  
22 really complicated, and there are multiple fisheries, and there  
23 may be doming, or other complex forms of selectivity, that we did  
24 not consider in the simulations, and, again, this is a place where  
25 I would rethink the guidance and go back and redo these  
26 calculations.

27  
28 Life history, and so, again, I think the general conclusion makes  
29 sense, in terms of 40 percent, but there are all kinds of cautions,  
30 throughout the literature, not to make assumptions across species,  
31 and I think that goes without saying for folks in this room, and  
32 so I have just pointed to three studies that highlight that point  
33 and that it may certainly be worthwhile reanalyzing,  
34 recalculating, these reference points and situations where -- For  
35 species where either the life history has been updated since we  
36 did this work or species that were not included in the analysis.

37  
38 All that plot is showing is that -- It's showing five different  
39 species, right, those five different lines, and, if you follow  
40 that vertical arrow upwards, we have assumed that, in that case,  
41 all of those species have a steepness of 0.8, yet they have  
42 different reference points, due to other aspects of their life  
43 history that are different between the species, and so don't ignore  
44 this issue.

45  
46 Hermaphroditic species, right, the groupers, and so, in this  
47 simulation, the biomass-based reference points are based on female  
48 biomass, and my understanding is that, in this region, there is

1 some consideration that, when it comes to hermaphroditic species,  
2 that biomass should be calculated as total spawning biomass and  
3 not female spawning biomass, and so, if that's the case, again,  
4 this is one of those places where I would consider rerunning this  
5 analysis.

6  
7 There are other issues related to scientific uncertainty that I  
8 think are also worth considering here, and this paper I think most  
9 aligns with the question of the role of the F proxy in OFL  
10 calculation, and there are certainly other issues at-hand,  
11 including environmental variability, and I believe that red tide  
12 was in the news last night again, and so I don't want to weigh-in  
13 on how the other metrics should be calculated, and it wasn't part  
14 of this paper, but I think it's a point that's worth just raising  
15 here, in terms of, if you're considering this framework, expanding  
16 upon it and asking how does the framework fit across the entire  
17 breadth of decisions and recommendations that this group is  
18 involved with.

19  
20 This slide just summarizes all of the times to apply the guidance  
21 and times to rethink the guidance, just in one slide, and I will  
22 give you a moment here.

23  
24 We're getting into some final conclusions in the paper here, and  
25 this one just reiterates what I have said several times, that the  
26 F 40 percent SPR seems to make sense for a variety of snappers,  
27 where F 50 percent seems to make sense for the grouper species.

28  
29 Now, this thought is a bit of an aside, but what this slide is  
30 showing is the second-half of the paper. Everything I have talked  
31 to, up to this point, centered on the theme of proxy estimation,  
32 but I did want to point out that there are other themes addressed  
33 in this paper that might be worthwhile considering.

34  
35 The paper goes into some depth on using what are known as broken  
36 stick or threshold F or hockey-stick-type control rules, which are  
37 shown on the left, where the F reference point -- Sorry. The  
38 fishing mortality used to determine OFL varies according to the  
39 biomass, right, and so one of the things that we did was we looked  
40 at how to use -- If whether these broken stick approaches could be  
41 used under rebuilding circumstances.

42  
43 What we did is we simulated a variety of broken stick approaches,  
44 and we also simulated a rule that I called, in the paper, the NS  
45 1 Rule that simulates, to the letter, the way in which rebuilding  
46 plans are expected to be applied under NS 1, and what's interesting  
47 is NS 1 typically requires some form of projection modeling, which,  
48 in my mind, had to be tied to steepness, because projections are

1 forecasting future recruitment, and I realize there are a variety  
2 of ways to tackle that topic, but this is what connected, in my  
3 mind, to the broken stick rules, and I wanted to ask, and could  
4 you achieve rebuilding without making a projection, and could you  
5 achieve rebuilding according to the timeframes expected under NS  
6 1, without requiring a single projection?

7  
8 In some cases, the answer is yes. I think there's some fine-  
9 tuning to be done, but you could generally, if you set up your  
10 broken stick rule properly, achieve rebuilding in ten years, or  
11 whatever the expectation was, and that's all I'm highlighting here,  
12 and we probably don't have time to get into this too much, and  
13 there are some other topics of discussion here, and like I've made  
14 this note there that says FMSY versus F proxy, and there may be  
15 cases where you are quite comfortable estimating steepness, or  
16 using a steepness prior in your stock assessment, and so it does  
17 beg the question of do you need a proxy at all. This paper assumes  
18 that you would use a proxy, but, again, that's an assumption, and  
19 that's possibly a discussion point to revisit.

20  
21 Finally, the issue of data-limited stocks, where you need these  
22 reference points, and not only is steepness uncertain, but it's  
23 difficult, or impossible, to do an assessment, or a data-rich  
24 assessment, and so I think there are some issues here, and  
25 especially in the data-limited issue, and the usual expectation is  
26 more precautionary reference points than under data-rich stock  
27 assessments, and so, again, that's another dimension of the problem  
28 that might be worth considering here, moving forward.

29  
30 I think this is almost the final slide, and so, again, I think  
31 that what the paper illustrates is a possible framework that could  
32 be applied, and so the conclusion, the first conclusion, is it may  
33 be worthwhile considering a process for proxy specification, an  
34 overarching process, of which this framework could play a role,  
35 but my point is, in terms of we thought about process in the paper,  
36 and I implore you to also think about developing that process,  
37 sometimes called better practices, and sometimes called best  
38 practices, et cetera.

39  
40 The analysis itself could certainly be strengthened, according to  
41 some of the issues that I called rethinking, which is -- My  
42 apologies. Actually, the second box is something different. There  
43 are extensions of the analysis that we did not cover.

44  
45 The analysis does not include life history uncertainty, and it  
46 just used point estimates for life history, and so all of that  
47 uncertainty could also be propagated forward into the analysis and  
48 the characterization of those probability distributions that I

1 showed earlier.

2  
3 We assumed a Beverton-Holt type stock-recruitment function, and  
4 you could consider alternatives there, like Ricker and the effect  
5 of estimation error on key quantities -- This perhaps more applies  
6 to the broken stick rules, and their application, but, when those  
7 broken stick rules were simulated, we just assumed that we had  
8 perfect knowledge of the various needed reference points, and, of  
9 course, in reality, there is some uncertainty around those, and  
10 potential bias as well, and I think that speaks to the last point  
11 there, which is imperfect information and implementation error.  
12 We did not include that in the analysis, and I think that more  
13 applies to the projections under the broken stick rules.

14  
15 Finally, the last box on the screen -- What I think that there's  
16 an opportunity to do here is to link the entire decision-making  
17 process, from data to assessment to decision-making -- This paper  
18 really falls under the decision-making component, with specific  
19 reference to delineation of reference point, but it's part of a  
20 larger process of data quality, assessment, and how all of that  
21 feeds into your various harvest control rules, and so I think  
22 there's an opportunity to fine-tune there, and I think there's an  
23 opportunity to encompass this kind of work into that broader  
24 specification of management strategies, and, of course, I have  
25 highlighted the use of MSE to achieve that. All the references  
26 are here, if you're interested, and thank you very much. Thank  
27 you for your time. Thank you for inviting me.

28  
29 **CHAIRMAN NANCE:** I appreciate you being here and being able to  
30 discuss this. We have an opportunity for questions, for sure.  
31 Are there comments or questions? Luiz, please.

32  
33 **DR. BARBIERI:** Bill, first of all, thank you. That was an excellent  
34 presentation, and I love the way that you set the stage and kind  
35 of broke it down for us and walked us through this whole process,  
36 and I think it's -- Thank you for coming to give the presentation,  
37 right, personally, and walking us through this, because, I mean,  
38 this is something that we've been discussing, as an SSC, you know,  
39 relative to recent assessments, and we have struggled, a little  
40 bit, you know, in terms of developing that sort of more formalized  
41 framework, right, to have a process for choosing what the proxy  
42 values should be for MSY.

43  
44 One thing that -- You know, one question that I have, with this  
45 analysis, and it's part of my previous question that I wanted to  
46 better understand, is, when you talk about MSY, or achieving,  
47 maximizing, catch, right, are you really thinking about a limit  
48 reference point, you know, in the sense of your slide -- Let's

1 see. It's 26.

2  
3 Are you thinking about a limit reference point where not just you  
4 are maximizing, you know, biological processes, improving  
5 composition, right, and distribution of demographics over the  
6 population, and, you know, building buffers, so to speak, you know,  
7 precautionary buffers to account for episodic events or other  
8 things, but you're thinking about, okay, we need to know, right,  
9 at what point, you know, am I getting to the bottom of the tank,  
10 and not a half-tank of gas, right, but I need to find -- I only  
11 have a few -- You know, a dozen miles, or twenty, or whatever many,  
12 but I am getting to the point where I need to get into a gas  
13 station and refill the tank, and I need to know where that is,  
14 right, for me to properly think about management, and what's the  
15 maximum that I can remove to this, of this stock, and that's what  
16 my understanding of a limit reference point is.

17  
18 You maximize harvest, right, without compromising long-term  
19 replenishment and sustainability of the stock, even though -- I  
20 mean, we know the maximum sustainable yield is not really our ideal  
21 goal, or target, for management, because it doesn't incorporate a  
22 whole number of other life history population dynamic attributes  
23 that we want that population to have to be resilient, right, and  
24 have maximum management success over the long term.

25  
26 This was my question before, and it's like, okay, when you  
27 estimated what the maximum amount of removals, right, the maximum  
28 harvest, the maximum sustainable yield, would be, it has to be  
29 defined within some kind of a time, right, limit.

30  
31 **DR. HARFORD:** Yes.

32  
33 **DR. BARBIERI:** Because, of course, we're dealing with tactical  
34 management. I mean, the council is going to be setting management  
35 in a way that maximizes harvest, the removals of that population,  
36 within a sustainable way, but within perhaps a decade, right, to  
37 use some of the NS 1 Guidelines.

38  
39 **DR. HARFORD:** For rebuilding.

40  
41 **DR. BARBIERI:** For rebuilding, right, and so you're trying to  
42 maximize something within a time horizon. You know, if I say that  
43 I can maximize this in a hundred years, that's a different  
44 question, right, for the managers, I think, to consider. I will  
45 stop there, but in terms of like -- Are you talking about, are you  
46 thinking about, here limit or target reference points? That's the  
47 first question.

1 **DR. HARFORD:** Right. Okay, and so let me answer that. It's  
2 definitely limit, and the entire paper is based on identifying the  
3 highest fishing mortality rate that you might consider under any  
4 circumstance that is expected to achieve MSY in the long-term, and  
5 so limit. The short answer is it's a limit that we looked at,  
6 yes.

7  
8 **DR. BARBIERI:** Okay, and then, to interpret your simulations,  
9 right, and so Slide 15, how did you obtain BMSY and CMSY, right,  
10 because, I mean, now we are looking at how the performance of this  
11 proxy -- Against what the true MSY is.

12  
13 **DR. HARFORD:** Right.

14  
15 **DR. BARBIERI:** I have to know what that MSY is to be able to  
16 evaluate that performance.

17  
18 **DR. HARFORD:** Absolutely. Okay. Great question. Yes, and so the  
19 -- What we might refer to as the true simulated catch MSY comes  
20 out of the simulation, but I take your point that it varies  
21 according to steepness, and I think this is where you're probably  
22 going with this, right?

23  
24 **DR. BARBIERI:** Well, steepness and selectivity.

25  
26 **DR. HARFORD:** I hear you, and life history. Right. Okay, and so  
27 the true BMSY and the true CMSY come from the simulations, because  
28 it's a simulation and we know what it is. In these simulations,  
29 for a given species, the life history and selectivity are held  
30 constant, and so let's just set those aside for a second, right,  
31 and really what's varying from different run to run is the  
32 steepness value, right, and so what we can do is -- Basically,  
33 what we do is we calculate MSY at a given steepness and run a  
34 simulation, okay, and we ask how well did that proxy achieve that,  
35 and we repeat that many hundreds of times.

36  
37 We then use the probability rules to integrate it all together,  
38 and I probably can't get into the probability rules right off the  
39 top of my head here, but that is how we do that, and so I think  
40 what you might be getting at is how can I know MSY if I don't know  
41 steepness, and so it's simulation-run-specific MSY.

42  
43 **DR. BARBIERI:** To obtain that MSY, you have to make an assumption.

44  
45 **DR. HARFORD:** About steepness.

46  
47 **DR. BARBIERI:** About steepness.

1 **DR. HARFORD:** Absolutely. Right, and so each run is -- Let me put  
2 it to you this way. Each simulation run is conditional on the  
3 simulated value of steepness, and then we use probability rules to  
4 marginalize across that, so that what we achieve is a distribution  
5 of outcomes that is not conditional on any given value of  
6 steepness.

7  
8 **CHAIRMAN NANCE:** Roy, to that point, please.  
9

10 **DR. CRABTREE:** Yes, and so the choice of the prior, I think, in  
11 this case, is 0.8.  
12

13 **DR. HARFORD:** Yes.  
14

15 **DR. CRABTREE:** So, if I chose a prior of 0.9, how much would that  
16 shift how all of this comes out?  
17

18 **DR. HARFORD:** Right. Right. So, on this slide, the top is showing  
19 -- If we just assumed that it's 0.8, right, generally -- As a  
20 general rule, the more that steepness goes towards one, the harder  
21 you can fish at FMSY.  
22

23 **DR. CRABTREE:** Right.  
24

25 **DR. HARFORD:** So that means -- That's why, at 0.8, it's showing F  
26 30 percent. I don't know exactly what would happen if we pushed  
27 it to 0.9, but it would move lower than F 30 percent. It would  
28 move in that direction.  
29

30 **DR. CRABTREE:** So it's sort of like, by choosing the prior, you're  
31 effectively choosing the SPR proxy.  
32

33 **DR. HARFORD:** Yes.  
34

35 **DR. CRABTREE:** Well, so you're right back to where you started, if  
36 you don't know what steepness is and you're choosing --  
37

38 **CHAIRMAN NANCE:** (Chairman Nance's comment is not audible on the  
39 recording.)  
40

41 **DR. CRABTREE:** Right.  
42

43 **CHAIRMAN NANCE:** You have that variety of steepness, and 0.9 being  
44 one of them, and probably 0.9 is the one that pushes it more to  
45 the left, as far as where all of the others are pushing it more  
46 toward the right, and you get a broader distribution, because  
47 steepness is unknown.  
48

1 **DR. CRABTREE:** Right, and I see that, and I think that's very  
2 useful, but you still have a situation where, for example, you  
3 believe that you have a lot of recruitment coming from somewhere  
4 else, and say you're in the South Atlantic with red snapper, and  
5 you have recruitment coming out of the Gulf, or you're in the Gulf  
6 of Mexico with red snapper, and you have all these magic fish that  
7 are out there and no one fishes on them, but they're kicking in  
8 all these recruits, and so you have reason to think that steepness  
9 would be very high, and so, if I came into this and said I think  
10 steepness is 0.9, or 0.95, then I'm going to be, probably, coming  
11 out with a more aggressive -- I think this is really useful, but  
12 it's still -- We still have the quandary of what's going on with  
13 it.

14  
15 **DR. BARBIERI:** I think that's the point, Bill. I mean, I think  
16 that the framework that you and your colleagues put together -- I  
17 mean, I think it's excellent, and I really think so, right, and I  
18 think that the way that you walked us through this process is  
19 excellent in framing the right questions and helping us, you know,  
20 provide that framework for thinking about this.

21  
22 I especially value the fact that you presented a bunch of the  
23 caveats, right, and you said, okay, here are things that, you know,  
24 may make this not be as prescriptive, because there is a sliding  
25 -- If we're going to be, you know, realistic about looking at  
26 possible outcomes here, you know, there is the possibility of  
27 sliding some of this a little bit to each one of the sides, in  
28 terms of the final outcome, right, and I think he highlights all  
29 the right factors for us to consider.

30  
31 My only, I would say, discussion point for the committee is, you  
32 know, think about it more as a way of thinking, and from a  
33 probabilistic approach, thinking this is not going to be a  
34 deterministic outcome, right, that's going to say, okay, now I can  
35 provide you a value, right, that's really coming out more likely  
36 for this group, and this one is more likely for this group, because  
37 now you have a -- It's like a combination permutation kind of  
38 thing, where, if I change -- You know, each parameter that I  
39 change, on this thing, I am changing simultaneously other ones,  
40 and it's going to be sliding those outcomes, and so the outcome,  
41 at the end, has to be probabilistic as well, right? Does that  
42 make sense?

43  
44 **DR. HARFORD:** Can I --

45  
46 **CHAIRMAN NANCE:** Let him respond, yes.

47  
48 **DR. HARFORD:** I am going to take them backwards, and so, Luiz,

1 your question, or your comment, was that there isn't going to be  
2 a single F proxy, and it's going to be based on this distribution,  
3 and I think that is an interesting and subtle point, whereas the  
4 argument that I made was that, if you look at those colored lines,  
5 they are distributions, and I said the greatest probability mass  
6 is centered at X, and there are, of course, other ways to interpret  
7 those probability distributions, and I think this is a very  
8 thoughtful idea.

9  
10 You could approach it -- You could look at the whole distribution,  
11 and you could say I want to avoid some very bad outcome, and look  
12 at the half of the distribution, or the fraction of the  
13 distribution, that aligns with those outcomes, right, and so that's  
14 a different -- That's a different way to interpret these plots,  
15 and I think a very valuable one. I have a couple other thoughts,  
16 if I could.

17  
18 **CHAIRMAN NANCE:** Yes, please. Go ahead and do that, and then I  
19 will take some more questions.

20  
21 **DR. HARFORD:** So you made a very good point that you cannot get  
22 away from talking about steepness in setting an FSPR proxy, and it  
23 doesn't -- You shouldn't -- It doesn't allow you to sidestep the  
24 problem of steepness, and, in reality, steepness is going to remain  
25 unknown, unless somebody disagrees with that statement, right, and  
26 so what do you do?

27  
28 You have to make a decision about a reference point in a  
29 circumstance when the information you need to make the right  
30 decision is unknown, and that's the quandary here. That is  
31 fundamentally it, and so you are asking about -- I have two  
32 suggestions about how to think about that, and one is you had a  
33 very good point about what if it was 0.9, but I would ask you, and  
34 are you willing to assign 100 percent probability that it's 0.9,  
35 or are you willing to acknowledge that it might also be 0.8, or it  
36 might also be 0.7, whatever other values, and I'm just making a  
37 point.

38  
39 That is the -- Once you start acknowledging the breadth of the  
40 uncertainty, I think that is how you solve this problem, and that  
41 is what we've tried to point out here in like Rows B and C, where  
42 the distribution shows -- It shows the peak at 0.8, but it  
43 acknowledges that other values are plausible, and, again, the tool  
44 that I was suggesting would allow you to redraw the shape of that  
45 distribution any way you like, and the reason, again, I think that  
46 might be valuable is because then you might ask the question of  
47 how different would the shape of that distribution have to be  
48 before it changed our minds about what proxy to choose, right, and

1 you might put it to 0.9 and still conclude that F 30 percent is  
2 reasonable.

3  
4 Likewise, I might be a risk-averse person and look at that Row C,  
5 where I would give an equal probability across a whole bunch of -  
6 - Which, to be honest with you, produces more conservative F proxy  
7 reference points, right, if I was a risk-averse individual, and  
8 so, again, you can't get away from this debate, this discussion,  
9 and I think all we've given you is possibly a way to frame it.  
10 Thank you.

11  
12 **CHAIRMAN NANCE:** Sean.

13  
14 **DR. POWERS:** So, first, to Roy's point, we like calling it cryptic  
15 biomass and not magic fish, okay?

16  
17 **DR. CRABTREE:** I must have misremembered.

18  
19 **DR. POWERS:** We try to stay away from the term "magic fish", as  
20 much as we can.

21  
22 **DR. CRABTREE:** I wanted to introduce a new term.

23  
24 **DR. POWERS:** You answered my first question, which was,  
25 essentially, how different would the distributions need to be say  
26 in your Slide 14, you know, where everything is on 0.8, and, you  
27 know, if we split that between 0.7 and 0.8 steepness, would that  
28 be enough uncertainty to kick in the higher SPR, but it sounds  
29 like the tool is available for us to explore how different it is.

30  
31 The other thing is what's magical about an SPR 30 or 40? Can your  
32 tool actually tell us what SPR we should be using, because, if our  
33 only choice is 30 or 40, and the answer is somewhere in the middle,  
34 then we're foregoing a lot of potential yield.

35  
36 **DR. HARFORD:** That's a really fair point. Can you move it forward  
37 one slide? Okay. That's a great point, and we certainly only  
38 evaluated jumps of 10 percent, and you could go back and reevaluate  
39 smaller increments, absolutely.

40  
41 Number two, and this gets back to something that Luiz said, you're  
42 still going to have to make a risk-based decision, based on those  
43 distributions, right, and you're still going to have to make a  
44 judgment about what is an acceptable level of risk of achieving,  
45 or not achieving, in this case, MSY.

46  
47 **DR. POWERS:** So the last point you brought up was very interesting,  
48 and one that has troubled me, and why do we have to go to an SPR?

1 For example, that scenario I gave you, where I'm pretty sure it's  
2 between 0.7 and 0.8, and so is that enough certainty to go with an  
3 MSY calculation, or when is the uncertainty so much that we should  
4 go with an SPR? I don't think we've given enough attention to the  
5 fact that the models can produce MSY, and, at times, we at least  
6 know that the steepness is high. I mean, we might not know exactly  
7 how high, but it's high, and so, I mean, just your thoughts on  
8 that, because I thought that was a very interesting statement.

9  
10 **DR. HARFORD:** I think, you know, my answer to that is that now  
11 you're asking about the entire decision-making framework, right,  
12 and can you run an assessment that limits steepness to the range  
13 that you suggested, and what consequences does that have for the  
14 stock assessment, and I don't have the answer to that, but my point  
15 is that you're starting to say, well, if the assessment can give  
16 us FMSY, then why do we need a proxy, and so I do think it's wise  
17 to ask that question across the entire what might be called a  
18 management strategy, the data, the assessment, the decision-  
19 making, right, or the harvest control rule, it's sometimes called,  
20 but let's just call it decision-making, to be generic.

21  
22 I think there was another part of your question that I still think  
23 we can get at probabilistically, because, if I'm not mistaken,  
24 FMSY, coming out of an assessment, where it can be estimated, is  
25 not necessarily a point estimate, and it could be a distribution  
26 of itself, right, and, of course -- Again, I don't know all the  
27 mechanics of this, but I think the goal here is to calculate OFL,  
28 and there are, of course -- Again, I haven't looked at  $P^*$  in a  
29 while, and I don't even know if that's still in play in this  
30 region, but, again, there's that probabilistic --

31  
32 **CHAIRMAN NANCE:** We're trying to get away from it.

33  
34 **DR. HARFORD:** Okay. Okay. Okay, and so I'm not trying to invoke  
35 that, but just the idea, of course, is that you could calculate -  
36 - You could calculate OFL as a distribution and not a point  
37 estimate, which gets back to the  $F$ , the distribution of FMSY, which  
38 gets back to the question of should we estimate it in the  
39 assessment, which probably gets back to the question of, if you  
40 have the data to so -- That's why looking at the entire management  
41 strategy is useful. I don't know if I directly answered your  
42 question.

43  
44 **DR. POWERS:** No, you did, I mean, because there was no -- It relies  
45 on it not being a point estimate, FMSY, and the reason that, in  
46 the background, that we're not so excited about  $P^*$  is our  
47 experience is the distributions are just so narrow, and they're  
48 not realistic, and it would be the same thing there. Do you have

1 the data -- Not only do you have the data, but do you have the  
2 variance, and the uncertainty, around all those points  
3 characterized enough to give you a real distribution, and that's  
4 the problem with things, but an excellent presentation. Thank  
5 you.

6  
7 **CHAIRMAN NANCE:** Luiz.

8  
9 **DR. BARBIERI:** Just to that point, to take advantage of what Sean  
10 just said and how you responded, Bill, you know, there's also a  
11 component that, because within this -- Even if we don't use the  
12 P\*-based harvest control rule, ABC Control Rule, right, we're going  
13 to be operating within some context of P\*, right, to some extent  
14 we will, and this is something that we, as an SSC, have to work  
15 with the council, where we focus on the scientific uncertainty  
16 side of things and they focus, right, on the management uncertainty  
17 and the risk tolerance, and so it's something that, whatever can  
18 be done to help us not be prescriptive to the council, as far as  
19 the proxy, it allows us to negotiate with them what we believe is  
20 meaningful advice, you know, without taking away that decision on  
21 the risk tolerance, right?

22  
23 **DR. HARFORD:** I'm sorry, and I haven't worked in this region in a  
24 little while, and is the risk tolerance part -- That is under the  
25 purview of the council, as opposed to the SSC? Got it, and so, I  
26 mean, one way you could start working on that issue is to convey  
27 risk to the council, methodologies and frameworks to convey risk  
28 to them, and that connects to the discussion we were just having,  
29 yes.

30  
31 **CHAIRMAN NANCE:** Doug, please.

32  
33 **MR. GREGORY:** Thank you, Mr. Chair. I have a couple of questions,  
34 and I've been waiting a while, and I'll try to step through this  
35 fairly quickly. The least-certain histogram -- I didn't catch  
36 where those bars came from, and are those from a set of priors?

37  
38 **DR. HARFORD:** Sorry. It's arbitrary, and we just use it as a  
39 demonstration.

40  
41 **MR. GREGORY:** Okay, and so -- But that was the one that seems most  
42 convincing as to what should be done, because it does incorporate  
43 some uncertainty. Is there a way to make that more probabilistic,  
44 rather than just fixed?

45  
46 **DR. HARFORD:** Maybe just to clarify, and it's assigning equal  
47 probability to all values of steepness between 0.4 and 0.9, I  
48 think.

1  
2 **MR. GREGORY:** That's the C level.

3  
4 **DR. HARFORD:** The C level, yes.

5  
6 **MR. GREGORY:** I am talking about the B level.

7  
8 **DR. HARFORD:** I'm sorry. Apologies. Can you repeat your question?

9  
10 **MR. GREGORY:** You said those histograms in B were just decided  
11 arbitrarily, and I don't mean that negatively, but they're fixed,  
12 and that's what you put in there for the simulation, to see what  
13 effect it had, and it's not based on literature or anything else,  
14 right?

15  
16 **DR. HARFORD:** I'm sorry. I misunderstood your initial question,  
17 and so Row B -- That prior does come from the literature, and it's  
18 a prior steepness for demersal fishes, and the citation -- If  
19 somebody could help me on this, and it's in the previous slide, I  
20 think. It's Shertzer and Conn. Thank you.

21  
22 **MR. GREGORY:** So you used one prior and got that distribution from  
23 the one prior?

24  
25 **DR. HARFORD:** Yes.

26  
27 **MR. GREGORY:** Okay, and so that leads into another question that  
28 I had, and why couldn't we do the same with steepness? Instead of  
29 having a prior of let's say 0.8, and getting a steepness estimate,  
30 why can't we get a distribution of steepness from that one prior?  
31 I'm not -- I don't do stock assessments, and so I'm not clear on  
32 this, and, if we can get a distribution of steepness from a prior,  
33 I would argue that's what we should be doing and get away from  
34 this somewhat arbitrary proxy thing.

35  
36 **DR. HARFORD:** I may be able to answer it in a round-about way. I  
37 think you're referring to the estimation of steepness during a  
38 stock assessment.

39  
40 **MR. GREGORY:** Yes.

41  
42 **DR. HARFORD:** Okay. Generally speaking, there is probably three  
43 different broad approaches to dealing with steepness in a stock  
44 assessment. One is assume that it takes on a single value and fix  
45 it at the value and do not estimate it in the assessment. That's  
46 Option 1. Option 2 is allow it to be freely estimated across its  
47 entire plausible range, and Option 3 is to apply an informative  
48 prior, like what is shown in B.

1  
2 **MR. GREGORY:** Right.

3  
4 **DR. HARFORD:** The information in that prior will likely influence  
5 the outcome of the assessment, in terms of what they call the  
6 posterior estimate.

7  
8 **MR. GREGORY:** Right.

9  
10 **DR. HARFORD:** Okay. Does that at least -- Does that get us partway  
11 there to the answer to your question?

12  
13 **MR. GREGORY:** Exactly. We're on track, but can't we redo that  
14 prior and get a distribution of posterior estimates?

15  
16 **DR. HARFORD:** Yes, you could certainly -- So, in B, we're showing  
17 one option for a prior, and you certainly could specify a different  
18 prior to be used in your stock assessment.

19  
20 **MR. GREGORY:** Okay, and so, if you specify the same prior twice,  
21 you will get the same answer.

22  
23 **DR. HARFORD:** In a stock assessment, yes.

24  
25 **MR. GREGORY:** Okay, but not here. Okay. Then the other thing is  
26 not really a question, but -- I haven't seen this, but, in  
27 instances where there's a reasonable steepness, and I know, on say  
28 the Atlantic side, they use steepness and estimate MSY more  
29 frequently than we do in the Gulf. Where that has been done, I'm  
30 curious how those Fs from the estimated MSY compare to proxies  
31 that could have been used, but weren't. I mean, to me, that would  
32 be insightful, as far as understanding, because what has bothered  
33 me for a while -- I don't really understand the relationship  
34 between proxies and MSY, and your analysis shows that it clearly  
35 is not fixed, and it implies that it's based on life history  
36 parameters and others.

37  
38 My final question is I would like to go back to the slides where  
39 you had the different species, and we can start with the grouper,  
40 the lines with steepness and biomass over --

41  
42 **CHAIRMAN NANCE:** What number, Doug?

43  
44 **MR. GREGORY:** I don't know. Let me see. Let me get my version.

45  
46 **DR. HARFORD:** I think it's the next slide. Is that the one?

47  
48 **MR. GREGORY:** It's Number 13.

1  
2 **CHAIRMAN NANCE:** Go ahead and bring up 13, Jessica, and, that way,  
3 we can see if that's the one he wants. Is that the one you want?  
4

5 **MR. GREGORY:** Right. I realize that you did this a number of years  
6 ago, and time is going by fast, and I'm curious about the red  
7 grouper from the South Atlantic and the red grouper in the Gulf  
8 being so similar, but my understanding is the South Atlantic did  
9 use total biomass for their estimates of SPR, or estimates of  
10 analysis in the stock assessment, whereas, in the Gulf, we didn't.  
11

12 **DR. HARFORD:** Okay. I can answer that one really quickly.  
13

14 **MR. GREGORY:** Okay.  
15

16 **DR. HARFORD:** In this simulation, which is what the plot is  
17 showing, I only -- I used female biomass for both of those stocks,  
18 and that's why they're so similar.  
19

20 **MR. GREGORY:** Okay, and so we've got the red grouper in the Atlantic  
21 is very similar to the gag grouper in the Gulf, and that's curious.  
22 I think we have pretty much the feeling that gag grouper are more  
23 -- They're less resilient than red grouper are, and the height of  
24 these graphs, these lines, and so you've got red hind at the  
25 bottom, and you've got red grouper Atlantic on the top, and that  
26 spacing -- The lines on the top are less resilient than the lines  
27 on the bottom? Is that what this indicates, because, near the  
28 bottom, we have black grouper and snowy grouper, and then we've  
29 got the hinds, and I would expect them to have productivities that  
30 are very different, and probably I would expect them to be on  
31 either side of the red groupers and the gag.  
32

33 **DR. HARFORD:** I see what you're saying. I mean, I can only  
34 speculate in my answer to that question, but I think the ones on  
35 the bottom are --  
36

37 **CHAIRMAN NANCE:** Luiz has the --  
38

39 **DR. BARBIERI:** No, no, no.  
40

41 **CHAIRMAN NANCE:** Okay. Tom.  
42

43 **DR. FRAZER:** I mean, part of the reason for the difference in the  
44 red grouper is just there's differences in life histories and size  
45 at sexual maturity, right, between the Atlantic and the Gulf.  
46

47 **DR. HARFORD:** Yes.  
48

1 **DR. FRAZER:** I mean, it's a significant difference. That's why I  
2 think you see that difference.

3  
4 **DR. HARFORD:** Thank you, yes.

5  
6 **MR. GREGORY:** Okay, but I'm trying to get at what -- How these  
7 curves relate to the productivity of the species.

8  
9 **DR. HARFORD:** Well, as productivity relates to steepness, these  
10 plots make no assumption about that, right, and so what the plot  
11 is showing, on the X-axis, is whatever you want to assume about  
12 steepness is reflected in the corresponding point on the Y-axis,  
13 and so, really, I'm trying to avoid making an assumption about  
14 productivity on this plot.

15  
16 **MR. GREGORY:** So why are red hind lower than red grouper?

17  
18 **DR. HARFORD:** It's a function of life history parameters.

19  
20 **MR. GREGORY:** Right.

21  
22 **DR. HARFORD:** I would have to go back and look at the finer details,  
23 but I can tell you that it's a function of the life history.

24  
25 **MR. GREGORY:** Okay. I don't want -- It's confusing, because of  
26 the snowy grouper is a deepwater species, and black grouper doesn't  
27 mature until thirty-two inches, and that's an instance where we've  
28 been fishing juveniles for a long, long time, and we've never had  
29 a size limit of thirty-two inches. Red hind are assumed to be  
30 quite a bit more resilient than the other species, and less  
31 harvested, and so, on the snapper slide, similarly, we've got  
32 greater amberjack at a lower line than the other species, but  
33 greater amberjack is the species we're having the most trouble  
34 with in trying to rebuild.

35  
36 It just seems like, if these were reflecting some sort of  
37 productivity of each species, the order of these species, these  
38 graphs, don't make sense to me, but I will leave it at that. Thank  
39 you very much.

40  
41 **CHAIRMAN NANCE:** John, please.

42  
43 **DR. FROESCHKE:** I guess, when I first looked at it, I kind of had  
44 that same idea, but then, the way I'm interpreting that -- For  
45 example, the red hind stock -- If you have a steepness that is  
46 approaching one, that means that your biomass, relative to MSY,  
47 and that's where you are trying to be for management, is going to  
48 be very low, which is consistent with something you're fishing

1 very aggressive, which makes sense for red hind relative to  
2 something like red grouper, where you're doing the inverse of that.  
3 That's how it makes sense to me.

4  
5 **DR. HARFORD:** Thank you, John, I agree, and that is how I would  
6 interpret it as well.

7  
8 **MR. GREGORY:** Thank you.

9  
10 **CHAIRMAN NANCE:** Thank you, Doug. Roy, please.

11  
12 **DR. CRABTREE:** One of the slides made reference to stocks that had  
13 episodic mortality, like red tide, and that that might necessitate  
14 more a conservative approach, and this is something that I have a  
15 hard time sort of -- If you have a stock, and you have these  
16 episodic mortalities, like red tide, effectively, you're saying,  
17 over time, the natural mortality rate is higher than it would be,  
18 or, if you believe that red tide events are getting worse over  
19 time, and natural mortality is going up, and, traditionally, we've  
20 looked at a relationship between FMSY and natural mortality, and,  
21 if the natural mortality rate is higher than we thought, then the  
22 F values you fish at would be higher.

23  
24 It's almost like, if you have higher natural mortality, because of  
25 these episodic events, you should really fish harder, because the  
26 fish are going to die anyway, periodically, from it, but there's  
27 always been that kind of relationship between natural mortality  
28 and F.

29  
30 I have had a hard time reconciling that in my head, how you go  
31 about it, and it gets at whether you -- If you believe, like with  
32 red grouper, that you have episodic mortality, should you set a  
33 more conservative reference point, and that means you're going to  
34 fish less hard, or should you in fact fish harder?

35  
36 **CHAIRMAN NANCE:** Luiz, to that point.

37  
38 **DR. BARBIERI:** Again, Roy, I think the difference is whether you're  
39 looking in the relatively short-term, right, what's going to be  
40 the immediate impact on the existing biomass of the stock, or, if  
41 you're looking as a long-term, over the entire lifespan --

42  
43 **DR. CRABTREE:** I am looking long-term, because I'm thinking in  
44 terms of MSY and things, which are long-term concepts. I mean, if  
45 you have the higher natural mortality, because of these episodic  
46 events, then the yields are going to be lower, because you're  
47 reducing the number of fish that are out there, but it's more about  
48 where the appropriate Fs would be.

1  
2 **DR. BARBIERI:** Right, but, whatever technique we use to estimate  
3 natural mortality, right, over the entire lifespan, if we take  
4 lifespan into account, for example, which is mostly how we do it  
5 now, right, you consider that, over the evolutionary timescale, or  
6 that lifespan, your natural mortality has already been adjusted,  
7 and so it represents a long-term average that doesn't account for  
8 the episodic events that are going to, in the short-term, impact  
9 the stock.

10  
11 **DR. CRABTREE:** But it's baked into the natural mortality rate that  
12 you're using long-term.

13  
14 **CHAIRMAN NANCE:** Sean.

15  
16 **DR. POWERS:** I'm not sure -- I am following more Roy's, but, you  
17 know, historically, red tides have been -- They weren't as bad,  
18 and now we're shifting to a time where red tide events become more  
19 and more pronounced, and juvenile habitat is becoming less and  
20 less, and all of those raise natural mortality, right, and so, I  
21 mean, that's -- Because we're basing natural mortality on history,  
22 that would mean that I think Roy's point -- That we're going to  
23 get into problems, and what's the -- Well, what's the consequence  
24 of raising natural mortality?

25  
26 **DR. CRABTREE:** I mean, we're really basing natural mortality on  
27 the --

28  
29 **DR. BARBIERI:** Think about total mortality, and you say, okay, if  
30 M is increasing, the only way to decrease that total mortality is  
31 to reduce F, because the two are additive.

32  
33 **DR. POWERS:** (Dr. Powers' comment is not audible on the recording.)

34  
35 **DR. BARBIERI:** Well, we know the consequences of that.

36  
37 **DR. CRABTREE:** Well, but so we're getting the M estimates that  
38 we're using out of how old the fish are, right, and so if, over a  
39 period of time, we're having episodic mortality events, we're going  
40 to see fewer old fish out there, because they're being killed by  
41 these episodic -- So that's going to change the view of M, and so  
42 in that sense, I can see how that means the episodic mortalities  
43 are already baked into it and shaping your M estimate.

44  
45 **CHAIRMAN NANCE:** But, like Luiz is saying, if your goal is to  
46 reduce Z, then you have -- The only way you can do it is to reduce  
47 F.

1 **DR. CRABTREE:** Yes, but the goal is not necessarily to reduce Z.  
2 The goal is to find the F that produces the maximum catches you're  
3 able to get out of it, and, if they're living shorter lives, and  
4 more of them are dying periodically, then you -- It's not entirely  
5 clear, to me, that fishing harder, or less hard, is going to let  
6 you catch more fish.

7  
8 **CHAIRMAN NANCE:** It seems like you're only saying that the older  
9 ones are dying.

10  
11 **DR. CRABTREE:** Well, no, but they're all -- I mean, it's affecting  
12 different ages differently, but, on average, you're going to see  
13 fewer old fish out there, over time, because more of them are  
14 dying.

15  
16 **DR. BARBIERI:** This is probably another Dave Chagaris talk for  
17 another day, right, and Dave comes back and kind of revisits that.

18  
19 **DR. TOLAN:** I was just going to bring that up, and didn't you come  
20 up and say, for red grouper, that, after a big mortality event for  
21 red tide, there is a bump in recruitment in the subsequent years?

22  
23 **DR. CHAGARIS:** I don't know that that's necessarily relevant to  
24 this discussion. I mean, that was more of an emergent property of  
25 the model, related the food web dynamics, but there have been quite  
26 a few simulation studies, even recent ones, looking at time-varying  
27 natural mortality in stock assessments, and I think that's really  
28 what we're talking about here, and I agree with the point that you  
29 made earlier, Luiz, about having sort of a long-term mortality  
30 that is reflective of just the life history and average natural  
31 mortality rate, and then these episodic events -- We think of them  
32 as components of natural mortality, because they aren't  
33 anthropogenic, but, if you think of them as not natural mortality,  
34 then I think it fits maybe within, you know, the approach that  
35 we're taking of reducing fishing pressure in the face of those red  
36 tide events.

37  
38 **DR. CRABTREE:** Yes, but I have a hard time not thinking of them as  
39 natural mortality, because they are, right?

40  
41 **DR. CHAGARIS:** So this has come up before, where -- I think actually  
42 Ryan may have brought this up, as far as like what if you assumed  
43 some -- There might be some average low-level red tide mortality,  
44 right, that is a part of your average natural mortality of 0.2 or  
45 whatever, and like maybe there's a small amount of red tide  
46 mortality that, on average, is there year after year, but, when it  
47 spikes, that severe increase in red tide mortality is not part of  
48 that average long-term --

1  
2 **DR. CRABTREE:** Let me ask you this. If you get really good at  
3 your job, in the next few years, so that you can predict when a  
4 red tide mortality event is going to happen --

5  
6 **DR. CHAGARIS:** That's not going to be my job.

7  
8 **DR. CRABTREE:** And how bad it's going to be, and you tell me, okay,  
9 next year, we're going to have really bad red tide mortality, then  
10 do you, as a manager, say, okay, let's go fish the hell out of  
11 them now, because they're going to die anyway, or do you just say,  
12 well, let's not fish, and we better not kill any, because they're  
13 all going to get killed?

14  
15 **DR. CHAGARIS:** So, yes, the omniscient manager would say go out  
16 and harvest all those fish before red tide kills them, and that is  
17 how that would --

18  
19 **CHAIRMAN NANCE:** If we get to the hurricane predictions, we can do  
20 it. Harry, please.

21  
22 **MR. BLANCHET:** I hate to take off of what was a very productive  
23 discussion there, but I can come back later, if people want to  
24 keep on going with what they were talking about.

25  
26 **CHAIRMAN NANCE:** Go ahead.

27  
28 **MR. BLANCHET:** Okay. It's kind of a different thought process  
29 entirely, as you might expect, and the simulations here are all  
30 based on long-term potential reductions in average recruitment,  
31 because of the steepness, and we have issues, in the Gulf, for  
32 some species, where we run an assessment, and we see all of the  
33 recruitment that, for the last umpteen years, depending upon the  
34 species, has been above the long-term expected, and so the current  
35 status of the stock, especially in the younger age classes, is  
36 much more optimistic than what we had seen, or what had been  
37 predicted, based upon the prior assessment.

38  
39 Rather than operating off of projected long-term recruitment, the  
40 management often is responsive to shorter-term observed changes in  
41 recruitment and stock size, and I am not quite sure how that  
42 management strategy -- Because the opposite is also the case.

43  
44 If we have a case where we have reduced recruitment, because of  
45 red tide or some unexplained event, and we have recruitment coming  
46 into the fishery that's below, we can recommend harvest levels  
47 that would be below projections based upon mean recruitment, and  
48 so there is an adjustment, both up or down, based upon recent past

1 history.

2  
3 To me, that's a very different approach than what you're saying  
4 when you say that you've got a stock that you are projecting 80  
5 percent of the average recruitment, or 60 percent, or whatever the  
6 number is, going into the long-term future. In this case, you're  
7 responding to what actually has happened and not looking at the  
8 long-term trend. You're looking at the long-term trend only as a  
9 benchmark to say where are we, and what has actually occurred,  
10 versus what was expected, and so how does that apply to this?  
11 Thank you.

12  
13 **DR. HARFORD:** Thank you for that. That's a really good question,  
14 and the short answer is we did not evaluate the issues that you're  
15 raising, and so that certainly is a caveat to this study. In other  
16 words, we look at the long-term outcomes, but we did not look at  
17 the short-term outcomes, issues like catch stability or biomass  
18 fluctuations, over shorter time horizons, like say several years  
19 to a decade, and that -- I don't know whether that would change  
20 our view, in terms of proxy, but I think it's a very good question  
21 that's been raised about this decision at-hand. Thank you. Thank  
22 you for making that point.

23  
24 **CHAIRMAN NANCE:** Thank you, Harry. Todd.

25  
26 **DR. TODD GEDAMKE:** Bill, I thought you would lead this right into  
27 an adaptive management comment, and so I thought I would just stand  
28 up and give a plug, because those comments were ideal. I mean,  
29 yes, there's a difference between short-term and long-term --

30  
31 **CHAIRMAN NANCE:** Would you introduce yourself, please?

32  
33 **DR. GEDAMKE:** I'm sorry. This is Todd Gedamke, MER Consultants,  
34 in the gallery. Bill was faced with these questions, working in  
35 Belize, and he actually has developed additions, or modifications,  
36 to this that deal with adaptive management that touch on virtually  
37 everything, other than the red tide, that you just discussed, what  
38 was the biomass taken last year, and what is the initial CPUE  
39 decline of an opening, and the parameters that could set up by  
40 this group could be chosen exactly as you've listed them out. We  
41 are concerned about adaptive management, or the red tide, and we're  
42 concerned about this, and, although you might not be omnipresent  
43 and all-knowing, you do have indications that are there, and this  
44 type of setup can be used to address those comments directly.

45  
46 **CHAIRMAN NANCE:** Thank you. Carrie, please.

47  
48 **EXECUTIVE DIRECTOR SIMMONS:** Thank you, Mr. Chair, and so I have

1 a general more ecology question, based on some of the data  
2 limitations that we have in the Southeast, and just have you done  
3 any simulations that look at a difference in how you define SPR?  
4 I think, in your paper, you look at it per recruit, spawning  
5 biomass per recruit, is how you're defining it, but have you done  
6 any, I guess, simulations, using total biomass or egg production?

7  
8 We do that as well, in the Gulf, to see, you know, with the  
9 simulations, based on the life history information we have  
10 available, you know, what would be a better proxy, based on that  
11 data that we have and what we're trying to achieve, from the  
12 management side of the house.

13  
14 **DR. HARFORD:** The short answer is no, and I think that that data-  
15 limited question is an important one, and I, you know, very, very  
16 briefly pointed out that there are some issues there that need to  
17 be addressed. I think it also speaks to the hermaphroditic species  
18 as well, and so I appreciate your question. Again, the short  
19 answer is it's something we can look into, but we haven't included  
20 that here.

21  
22 **CHAIRMAN NANCE:** Okay. Any additional questions from the SSC?  
23 Luiz, please.

24  
25 **DR. BARBIERI:** Bill, just to thank you, again, for coming over,  
26 and, as you can see, it just generated a lot of debate, right,  
27 and, I mean, we read this paper when it first came out, and the  
28 committee has revisited the paper and discussed it several times,  
29 and so it was great to have you here, so we could have this back-  
30 and-forth and expand the scope, right, of questions that were  
31 asked, and perhaps think about, okay, what could be potential next  
32 steps for things that we could be using, right, to more closely  
33 work with the council in addressing some of these issues.

34  
35 **DR. HARFORD:** Thank you, Luiz. It's my pleasure, and, you know,  
36 I will also add that I will come to Tampa anytime, but getting an  
37 invite to come to Tampa in the winter, when I live up north, was  
38 awesome, and so thanks again.

39  
40 **MR. RINDONE:** Noted. Schedule Bill for winter months.

41  
42 **CHAIRMAN NANCE:** We're glad that we could make it happen. I also  
43 wanted to just say that we greatly appreciate your willingness to  
44 come down and to be able to do this. I remember the presentation  
45 in 2019, and I think I appreciated it more here, having you here,  
46 and I think the discussion was, I think, a lot more valuable, with  
47 us all sitting around the table, to be able to do that, and so  
48 thank you again.

1  
2 **DR. HARFORD:** Thanks again.

3  
4 **CHAIRMAN NANCE:** Let's go ahead and take a break, and we'll come  
5 back at twenty -- I guess it will be 2:40 Eastern Time.

6  
7 (Whereupon, a brief recess was taken.)

8  
9 **CHAIRMAN NANCE:** Okay. I think we can come back now. I'm glad we  
10 -- You know, that's one of the nice things about being able to  
11 meet together, is we can have discussions in the back and so forth,  
12 and I certainly encourage that. We'll go ahead and move to Agenda  
13 Item Number XIV, which is the Scamp and YMG Updated Projections  
14 Within the Shallow-Water Grouper Complex. I think YMG is  
15 yellowmouth grouper, and so, Ryan, would you go over the scope of  
16 work, please, and then we'll, I think -- Skyler, are you on?

17  
18 **DR. SKYLER SAGARESE:** I am.

19  
20 **CHAIRMAN NANCE:** Good. It's nice to be able to hear your voice.  
21 Ryan, go ahead and do that, and then we'll turn the time over to  
22 Skyler.

23  
24 **SCAMP/YMG UPDATED PROJECTIONS WITHIN SHALLOW-WATER GROUPE**  
25 **COMPLEX**

26  
27 **MR. RINDONE:** Sure, and so Sky is going to present the updated  
28 projections for the shallow-water grouper complex, which includes  
29 scamp, yellowmouth grouper, black grouper, and yellowfin grouper.  
30 Scamp and yellowmouth were recently assessed in SEDAR 68, which  
31 examined both species together and found them healthy. The council  
32 did not express interest in creating a new share category for scamp  
33 and yellowmouth grouper, as part of the shallow-water grouper  
34 component of the IFQ program, and it wanted to basically keep that  
35 complex of four species together, and so the Science Center was  
36 requested to update the projections for the entire complex, which  
37 is what that data file is for in the briefing materials, and that  
38 necessitated calibrating historical landings for black grouper and  
39 yellowfin grouper to MRIP-FES, to match the data units used for  
40 scamp and yellowmouth.

41  
42 The species in the shallow-water grouper complex do not use sector  
43 allocations, and so you guys should review Sky's presentation,  
44 which talks about another request that the SSC had to look at 40  
45 percent SPR and a different recruitment scenario, and consider  
46 catch limit recommendations to the council, as appropriate.

47  
48 **CHAIRMAN NANCE:** Skyler, before you take off, just -- We have the

1 presentation here from Skyler, and we also have some stuff that  
2 Ryan sent out this morning, landings data, and so, if you have not  
3 looked in your email, please do so, because that will be pertinent  
4 in our discussions. Skyler, go ahead, please. Thank you.

5  
6 **DR. SAGARESE:** Thank you very much. Yes, and so it's good to be  
7 back, and I apologize that I'm not there in-person. I will be  
8 someday, I promise, but this just seemed like it wouldn't be taking  
9 too much time to warrant travel to Tampa. What I'm going to  
10 present today are some additional projection work that we've done  
11 since Katie presented the SEDAR 68, the scamp operational  
12 assessment, results back in September.

13  
14 Where we left off with that meeting was -- I know there was a lot  
15 of good discussion, and one of the pieces of homework that we had  
16 was trying to decide how we would handle the recruitment assumption  
17 within our projections to try to estimate OFL calculations, and  
18 so, at that meeting, it was recommended by the SSC to switch to  
19 that mean recruitment, because recent mean recruitment has been  
20 much more different compared to the whole time series.

21  
22 In this case, for scamp, it was to use the last ten years of  
23 estimated recruitment, and so, for scamp, we only estimate  
24 recruitment deviations through 2017, and I will get into that a  
25 little bit more in the next slide, but, ultimately, what the cause  
26 for concern was here is you can see, with our estimated age-zero  
27 recruitments, for the whole time series, that you can see the last  
28 ten years, where it was estimated from 2008 to about 2017, is much  
29 lower, whereas those last three years -- Because we did not  
30 estimate recruitment deviations, the model input essentially is  
31 placeholders based directly from the spawner-recruit curve, and so  
32 those three estimates, in those last three years, definitely seemed  
33 overly optimistic in the current base model configuration, and so,  
34 depending upon how we treat recruitment in our projections, the  
35 decision on how to handle those years would make a big impact in  
36 the short-term.

37  
38 Why was this an issue, and so the scamp assessment was unique in  
39 that, for many of our other stocks, like gag and red grouper, we  
40 tend to have more information on the younger age classes, and we  
41 have the survey for gag, and we have the SEAMAP groundfish survey  
42 for red grouper, but, for scamp, we didn't have a lot of data  
43 sources that actually catch the smaller individuals, and so we  
44 didn't think there was enough information in the data to actually  
45 estimate recruitment deviations through our terminal year of 2020,  
46 and so we made the decision to stop the estimation of the deviation  
47 in 2017, because the -- Because scamp tends to start appearing in  
48 the recreational fishery data around three years old, and, of

1 course, if they're below, they tend to be discarded.

2  
3 We didn't think there was enough information there, and that's why  
4 that decision was made and accepted by the panel throughout the  
5 research track process, and so what you see with -- I mentioned in  
6 the previous slide, and you can see that we have 2018 through 2020.

7  
8 The way Stock Synthesis works is, because we're not estimating  
9 deviation there, it just pulls and says your recruitment estimates  
10 for those years, those last three years, come directly from the  
11 spawner-recruit curve, which, in this case, is an estimate of  
12 recruitment of about 1.2 million scamp each year for those three  
13 years.

14  
15 Where this became an issue is, normally, it's very easy for us to  
16 just update our projections and change the assumption of  
17 recruitment to the recent mean, and we have no issue, but, in this  
18 case, you can see that that 2018 to 2020 -- That's three years at  
19 the end of the assessment, and changing that one assumption about  
20 those recruitment estimates actually did have somewhat of a  
21 noticeable difference on our assessment model, and it did not  
22 converge.

23  
24 The reason why it did not converge is because the recruitment  
25 estimates in those three years led to slightly different parameter  
26 estimates. We looked at the differences, and only twelve of the  
27 parameters had differences within more than 5 percent from the  
28 base model estimates, and many of them were recruitment deviations.  
29 As you can imagine, when you change a recruitment estimate for one  
30 year, it can kind of go back in time and affect the others, but it  
31 was also a big difference due to the recreational fisheries,  
32 especially the charter and private. One of the length-based  
33 selectivity parameters was different, and it had one of those  
34 larger differences, which we did emphasize in the base model.

35  
36 There was a lot of uncertainty in some of these parameters anyway,  
37 and so I think what we're seeing here is just that small change in  
38 how recruitment was handled in the last few years of the assessment  
39 period. You see that there was a slight difference there, and so,  
40 when we tried to project forward with this model, it did not do  
41 what we thought it was doing, and it was not using the same model  
42 parameters, and so we were uncomfortable with that. We didn't  
43 want to present results from the model that did not converge  
44 throughout the projection.

45  
46 What we did to alleviate this issue, and I think Katie mentioned  
47 this when she presented in September, and this was one of the  
48 options that we were going to look into, and, essentially, what

1 we've done is we've run a sensitivity run for our base model that  
2 is documented throughout all of the SEDAR 68 operational assessment  
3 documentation. All we did here was allow the model to estimate  
4 recruitment deviations through 2020, and what see -- I am just  
5 plotting -- This is a comparison of the recruitment deviations,  
6 estimated by each model on the left, and then the age-zero  
7 recruitment estimates on the right.

8  
9 Now, of course, I screwed up the labeling here, because I manually  
10 entered the labels, but, on the left, you will see that our base  
11 model -- Our base model is the one in blue, where we estimated  
12 recruitment deviations through 2017, and you can see that, from  
13 2018 to 2020, the recruitment deviations are zero, whereas, in our  
14 sensitivity model, we did estimate recruitment deviations through  
15 the terminal year of 2020. The first thing to note on that figure  
16 is the huge uncertainty when you actually do estimate those  
17 deviations, particularly in 2019 and 2020.

18  
19 Of course, you know, the more recent -- We don't have a lot of  
20 information, and so we expected that high uncertainty, but the  
21 good thing here is that, you know, the zero estimate, that we  
22 assumed previously, does fall within those wide ranges for each of  
23 those years, and so, on the right, you can just see the changes in  
24 recruitment, and so what we initially had thought was a little  
25 overly optimistic, and you see that, yes, the model -- If you did  
26 estimate the deviations in those years, you would see lower  
27 recruitment, which is more in line with what you thought might be  
28 occurring.

29  
30 **CHAIRMAN NANCE:** Skyler, just so I'm clear, the right-hand graph  
31 is estimate through 2017, like we've seen, and the right is the  
32 base model estimated through 2020.

33  
34 **DR. SAGARESE:** Both figures show the base model in red -- Sorry.  
35 The base model is in blue points, and then the sensitivity run is  
36 in red, and so they're just the different trajectories through  
37 each of the models. Both models have terminal years of 2020, but  
38 one stops the recruitment deviations in 2017, which was our base  
39 model, in blue.

40  
41 **CHAIRMAN NANCE:** That's the one on the left, isn't it? Then the  
42 right is the new run. No?

43  
44 **DR. SAGARESE:** No, and both runs are shown in each figure.

45  
46 **CHAIRMAN NANCE:** Okay. Thank you. That's why I was -- I was  
47 having a hard time understanding this one. Okay. Thank you.

1 **DR. SAGARESE:** Yes, and so these are our comparison plots, and, if  
2 you look in the documentation report, the projection report, the  
3 labels are correct, and we show a couple more comparison plots  
4 that you're using to seeing in our assessment reports, and so this  
5 is just comparing essentially the dry quantities for each of the  
6 model runs. The take-home here is that what we showed with the  
7 base model, in blue, that those trends don't deviate that much  
8 from what we saw in our sensitivity run. They do remain within  
9 the bounds. Any other questions, or should I continue?

10  
11 **CHAIRMAN NANCE:** Only me was frustrated. Go ahead.

12  
13 **DR. SAGARESE:** Okay. Next slide, please. Okay, and so, just to  
14 refresh, what I'm going to show now -- I'm going to walk us through  
15 a couple of different projection iterations that we've done. The  
16 first set I'm going to show -- The only difference from what we've  
17 shown in the past, with what Katie presented, is this is looking  
18 at trying to get at our OFL estimates, and so, for these  
19 projections, we're really interested in the short-term, and so  
20 we're assuming that our recruitment is derived from the recent  
21 mean, and so it's lower than what our benchmark had shown, and so  
22 that's the only change highlighted in red here. The scenario is  
23 -- Everything else is the same, the way we've assumed selectivity  
24 and retention, the interim landings, and all of that remains the  
25 same as what you've seen in all the SEDAR 68 operational  
26 documentation to this point.

27  
28 Again, this is kind of the continuity from what you've seen in the  
29 past. Just a refresher for scamp is it was recommended to look at  
30 the MSY proxy of 40 percent SPR, and so these results that we're  
31 showing now -- This is starting our projection in 2023, which is  
32 what we've done in the past, and also redefining our optimum yield  
33 as 90 percent of our MSY, and so it's not 90 percent of the  
34 exploitation rate, and I know we've had some discussion on showing  
35 these results this way.

36  
37 A reminder that this is our OFL projection, and we're only  
38 interested in the short-term. This is essentially changing -- The  
39 only thing that has changed from the benchmark to this is how we  
40 treat recruitment in our projection period, and so we're assuming  
41 much lower recruitment than if recruitment were derived from the  
42 spawner-recruit curve.

43  
44 The first thing to check that is looking at the recruitment column.  
45 Instead of about, what did we say, 1.2 million, you can see that  
46 it's about 900,000, and so our recruitment is lower than -- It's  
47 essentially that average recruitment from 2008 to 2017. We're  
48 fishing -- Looking at the F over F SPR 40 percent column, we're

1 fishing at F SPR 40 percent, which is where we want to be, and so  
2 our projection is doing what we expect.

3  
4 The one thing to note is that our -- Remember that our benchmarks,  
5 and so our equilibrium SSB and the long-term and the minimum stock  
6 size threshold, those metrics are coming from our previous  
7 benchmark results that Katie had presented for 40 percent FSPR.  
8 The benchmarks do not change in the short-term projection. We're  
9 still comparing to that annual, where we want to be, from the long-  
10 term projection, which was derived with recruitment coming from  
11 the spawner-recruit curve.

12  
13 The first thing you notice, when you compare this table to what  
14 you've seen in the past, is, number one, the spawning stock biomass  
15 estimates for these near-term years are lower than what they show  
16 in the other run, which is a direct function of how we treated  
17 recruitment, and so we're saying now that there's less recruitment  
18 for the population, and so there's not going to be as large of an  
19 SSB, and so you're seeing a smaller total SSB per year, but you're  
20 seeing ratios that look much different.

21  
22 It's not that we're fishing towards MSST, but it's just that the  
23 population we're actually -- It's smaller than what we thought,  
24 and so we're fishing it down, but we're still using those  
25 benchmarks from the other run, and so we're not redoing benchmarks,  
26 but we're just giving you an idea of, for these five years in the  
27 short-term, what's going on, and how are these ratios changing,  
28 and then we're also showing -- The last few columns are -- All of  
29 the projected yields that you're going to see for scamp in this  
30 presentation are million pounds gutted weight, and as well as the  
31 optimum yield. Any questions on that?

32  
33 **CHAIRMAN NANCE:** Luiz has a question, please.

34  
35 **DR. BARBIERI:** Thank you, Mr. Chairman. Thank you, Skyler, for  
36 the presentation, but just a quick question. The one thing that  
37 I didn't quite get, when I was reading through this, is how did  
38 you manage to get the model to converge? I mean, what change did  
39 you make that got the projection model to actually converge?

40  
41 **DR. SAGARESE:** Yes, and so that's a good question, and so what  
42 ended up happening with -- We essentially switched to that, instead  
43 of -- Let me back up. The only change we made to get the model to  
44 converge was we allowed the model to estimate the recruitment  
45 deviations in 2018, 2019, and 2020, and, because the base model -  
46 - We ended recruitment deviations in 2017, and, because we had  
47 three additional years in Stock Synthesis, where it was expecting  
48 recruitment estimates, it basically filled in those last three

1 years, 2018, 2019, and 2020, with an estimate from the spawner-  
2 recruit curve, and so, when we changed that, and instead of SS  
3 using that spawner-recruit curve, SS then used that recent mean,  
4 because it's the period called the late deviations, and so SS  
5 changed the behavior of how that recruitment was estimated.

6  
7 That was the issue we were having, and so when we -- We changed  
8 how we wanted to handle recent mean recruitment in the projection,  
9 and that small change in those last three years by SS, that we  
10 couldn't model or code our way around, it gave us a slightly  
11 different result in those 2018, 2019, and 2020, and that's why the  
12 model did better, because we were better able to -- The parameter  
13 estimates, for example, were in a better space for the charter and  
14 private selectivity, and that was one of the biggest issues, and  
15 so I think it was just an issue with that selectivity pattern that  
16 was causing the model to crash initially, but, by changing that  
17 recruitment in SS, that we were kind of forced to do -- By changing  
18 that, by changing to recent mean recruitment, the model did  
19 converge, quite nicely.

20  
21 You know, we've redone all the diagnostics, and all the plots, to  
22 make sure there were no major changes there, and this model -- The  
23 sensitivity run performed very similarly to our base model.

24  
25 **DR. BARBIERI:** Perfect, and, Skyler, thank you.

26  
27 **CHAIRMAN NANCE:** Any other -- John, please.

28  
29 **DR. FROESCHKE:** Yes, and hi, Skyler. I'm really struggling with  
30 this, and I appreciate you entertaining some previous questions  
31 about this, but I still don't understand how we're fishing down  
32 the biomass in the short-term toward MSST, and I'm assuming like,  
33 if you carry this projection beyond 2028, at some point the SSB  
34 over MSST would start increasing. I mean, to me, it should reach  
35 equilibrium, at 1.33, I think, one divided by 0.75, and, in the  
36 report, and I think it's Figure 1, it seems to indicate that, at  
37 some point, it goes back up, but I can't tell, mechanistically,  
38 what we're doing that would lead to that increase.

39  
40 **DR. SAGARESE:** Okay, and so, first, I just wanted to clarify, and  
41 Figure 1 is from the benchmark projection. Figure 1 is not  
42 comparable, in terms of the derived quantities, because that is  
43 our -- It's a different assumption, and our projected recruitments  
44 are handled differently. Yes, the SSB trend in those first two  
45 years, and so 2024 to 2028 -- The SSB is doing something  
46 differently, again because we're handling projected recruitment  
47 differently, and so that makes that difference.

1 The thing to note here is that, if I were to carry this projection  
2 forward, long-term, which we do, and we do that anyway, but it's  
3 not -- We don't trust this projection beyond the first maybe --  
4 You know, five years is generally what we present, because we're  
5 uncertain what's going to happen, because we don't -- You know,  
6 you don't want to treat this newer regime, in a lower recruitment,  
7 as your benchmark, because the benchmarks would then change.

8  
9 If you take this projection a hundred years, you don't reach the  
10 same final SSB point, and you actually would reach lower SSB, and  
11 so I do want to be careful of comparing the benchmark projection,  
12 where recruitment comes from the spawner-recruit curve, with these  
13 short-term calculations, where we're programming recruitment to  
14 follow the recent mean recruitment, and so there are differences  
15 in these first five years, and it's due to that recruitment  
16 assumption.

17  
18 **CHAIRMAN NANCE:** Katie.

19  
20 **DR. SIEGFRIED:** I can help a little bit with this. When we talked  
21 about it, after the initial discussions with council staff, and I  
22 understand the confusion from the report, and, you know, what  
23 Skyler just said is exactly right, but it helps to maybe say it a  
24 couple of different ways.

25  
26 This table is not the same as what's in Figure 1, and so the table  
27 from Figure 1, against this table, would be different, and you  
28 would see the stock going towards SSB SPR 40, but the recruitment  
29 would also be different, because this is using lower recent  
30 recruitment, and this isn't the average recruitment from the stock-  
31 recruit curve, which is what we use to set the benchmarks.

32  
33 This is showing the request from the SSC, which actually is for  
34 ABC, but she also offered you OFL, to use recent mean recruitment,  
35 which is just meant for short-term projections. For the long-term  
36 projections, and so the benchmarks, she used the average  
37 recruitment from the stock-recruit curve, and so don't compare  
38 this with Figure 1.

39  
40 **DR. FROESCHKE:** I guess this is a follow-up, and it seemed like,  
41 in amberjack, we did that differently, where we did make the  
42 projections based on a lower recruitment estimate in perpetuity,  
43 did we not?

44  
45 **DR. SIEGFRIED:** Well, all of the projections are carried out, you  
46 know, to longer time scales, but the difference here is she's  
47 showing you the effect on getting -- What an OFL would be, as  
48 opposed to, for amberjack, we showed you a different ABC.

1  
2 **DR. FROESCHKE:** So last question. On this particular one, if you  
3 forecasted it out, if you continued it down through time, what  
4 would the column SSB over MSST stabilize at?

5  
6 **DR. SIEGFRIED:** Well, we can look at that, but that's hopefully  
7 not the goal, because all of this is supposed to be a short-term,  
8 to show you what would happen if you had continued low recruitment.  
9 We're not trying to get to an equilibrium with this lower  
10 recruitment. If that was the case, that would be like the first  
11 example, with amberjack, where we set the benchmark lower, because  
12 we assumed low recruitment in perpetuity, and so this isn't meant  
13 to be seen long-term, because we don't think we're going towards  
14 an equilibrium of this projection.

15  
16 **CHAIRMAN NANCE:** With amberjack, we were doing that low recruitment  
17 out basically forever, and we were saying that's what it was going  
18 to be during the projection time, where this is just short-term.

19  
20 **DR. SIEGFRIED:** We showed that, but that was a changing -- That  
21 was the regime shift idea. We're not arguing a regime -- Well, I  
22 didn't think that you all argued a regime shift for scamp, and so  
23 this is kind of Skyler going above and beyond and showing you the  
24 OFL version of lower recruitment, as well as the ABC version.

25  
26 **CHAIRMAN NANCE:** Okay. Okay. Doug.

27  
28 **DR. SIEGFRIED:** Sorry to interrupt, Sky.

29  
30 **MR. GREGORY:** I am not sure that I understand what's going on. I  
31 think, anytime you present this particular table, to the council  
32 or to us, it's going to invoke the same questions, because it  
33 doesn't intuitively make sense that recruitment is constant, and  
34 we're fishing at a constant, more conservative fishing mortality  
35 rate than we have ever projected for OFL, yet spawning biomass is  
36 declining, to the point where, at the end of the five-year period,  
37 we're going to be down to MSST.

38  
39 I mean, that just doesn't seem like an appropriate direction to  
40 go, and I will leave it at that, because I don't fully understand  
41 what these explanations are, and why are we looking at a table  
42 with different recruitment from the projections for OFL and ABC,  
43 if that's what is going on?

44  
45 **CHAIRMAN NANCE:** Thank you, Doug. Luiz, to that point.

46  
47 **DR. BARBIERI:** Let me see if I can explain this. I mean, this was  
48 our choice. Remember that we had this discussion, when we

1 discussed these projections the last time, and the difference here  
2 is that scamp doesn't have a rebuilding plan, because it was not  
3 found to be overfished, but, again, because we wanted to account  
4 for the low recruitment during the next few years, you know,  
5 potentially expected to be low recruitment, we wanted to have  
6 projections that accounted for that lower recruitment, but still  
7 have the regular reference points that were used in the assessment,  
8 that are based on the average stock-recruitment relationship, to  
9 estimate reference points, right, because, you know, this is not  
10 giving us the long-term, and we don't expect that this is going to  
11 go in the long-term, but we wanted to account -- If there is  
12 something happening in the short-term that is causing recruitment  
13 to be lower, we wanted to have that accounted for as we provide  
14 catch advice, and I don't know if that helps, Doug.

15  
16 **CHAIRMAN NANCE:** Go ahead, Roy.

17  
18 **DR. CRABTREE:** In this instance, even if we fish at the appropriate  
19 F level, if the recruitments remain low like this, the stock is  
20 never going to get back to where it needs to be, and we just don't  
21 -- We think that it will revert to the mean at some point, because  
22 we don't have any evidence that there's a new regime here, but  
23 that's what is driving this.

24  
25 Now, it is a concern that we're approaching the MSST, and that's  
26 with the 2023 start date, which doesn't seem likely to be, and  
27 it's 2024, and I think it's even more pronounced when you start  
28 later, and so this is a stock, because of those low recruitments,  
29 that we need to be conscious of this happening, and the council  
30 needs to be careful.

31  
32 **DR. BARBIERI:** Exactly, and that's the presentation, Mr. Chairman,  
33 as it presents to the council. We have to be explicit about all  
34 these things, so they understand that the goal of these projections  
35 is really short-term catch advice.

36  
37 **CHAIRMAN NANCE:** Katie, please.

38  
39 **DR. SIEGFRIED:** The way Roy said it is the way that I should have  
40 said it, and that's exactly right. What is being shown here is  
41 that, if you fish with the benchmark from the average recruitment  
42 from the stock-recruit curve, and so F over FSPR 40, with low  
43 recruitment, lower than average, you're never going to get to that  
44 benchmark, and so this is like a cautionary tale of that instance.

45  
46 **CHAIRMAN NANCE:** That's the first time somebody has said that about  
47 Roy.

1 **DR. CRABTREE:** In twenty years of doing this.

2  
3 **DR. SIEGFRIED:** But, I mean, Doug's intuition is not wrong either,  
4 because he saw the caution and went, oh, this isn't what we should  
5 be doing, and that's what we're saying. If you continue down this  
6 road with low recruitment, it's a problem.

7  
8 **CHAIRMAN NANCE:** If we are projecting with low recruitment, and  
9 staying at the same fishing level, this is what is happening. We  
10 will approach SSB over MSST, and we're going to go below one,  
11 through time. Josh, please.

12  
13 **DR. KILBORN:** Thank you. If you look at Slide Number 2, I think  
14 we might -- I'm curious why we don't think this is a regime shift  
15 and why we think this might go back to, you know, an average  
16 recruitment that is maybe more acceptable, because, if you look at  
17 that slide on Number 2, I mean, it's been almost twenty years of  
18 low recruitment for this stock, and that sounds like a regime  
19 shift, right, and so I'm just curious why we're not having that  
20 conversation as well.

21  
22 **CHAIRMAN NANCE:** Go ahead, Roy.

23  
24 **DR. CRABTREE:** Well, I think that's a good question, and we spent  
25 a lot of time on this discussion with greater amberjack, where we  
26 had a similar situation, where we had I think it was at least  
27 twenty years of low recruitment, and so the unresolved question we  
28 have is how long do you have to be in a low-recruitment period  
29 before you do feel like you can declare a regime shift has occurred  
30 and re-estimate all of these parameters?

31  
32 I don't believe we have ever done that, to my knowledge, but we  
33 seem to think that it's longer than fifteen to twenty years, and  
34 you have to have some reasons, but, given the ecosystem changes  
35 that are happening, with water temperature and other things in the  
36 Gulf, I think this is going to be an issue that isn't potentially  
37 going to go away, and we're going to have to deal with it at some  
38 point.

39  
40 **CHAIRMAN NANCE:** I think we did -- We have used that long-term  
41 average from our last meeting, and so it's those lower recruitment  
42 levels that we used. Mike.

43  
44 **DR. ALLEN:** Thanks, Mr. Chair. One difference with the amberjack  
45 discussion was that there had been a lot of management changes and  
46 no response in recruitment, and I don't know if, in this case --  
47 Our last discussion was there haven't been the management changes,  
48 and the expectation was that it would go back up, and that may or

1 may not be true.

2  
3 **CHAIRMAN NANCE:** It is right, because we spent some time talking  
4 about that. David, please.

5  
6 **DR. CHAGARIS:** Then, on the regime shift idea, you know, there is  
7 some counterintuitive consequences that come along with assuming  
8 a regime shift, and we saw some of those presentations at the  
9 National SSC Meeting in Alaska, and, essentially, what that would  
10 result in, and this was shown with greater amberjack, I believe,  
11 was that you basically are throwing in the towel and saying that  
12 the stock is no longer ever going to be able to reach its previous  
13 unfished spawning stock biomass, and so you actually would fish it  
14 more aggressively, because now you aren't trying to reach this  
15 higher bar, and so it would actually probably look worse than, you  
16 know, what was shown in that previous table.

17  
18 **CHAIRMAN NANCE:** Jim.

19  
20 **DR. TOLAN:** Thank you, Mr. Chairman, and I want to take sort of a  
21 counter regime shift point. To me, and I've seen this many, many  
22 times, from the 1980s, and we're basically going back to where we  
23 were before. If you look at the recruitment for this species in  
24 the 1980s, up to the 1990s, it's about where it is now, and I've  
25 seen a number of species, in the 1990s and the 2000s, where it's  
26 just taken off, and it returned right back to where it was before,  
27 and so I don't think it's a regime shift, and I think it's just a  
28 return, whether it's an environmental factor or what, but I say  
29 this is just -- It's a return to what it was, and I'm supportive  
30 of the way that we're doing this, these last ten years, and I think  
31 it's right back to where the line started out at, and so I'll just  
32 take the counterpoint.

33  
34 **CHAIRMAN NANCE:** Any other questions? Trevor, please.

35  
36 **MR. MONCRIEF:** I was just going to support kind of what Jim just  
37 said. That's kind of the direction that I was going in, and, maybe  
38 for the folks that were a little bit more intimately involved in  
39 this assessment, and, I mean, are we to the point where we  
40 understand this species well enough to try to make that assumption  
41 about a regime change?

42  
43 You know, I saw the landings that were sent, and I looked into it  
44 a little bit more, and peak alters wave-by-wave and by year, and  
45 sometimes it's in March, and sometimes it's in June, and sometimes  
46 it's in July. I mean, it just seems like -- I don't think we have  
47 a very good hold on the species as a whole, and that's to be  
48 expected, because of how much it's caught, and it's relatively low

1 in the recreational fishery, and a little bit more so in the  
2 commercial fishery, and then, also, just given the amount of  
3 information that's on the species, and so maybe I'm on the wrong  
4 track here, but I don't know if we have a very good hold on this  
5 species, to really make concrete decisions on it to that degree,  
6 and maybe that didn't make sense, but that's my view.

7  
8 **CHAIRMAN NANCE:** Thank you, Trevor. Any other -- Okay, Skyler.  
9 It looks like we can move on.

10  
11 **DR. SAGARESE:** Okay. Great. The next slide is just the same  
12 procedure, with the exception of starting our projections in 2024,  
13 and so, for this, we put the 2023 landings, assuming they're the  
14 same as 2022, and those 2022 estimates were based on the 2019 to  
15 2021 average, and, again, you know, we're showing the same  
16 information, and we're projecting with the recent mean recruitment  
17 being low, and we're projecting F 40 percent SPR, and we're showing  
18 you potential OFL and OY.

19  
20 I do want to note, before we kind of talk too much about this  
21 slide, that I would like to cover the next one as well, because,  
22 as I was reviewing that spreadsheet of landings that correspond to  
23 the shallow-water groupers, we noted that there was a pretty large  
24 difference in the 2021 charter landings, and so what we did was we  
25 went back and found that the source of that was a data correction  
26 that was made by the Office of Science and Technology for the  
27 charter, in west FLorida specifically, in all of the waves of 2021.

28  
29 We wanted to update the charter and private landings for 2021,  
30 using the most recent information, which was about 12,000 fish  
31 lower, which was a fairly large difference, and also update our  
32 average landings that was then input for 2022 and 2023 for our  
33 projections, and so this is essentially the last step of the  
34 projection that we're showing, where we're starting in 2024, and  
35 we've also updated charter and private to use the most recent  
36 information, which, unfortunately, for SEDAR 68, I literally just  
37 missed --

38  
39 The data pull that I got was almost a week before they identified  
40 the correction, and I just wasn't made aware, and so we've updated,  
41 to the best of our ability, and this is essentially what we would  
42 be looking at for the OFL projection under this recent mean  
43 recruitment being a lower scenario for F SPR 40 percent, and so  
44 you note that, in this case, yes, we still have the same trends of  
45 what we saw, but, again, we're only interested in the short-term.

46  
47 We're not assuming that this is going to go long-term, and so the  
48 benchmarks are derived from our projection run that assumed

1 recruitment from the spawner-recruit curve, and so here would be  
2 the estimates.

3  
4 **CHAIRMAN NANCE:** So that paints a little rosier picture.

5  
6 **DR. SAGARESE:** It makes sense, because we've been assuming --  
7 Sorry. Go ahead.

8  
9 **CHAIRMAN NANCE:** I'm sorry, Skyler.

10  
11 **DR. SAGARESE:** I was just going to say that it does paint a little  
12 rosier of a picture, because we were assuming higher  
13 charter/private landings in the first few years of the projections,  
14 and they're actually lower, as well as that average, and so it  
15 comes down a little bit, and so we see a slightly different  
16 picture.

17  
18 **CHAIRMAN NANCE:** Yes. Thank you. I was just making sure that I  
19 was depicting that in my head correctly. Okay. It looks like no  
20 questions on that. Go ahead.

21  
22 **DR. SAGARESE:** This is the last projection, and what we did was  
23 provide an ABC, under the assumption that the ABC value would be  
24 75 percent of fishing at F SPR 40 percent, and we tend to provide  
25 this value for other stocks, and so we added it here, but, of  
26 course, that number could always change, and we could always adapt  
27 as you see fit, and, in this case, again, this is all the same  
28 specifications that we've seen. The recent mean recruitment is  
29 about 900,000 fish, and you can see that.

30  
31 You can see, in the projection, that we're fishing at 75 percent  
32 of that F SPR 40 percent, and this is what the yields would be,  
33 and you can see they're pretty similar. In each of these years,  
34 it's about 0.268. It's pretty similar, and so you see much less  
35 variability. Sorry. That's the SSB ratios, but the yields are  
36 very, very similar in those five years, 0.203, and, again, these  
37 are just yields, in millions of pounds gutted weight, and I don't  
38 know if this would be the ABC selected, but it's one option that  
39 we've provided.

40  
41 **CHAIRMAN NANCE:** Okay. Thank you. On this one, with the ABC  
42 projection, which is 0.75 of F 40 percent SPR, it looks like the  
43 SSB over MSST is pretty stable through that period, and it's about  
44 1.09, around there, throughout that entire timeframe, and so we're  
45 not decreasing. We're staying pretty level at that, which I think  
46 is good. Okay. I think the next slide is questions, and so if  
47 you -- I don't think you ran out of questions, but let's go ahead  
48 and have questions now. Roy.

1  
2 **DR. CRABTREE:** Well, not so much a question as a comment, and so  
3 I think this looks fine, and I'm comfortable with setting the ABC  
4 off of this slide, but I do think that we need to emphasize, to  
5 the council, that the biomass is below target, and we've had low  
6 recruitments, and this is a case where a little precaution would  
7 be wise, because we are skirting relatively close to an overfished  
8 condition, and I don't know -- Ryan, when is there another -- I  
9 don't remember, when we looked at the SEDAR, but is there an  
10 update, or something else, on the horizon for this? At any rate,  
11 I think this is a case where we need to be careful, because,  
12 assuming we're not going to get something new for several years,  
13 we don't want to come in, in a few years, and find out we're now  
14 overfished.

15  
16 **MR. RINDONE:** 2026.

17  
18 **CHAIRMAN NANCE:** Okay. Steven, please.

19  
20 **DR. SAUL:** Thank you, Mr. Chair, and thank you, Skyler, for the  
21 presentation. If you look at landings over time, from 1986 -- In  
22 the spreadsheet that was provided, there is a lot of variability,  
23 but there's a clear decline. If you fit a trend line through that,  
24 there's a clear decline from 1986 to 2021, which could explain  
25 some of the recruitment increase, perhaps the stock attempting to  
26 increase its productivity, due to harvesting pressure, and then,  
27 you know, kind of a drop that corresponds with declining landings,  
28 due to maybe overharvest or whatever.

29  
30 You know, there may not be regime-shift-type stuff going on, but  
31 there could just have been -- It could be a function of harvest,  
32 and not that this stock is harvested a lot, but the population is  
33 not that large either out there, and so it could just be a function  
34 of, you know, stock stress, the stock responding, attempting to  
35 compensate, and then not being able to, and dropping. Having said  
36 that, I'm comfortable with this sort of constant recruitment  
37 approach as, you know, a precautionary way forward to set limits.

38  
39 **CHAIRMAN NANCE:** Thank you. Roy.

40  
41 **DR. CRABTREE:** Skyler, can you refresh my memory, and was there  
42 any fishery-independent data series in this assessment, or is it  
43 the --

44  
45 **DR. SAGARESE:** The main data source is the combined video survey,  
46 and I believe, for the operational, there's been a lot of changes,  
47 and it's now the G-FISHER survey, and so I don't know how the  
48 continuation of that survey is going to affect our ability to use

1 that index for an interim analysis.

2  
3 I think I heard, yesterday, that there's some sort of spatially-  
4 reduced -- To continue using that combined video survey, and so  
5 hopefully that can be done for scamp, but it's the only fishery-  
6 independent index that we have for this stock assessment.

7  
8 **CHAIRMAN NANCE:** Okay. Any questions offline or anything? Okay.  
9 Do we have a way forward? Do we have a motion? Ryan, please.

10  
11 **MR. RINDONE:** I think, with respect to all of this, the council is  
12 trying to keep the shallow-water grouper complex as a whole,  
13 together, to continue to manage it together, and so that was part  
14 of the reason why the landings data were provided in the table for  
15 the other two species that are in the complex, black grouper and  
16 yellowfin grouper, the latter of which there is really not much,  
17 but, for black grouper, there are landings.

18  
19 **CHAIRMAN NANCE:** Ryan, we have -- In my mind, we were going to,  
20 and maybe I'm totally wrong here, but, for scamp, we were going to  
21 do, but then we could do the other ones separately, or do we have  
22 to do them totally?

23  
24 **MR. RINDONE:** Well, right now, they're managed totally, as a  
25 complex, and so it doesn't matter. Like, if you're fishing under  
26 commercial IFQ program, it doesn't matter whether you catch a scamp  
27 or a black grouper. It's a shallow-water grouper, and it counts  
28 towards that ACL. To split them apart, it requires a lot more  
29 changes to the IFQ program, and the council wasn't preferring to  
30 break apart the shallow-water grouper complex.

31  
32 **CHAIRMAN NANCE:** So, because of that, the assessment of scamp is  
33 -- I won't say it's irrelevant, but we don't -- We don't manage  
34 just on scamp.

35  
36 **MR. RINDONE:** Well, you're not managing just on scamp, but, I mean,  
37 right now -- Like, previously, prior to this assessment, the only  
38 species that had an assessment in the complex was black grouper,  
39 and then we ran into the issues that we ran into with SEDAR 48,  
40 and is that right? Anyway, now we have an assessment for --  
41 Essentially, for two of the species in the complex, which can give  
42 you guys an idea about the complex in general, and the kind of  
43 fishing pressure that it might be under, and you can also rely on  
44 looking at the individual species-specific landings, because, for  
45 some of the species, like for black grouper, they are harvested  
46 mostly in southwest Florida, and, actually, almost exclusively in  
47 southwest Florida, whereas scamp are harvested across the Gulf.

1 When you're looking at the landings, and you can fiddle with -- In  
2 the file that was sent around, you can fiddle with looking at  
3 species-specific landings. If you use the drop-down menu and you  
4 pick specific common names, you can look at the average. You can  
5 look at the yearly landings and the average landings for different  
6 species, or combinations of species, and you can see what the  
7 species-specific trends are in those landings as well, and not  
8 just the complex as a whole.

9  
10 What Dr. Saul had said about, over time, the landings being on a  
11 decline, if you were to fit linear trend lines to that, that is  
12 what you would see -- We have seen an increase in recreational  
13 landings in the recent years, which makes sense, because there's  
14 larger boats, more engines, better bottom-finding equipment,  
15 better mapping technology available, and especially for species  
16 like scamp, which are still considered shallow-water grouper, but  
17 do occur in deeper waters, generally speaking, especially in the  
18 northern Gulf. Some of those equipment characteristics are going  
19 to be necessary to successfully target other species, and so --  
20 Steve.

21  
22 **DR. SAUL:** I just have a procedural question, I guess, to that  
23 point. So we have an assessment for scamp, and a projection, but  
24 are we -- What I'm hearing is that we're charged with setting the  
25 ABC and OFL for the whole complex, and is that correct?

26  
27 **MR. RINDONE:** Yes, because that's how it's currently managed, and  
28 so, if you guys were recommending something else -- Essentially,  
29 the council is going to have to have a status quo alternative to  
30 go off of, and then, if you guys were recommending to break scamp  
31 and yellowmouth grouper out, and for them to be managed separately,  
32 then we would still need to do something with black grouper and  
33 yellowfin grouper. Those species couldn't then just not have an  
34 ACL. There would have to be something for them as well.

35  
36 **DR. SAUL:** Okay, because I was going through all these sort of  
37 ratio exercises in my head, of how to like take the yield estimates  
38 from the projection for scamp and then apply the other catches, I  
39 guess, or fractions thereof, to come up with a total ACL and OFL  
40 for the whole complex, and is that what has to happen, or I guess  
41 how do you move forward, when you're given the charge to manage  
42 the complex, or provide limits for the complex, when we just have  
43 an assessment for one component of that?

44  
45 **MR. RINDONE:** Having an assessment for a component of it, like I  
46 said, can serve as an indicator for, generally speaking, how the  
47 complex is doing, and so by no means is the assessment without  
48 utility.

1  
2 **DR. CRABTREE:** I think the question is so, okay, we have an ABC  
3 that we would set at around 200,000 pounds, based on this table,  
4 and so we're trying to get to a complex level, and so we have  
5 200,000 plus in yellowfin, and how many pounds are there for those  
6 two, because we don't have any information on them now, but they  
7 have -- There is a catch level in place, and so there must be some  
8 way to figure that out, and I don't know what it's based on.  
9

10 **MR. RINDONE:** I guess it becomes a question of, you know, what  
11 sort of approach you guys want to take.  
12

13 **CHAIRMAN NANCE:** We have confidence intervals, right, Ryan? Go  
14 ahead. I'm sorry.  
15

16 **MR. RINDONE:** Well, if we look at the ABC Control Rule, which I  
17 can send back around to you guys, you guys can consider whether  
18 you want to do something like take a Tier 3 approach for the  
19 complex as a whole, and I'm not specifically sure about whether  
20 you can take the projections from this and then add them to some  
21 sort of averaging for yellowfin grouper and black grouper and then  
22 add all of that together, and I'm not certain of the  
23 appropriateness of that.  
24

25 **CHAIRMAN NANCE:** Mara, I would like to hear your opinion, please.  
26

27 **MS. MARA LEVY:** Hi. It's good to be here in-person. I'm Mara  
28 Levy, if you don't know me, and I'm with the NOAA Office of General  
29 Counsel, and so I'm just listening in. Just it might be helpful,  
30 at some point, and I don't know if you have time to do that now,  
31 to look at what was in the Generic ACL Amendment, which is what  
32 put the shallow-water grouper complex catch limits in place, and  
33 it looks to me, from that table, that it was basically an addition  
34 of what came out of the black grouper SEDAR 19 assessment, and it  
35 says the scamp OFL and ABC, and we're using Tier 3, using data  
36 from 1999 to 2008, and yellowmouth grouper OFL and ACL, using Tier  
37 3 of the control rule, using 1995 data through 2008, and I think  
38 you did add them together to get the complex.  
39

40 It would be worthwhile updating that data, right, and so, to the  
41 extent that you don't have these, for maybe something that's in  
42 the complex, to then maybe look at using Tier 3 again, but updating  
43 the years, but, where you have these from the assessment, using  
44 those.  
45

46 **CHAIRMAN NANCE:** Mara, so we could use black grouper, and do we  
47 have that? No?  
48

1 **MS. LEVY:** No, and there is two choices, right, and another option  
2 is for the complex to -- For the council and the SSC, with input  
3 from the SSC, to pick an indicator stock, right, and so you could  
4 choose an indicator stock that's representative of that complex,  
5 and then that's what you're monitoring, but that's not the way  
6 that it was done back when these catch limits were put in place,  
7 but what you and the council did then was just take all the  
8 different OFL and ABCs from whatever method you got them, add them  
9 together, and we came up with an ABC.

10  
11 Now, this complex has an additional problem, because we said the  
12 OFL wasn't defined, because of all of these issues, right, which  
13 is problematic from a Magnuson Act standpoint, because we don't  
14 have an overfishing limit, and so it would be nice to grapple with  
15 that, but I don't know exactly how you would want to handle it,  
16 and, again, one way is to have an indicator stock that has an OFL,  
17 et cetera, that you're monitoring, and then that status  
18 determination gets applied to the whole complex, but you have to  
19 sort of make a determination that that's an appropriate indicator  
20 stock for the complex.

21  
22 **CHAIRMAN NANCE:** Thank you. That was very helpful. Roy.

23  
24 **DR. CRABTREE:** If we did say, okay, scamp is the indicator species  
25 for the complex, how though then, in the IFQ program, would we  
26 assign the quantity of shallow-water IFQ share that's available?  
27 It seems to me that you still have to have some poundage for black  
28 grouper and yellowfin that you're going to add into this.

29  
30 **DR. BARBIERI:** You see, my understanding --

31  
32 **CHAIRMAN NANCE:** Luiz.

33  
34 **DR. BARBIERI:** -- of Mara's explanation is that, the way that we  
35 have been handling this, thus far, was set up an OFL and an ABC on  
36 a per-species basis and then sum it together for the complex, and  
37 so, in this case, right, we could -- I think that Mara presented  
38 this as an option for us to consider, and we could take the catch  
39 advice here, right, for scamp and then basically do, using a Tier  
40 3b, I guess, or 3a, or Tier 3, for the other three species, and  
41 then just add them together, but, you know, when you have an  
42 assessment-based catch advice, you use it, because, of course,  
43 it's superior then to the other ones.

44  
45 **DR. CRABTREE:** If I could, Jim, and I think the scamp would be the  
46 indicator, and so the status of the complex would be based on the  
47 scamp assessment. We still have to go to the control rule to pull  
48 out the quantities and sum them up. I don't have any desire to

1 break apart the shallow-water complex or anything, and that's much  
2 more complicated, and burdensome, I think, for the Fisheries  
3 Service, because they have to go into the IFQ program and reprogram  
4 and change all of that.

5  
6 Ryan, there used to be, years ago, some provision in the regs that  
7 scamp could switch from shallow-water to deepwater, if it reached  
8 some level, and I think that was taken out, and so that's another  
9 thing at play here that I think we need to understand, and so I  
10 think what we need -- I guess we'll have to come back at a different  
11 -- I don't know if we can get that resolved at this meeting, but  
12 we would have to come back in with a basis for black and yellowfin  
13 and go through the control rule and come up with that. We need to  
14 evaluate what that means, that it might switch into deepwater, and  
15 then I think we could put it together.

16  
17 **DR. BARBIERI:** To that point, Mr. Chairman.

18  
19 **CHAIRMAN NANCE:** Yes.

20  
21 **DR. BARBIERI:** The complication there, for the other species, and  
22 John will remember this, John Froeschke, is that we had to  
23 determine a set of reference years, right, where we had stable  
24 enough landings, ten years, ideally, or longer, of stable landings,  
25 and we had to evaluate landings, and we had a separate workshop,  
26 if I remember correctly, right, to evaluate landings on a species-  
27 by-species basis to identify when we have a period of stable, you  
28 know, as stable as we could get for this stock's landings, to come  
29 up with an average of that period and then estimate standard  
30 deviation and apply the --

31  
32 **CHAIRMAN NANCE:** What we will talk about with wenchman.

33  
34 **DR. BARBIERI:** Right.

35  
36 **CHAIRMAN NANCE:** John.

37  
38 **DR. FROESCHKE:** A couple other things, and so, one, if we were to  
39 go with the adding, I think the way that -- We talked about this  
40 originally, but take out scamp, for now, for that, but the other  
41 species -- You would want to put all those landings together and  
42 then compute it, because it's the means and the standard  
43 deviations, and so the ABC -- Otherwise, you're going to be adding  
44 the variances, which doesn't make any sense, and so the other thing  
45 -- I think, when we did it the first time, we took black grouper  
46 separately, because it was an assessment, which now we don't really  
47 have a lot of faith in, but the other issue is that it's also in  
48 a different currency.

1  
2 I think we would probably be better off moving that one out of the  
3 assessment values and just into a regular Tier 3 kind of thing,  
4 and so you could add all those species up, do that, and then  
5 combine that with scamp, and I do have a little bit -- I've thought  
6 about that, the deepwater and shallow-water grouper thing, and I'm  
7 not sure if it's an issue, but, potentially, if you didn't move  
8 the deepwater grouper species into the FES currency, even though  
9 it's almost entirely commercial, there could be some kind of weird  
10 currency difference between landing fish in one IFQ versus another,  
11 and I don't know how that would all work, because the stock -- The  
12 deepwater grouper, if it was managed in the FES currency, it would  
13 be a slightly different poundage than it is if you did it in the  
14 CHTS currency.

15  
16 **CHAIRMAN NANCE:** I'm not sure that moving them out of the complex  
17 is the way forward. I do like having, from my opinion, scamp,  
18 with its OFL, and then the other three species in the complex, two  
19 species, the other two species then -- As we have landings data,  
20 and we can get an average, and we could go below that average, a  
21 deviation, those types of things, or two deviations below,  
22 depending on how comfortable we are to be able to set those and  
23 then put that as the poundage that we would add to that for the  
24 complex. Mike Travis, please.

25  
26 **DR. TRAVIS:** Thanks, Jim. I wanted to speak to what Roy mentioned  
27 earlier. Those flexibility measures still exist, and so you've  
28 got three species, scamp, warsaw grouper, and speckled hind, that  
29 are essentially found in both the shallow-water and the deepwater  
30 grouper complexes, and so, for scamp, scamp is designated primarily  
31 as a shallow-water grouper species, but it can be landed using  
32 deepwater grouper allocation, once they've used all their shallow-  
33 water grouper allocation.

34  
35 Similarly, with warsaw grouper and speckled hind, they are  
36 designated as deepwater grouper, but they can be landed using  
37 shallow-water grouper allocation, after they have used up all their  
38 deepwater grouper allocation, and so that's kind of a major  
39 difference between, you know, how scamp is handled in the IFQ  
40 program, versus yellowmouth grouper.

41  
42 **CHAIRMAN NANCE:** Thank you. Will Patterson, please.

43  
44 **DR. PATTERSON:** Thank you, Mr. Chair. This is an interesting  
45 discussion, and, when scamp came up earlier, and we started talking  
46 about this issue about the council voting not to remove it from  
47 the complex, you know, I've been scratching my head trying to  
48 figure out how then do we provide management advice, but, also, it

1 just seems really frustrating, to me, the amount of work and effort  
2 that went into the research track assessment for scamp, and then  
3 an operational assessment for scamp, to then be faced with this  
4 issue of taking the scamp numbers that, you know, we spent a lot  
5 of time reviewing, and it was a really strong assessment, and  
6 Skyler and her team did a tremendous job with this assessment,  
7 and, you know, given the COVID situation, it took maybe a little  
8 bit longer than we were hoping, but, you know, that couldn't really  
9 be fixed, or planned around, and it just was what it was, but I  
10 just don't understand why we can't make a recommendation based on  
11 scamp.

12  
13 We have a scamp assessment, and we have these updated projections,  
14 and it seems to me that's the most scientifically-defensible  
15 approach, is to provide the council management advice for scamp,  
16 and then, if the council has pragmatic concerns about IFQ issues,  
17 shallow or deepwater grouper, or other reasons why they want to  
18 keep it in the complex and manage it that way, then they can take  
19 that management advice and, I guess, utilize the other information  
20 that we provided for the complex other species earlier.

21  
22 It just seems, to me, that, you know, all this other is just going  
23 to be much less certain information that we're providing, with  
24 something that is actually a pretty substantial scientific  
25 product.

26  
27 **CHAIRMAN NANCE:** Thank you, Will. Let me ask you this. We do  
28 have the ABC projections for scamp, and so would you feel  
29 comfortable -- If we added the others to that, would you feel  
30 comfortable doing that, or what do you see as a path forward?

31  
32 **DR. PATTERSON:** I would -- That doesn't make sense to me, and maybe  
33 I'm just not looking at this the right way, but my, you know, sort  
34 of preference here would be to make management advice based on  
35 scamp, for scamp, based on the assessment and projections, and  
36 then the council can use that and manage the complex how it  
37 chooses, I suppose, but, you know, we've gone from a data-limited,  
38 or data-moderate, situation here with the complex, and one of its  
39 main species, and now taking it a step forward, and it seems, to  
40 me, that we would -- That we wouldn't be moving forward if we did  
41 anything else but take the scamp assessment and provide scamp  
42 advice. Then the council can manage them how they choose within  
43 the complex.

44  
45 **CHAIRMAN NANCE:** Okay. Thank you, Will. Roy.

46  
47 **DR. CRABTREE:** I think that's right, but I do think the council is  
48 going to come back to us and say, okay, well, we need updated ABCs

1 for black grouper and yellowfin grouper, so that we can determine  
2 the shallow-water quota, I think because the status quo right now  
3 sounds like black grouper is based on an old assessment that's  
4 essentially been -- I don't know if it was rejected, or it had a  
5 lot of problems with it, and I don't think that made it valid, and  
6 so, I mean, we could go ahead and approve an ABC for scamp and  
7 yellowmouth, and I guess we could do that today, and then I think  
8 though we're going to have to come in at a future meeting and look  
9 at the landings of black grouper and yellowfin and give them an  
10 updated data-poor ABC for that.

11  
12 Then I think the other question, which I believe the council can  
13 then deal with, is I think they're going to have to look at how  
14 much scamp is typically caught by the deepwater grouper fishery  
15 versus the shallow-water, and then, of the ABC we give them for  
16 scamp, they're going to have to assign a certain amount to  
17 deepwater and reduce the shallow-water amount by that, but that's  
18 kind of a management thing that I think the council could figure  
19 out.

20  
21 **CHAIRMAN NANCE:** Luiz, please.

22  
23 **DR. BARBIERI:** To Will's point, and I think he made some valid  
24 points there, right, and, when we were discussing this way back  
25 when, right, in terms of structuring the ABC Control Rule, and  
26 structuring how the generalized ABC amendment, or ACL amendment,  
27 was going to be put together, the idea was that we were going to  
28 have to manage these complexes, you know, in terms of managing  
29 these complexes like this, and generating quantities, right, for  
30 management advice was really for the species that were not  
31 assessed, right, from that management advice perspective.

32  
33 As they would have assessments, we would provide that management  
34 advice based on the assessment, and so the reason, right now, the  
35 council has some level of just standing management advice for black  
36 grouper, right, and for the other species, whatever the other  
37 species is, and I don't remember --

38  
39 **CHAIRMAN NANCE:** Yellowfin.

40  
41 **DR. BARBIERI:** Yellowfin, right, and so all we will have to do is  
42 update the number that has been entered before for scamp, based on  
43 average landings, to this new number that is coming out as ABC. I  
44 mean, if we're going to use this as a complex, right, don't you  
45 have to have new numbers for each one of those species, right, to  
46 calculate the average? You had a number before for scamp, and now  
47 you're going to have a new one, and the new one is estimated  
48 according to the advice of the assessment.

1  
2 **CHAIRMAN NANCE:** I am just going to this to the group, and so you  
3 have the table, and this is the ABC, and so you put that within  
4 the table. For black grouper and yellowfin, and I think those are  
5 the other two, then you put in, based on a Tier 3 value, with the  
6 new landings data, and we can either take one deviation or two,  
7 you know, those types of things, to be able to come up with numbers  
8 that we're comfortable with, and put those into the table, because  
9 we have to have, for each of the different species, numbers for  
10 the complex, which I think are --

11  
12 **DR. BARBIERI:** That's what I'm thinking, yes.

13  
14 **CHAIRMAN NANCE:** In that table, it's an additive table.

15  
16 **DR. CRABTREE:** Except for the complexity of scamp can be caught in  
17 the deepwater grouper complex as well, and I still think, somehow,  
18 you're going to have to assign some fraction of the scamp ABC to  
19 the shallow-water and some fraction to deepwater, because you've  
20 got -- The IFQ program issues shallow-water grouper quota and  
21 deepwater grouper quota.

22  
23 If scamp can be landed in the deepwater grouper quota, then you're  
24 going to have to account for some fish there. If you put the whole  
25 ABC in the shallow-water, then you're allowing -- You know, you've  
26 got too much quota, and so, somehow, you've got to account for  
27 that.

28  
29 **CHAIRMAN NANCE:** But is it based on a percentage? Is shallow-  
30 water and deepwater -- I'm going to show my ignorance here, but is  
31 shallow-water and deepwater based on 80 percent of the scamp goes  
32 into shallow and 20 percent into deep?

33  
34 **DR. CRABTREE:** That I don't know. I don't know how it was set up.

35  
36 **DR. BARBIERI:** But, see, I don't know if this is an SSC problem.

37  
38 **DR. CRABTREE:** I don't think it is. I think it's something the  
39 council would have to figure out.

40  
41 **DR. BARBIERI:** NOAA Fisheries handles that part.

42  
43 **CHAIRMAN NANCE:** So we would put the ABC in total for scamp.

44  
45 **DR. BARBIERI:** Yes. We provide management --

46  
47 **CHAIRMAN NANCE:** They would then allocate.

1 **DR. BARBIERI:** Right, and they would handle that. That's a  
2 management -- Yes.

3  
4 **CHAIRMAN NANCE:** John, please.

5  
6 **DR. FROESCHKE:** Just so I'm clear, I thought, originally, Luiz,  
7 you were suggesting that we just take the numbers that we have on  
8 the book now for the shallow-water grouper complex, and say that's  
9 a million pounds, and I don't know, but whatever it is. At that  
10 time, the scamp contribution to that was 25 percent, 250,000, and  
11 say now it's 300,000, and so then the new complex was -- It raised  
12 the whole thing up by 50,000 pounds, and is that what you were  
13 suggesting?

14  
15 **DR. BARBIERI:** Yes. Yes, it was, because we still have to look at  
16 this on a species-by-species basis, and so, if the council wants  
17 an update -- Think about this. If the council wants an update of  
18 the shallow-water grouper complex, they can request that, right,  
19 and so the council decided to request management advice on scamp,  
20 and the Science Center conducted the assessment, and the SSC  
21 reviewed it, and now we'll provide that management advice.

22  
23 To update the entire complex, it will require updating the numbers,  
24 or not, because, if we didn't -- I suppose, if we didn't do this  
25 for scamp, right, the numbers for black grouper, and yellowfin,  
26 would remain the same, right?

27  
28 **DR. FROESCHKE:** The problem is, if you were to do that, you're  
29 going to have scamp in FES units and the other ones that are in  
30 different currencies, and so then you're changing the percent of,  
31 you know, what could be landed, just based on a currency, and that  
32 potentially could allow more harvest on the non-scamp species and  
33 the complex, simply by virtue of migrating the currency to the FES  
34 and scamp.

35  
36 **DR. BARBIERI:** Absolutely, and so then this is done in two steps.  
37 One step is we provide management advice based on the assessment  
38 for scamp, and the council requests updated management advice,  
39 catch advice, for black grouper and yellowfin based on FES, right,  
40 and we get those landings, right, and we -- We're going to have to  
41 look at plots of them, and remember how we handled this for the -  
42 - Remember?

43  
44 **DR. FROESCHKE:** Yes, and I kind of thought that we were prepared  
45 to do that today, but maybe not.

46  
47 **CHAIRMAN NANCE:** We may be. Steve, please.

1 **DR. SAUL:** To Luiz's and whoever was on the phone, and I can't  
2 remember -- Will's, and I agree with that. Sorry. I am taking a  
3 pause, because I don't see scamp in this table that's being shown  
4 on the screen in the deepwater complex, but it is?

5  
6 **MR. RINDONE:** The way that it works is that scamp is included in  
7 the shallow-water grouper complex. However, if you -- If you're  
8 a shareholder, and you have landed all of your allocation of  
9 shallow-water grouper, but you still have some deepwater grouper,  
10 then you can continue to land scamp under your deepwater grouper  
11 allocation.

12  
13 That is an allowance that currently exists within the grouper-  
14 tilefish IFQ program, and so it doesn't go the other way though,  
15 and like you have to have had shallow-water grouper allocation to  
16 be able to land scamp under deepwater, and you have to have  
17 shallow-water grouper and deepwater grouper allocation, and you  
18 have to exhaust that shallow-water grouper allocation to land scamp  
19 under deepwater.

20  
21 **DR. SAUL:** Okay. That clarifies it a little bit.

22  
23 **MR. RINDONE:** I realize that that's a complicating factor, and I  
24 promise it is not the only one.

25  
26 **CHAIRMAN NANCE:** Doug Gregory, please.

27  
28 **MR. GREGORY:** Thank you, sir. I have to admit that I'm confused,  
29 but I'm thinking that -- I think Luiz made the point earlier that  
30 we just give them the scamp information and let them make the  
31 adjustments, whatever it is, and it's not required -- It might be  
32 desirable, but it's not required to update the black grouper  
33 assessment when the -- Particularly since, the last time it was  
34 tried, it was stated that it was impossible to do, and the  
35 yellowmouth is probably such a small population that you can't do  
36 an assessment on it, and so why get wrapped up in all that?

37  
38 Just give them the numbers and let the Regional Office handle the  
39 FES and CHTS differences. I think they can work out, and, if the  
40 Center and the council staff feel like it's got to come back to  
41 us, then fine, but I don't -- I'm confused why we're getting all  
42 wrapped up in it now, but that just could be me.

43  
44 **CHAIRMAN NANCE:** Thank you, Doug. Ryan, please.

45  
46 **MR. RINDONE:** Thank you, Mr. Chair, and so we're not talking about  
47 redoing the black grouper assessment here. I think what's being  
48 talked about is taking the information from SEDAR 68 and then,

1 which is in MRIP-FES units, and then examining black grouper and  
2 yellowfin grouper in FES units also, and then coming up with an  
3 aggregated -- An aggregated OFL and ABC.

4  
5 **CHAIRMAN NANCE:** Yes. Katie, please.

6  
7 **DR. SIEGFRIED:** This is something that we had discussed with  
8 council staff when the request came through for these data in FES  
9 units, and, of course, I'm not a member of the committee, but isn't  
10 it possible to send this to the IPT level and have the Science  
11 Center weigh-in on how to ratio these things out, based on this  
12 table? It's still possible to move forward with the projections  
13 that Skyler has provided and then work on this in the IPT, isn't  
14 it?

15  
16 **CHAIRMAN NANCE:** Absolutely.

17  
18 **DR. SIEGFRIED:** Okay.

19  
20 **CHAIRMAN NANCE:** Absolutely. I just -- Where I'm coming from,  
21 Katie, is I don't have any problem with doing the ABC for scamp  
22 today and putting it in this table. I think we can come up with  
23 numbers for black grouper and yellowfin grouper in this table,  
24 also, and come up with values to give a total, or we could just do  
25 -- We could just do scamp today and tell the council that we could  
26 come back at a later meeting and do the others. I mean, that's an  
27 option too, but I do think we could come up with the numbers in  
28 this table. Carrie.

29  
30 **EXECUTIVE DIRECTOR SIMMONS:** The ABC has to come from the SSC and  
31 not the -- The ABC has to come from the SSC and not the  
32 interdisciplinary planning team that we're talking about.

33  
34 **CHAIRMAN NANCE:** Right.

35  
36 **EXECUTIVE DIRECTOR SIMMONS:** So you can give us the scamp numbers  
37 today, but we really can't do anything with them, management-wise,  
38 until we figure out what we're going to do with those other minimal  
39 species in that complex.

40  
41 **CHAIRMAN NANCE:** I do think -- I do think that we have enough  
42 information, on this table that's been provided, to come up with  
43 -- Maybe I'm the only one, but come up with values that would be  
44 comfortable with to be able to give to the council for the whole  
45 complex. Carrie, please.

46  
47 **EXECUTIVE DIRECTOR SIMMONS:** Just one more point of clarification,  
48 and the council did not vote not to separate scamp from the

1 shallow-water grouper complex. We just started talking about it  
2 when we were getting the preliminary assessment, before we got the  
3 projections, and we talked about it at the Reef Fish AP, and, at  
4 the time, we did not think that it was necessary to do that. There  
5 was no vote that said they didn't want to do that.

6  
7 **MR. RINDONE:** Well, I mean, we had asked them if there was any  
8 interest in it, and there wasn't any interest to indicate it.

9  
10 **CHAIRMAN NANCE:** Harry, please.

11  
12 **MR. BLANCHET:** A simple question, perhaps, and then a troublesome  
13 one, maybe.

14  
15 **CHAIRMAN NANCE:** You never ask a simple one.

16  
17 **MR. BLANCHET:** Do we have information, from the commercial tracking  
18 system, in terms of the amount of scamp that has come from people  
19 reporting it as part of their deepwater grouper complex, versus  
20 part of the shallow-water grouper complex, because, if we don't,  
21 then a lot of this becomes moot.

22  
23 **CHAIRMAN NANCE:** Harry, I think what we want to do is we're going  
24 to provide a number for scamp. How the council, or the Regional  
25 Office, divides that between shallow-water and deepwater can be up  
26 to them, because we're giving them a total for scamp.

27  
28 **MR. BLANCHET:** Yes, I agree, and I am following that. I think it  
29 would just be useful if, when that's provided, whether -- If the  
30 council would know if that information is available, because that  
31 kind of sets what kind of options are available to them, rather  
32 than have it -- Have that one more thing to delay the decision, if  
33 they don't -- So some homework prior to that council discussion.

34  
35 The other, and in somewhat of a different frame, is some of the  
36 recent assessments, and monitoring, has gone on in the Florida  
37 state monitoring program units, rather than in the FES units, for  
38 several reasons, and is it appropriate to consider that as a  
39 translation, as well as using FES units for the complex, and  
40 perhaps Luiz might answer that. Thank you.

41  
42 **CHAIRMAN NANCE:** Thank you, Harry. Tom.

43  
44 **DR. FRAZER:** I think a couple of things have to happen. I mean,  
45 so we have new data, essentially, new projections, catch advice,  
46 for scamp, and we're not in a position today, really, right, to -  
47 - We can convert the numbers to FES equivalents for yellowfin and  
48 black, right, and that's just an exercise, and we can do that

1   sometime today, and then we can make those -- They would be  
2   additive, right, and then the SSC could recommend, right, moving  
3   forward with that's the total for that complex.

4  
5   A question I would have is whether or not the SSC recommends, in  
6   the future -- If you want to get it done now, you just use what's  
7   on the books, but, if the SSC wants to recommend that we update,  
8   right, the catch advice for yellowfin and black, for some reason,  
9   then we could do that, but we don't have to do that today, and  
10   that's my opinion.

11  
12   **CHAIRMAN NANCE:**   What do you mean by update, Tom?   Not use these  
13   numbers here?

14  
15   **DR. FRAZER:**   Yes, and, I mean, do we have more newer information  
16   or something.   I think, because we're based on -- We have a  
17   historical time series already selected for these two species.

18  
19   **DR. BARBIERI:**   What we have here in front of us, Jim, is an updated  
20   time series of landings, commercial and recreational, that would  
21   update the previous -- No, John?

22  
23   **CHAIRMAN NANCE:**   Yes.

24  
25   **DR. BARBIERI:**   Right, and so this -- What we have here,  
26   potentially, to update the Tier-3-based catch advice, using a  
27   different set of reference years, you know, than we used before,  
28   and now going through -- At least what I saw was going through  
29   2021, and I don't know if we're prepared to do that today, right,  
30   and so what we could do, and I think this is what --

31  
32   **CHAIRMAN NANCE:**   Here's what I want to do, because I think we're  
33   ready.   We're going to take a ten-minute break, and we're going to  
34   come back at 4:15, and so don't go too far, and Ryan is preparing  
35   a table, and so what we want to do, at 4:15, is look at these  
36   numbers, and we need to have a motion on what we want to do with  
37   scamp, and then we want a motion on what we want to do with these  
38   other species in the complex.   We either don't update them or we  
39   update them, and I think we can update scamp today, and I think we  
40   can update the other two today also, but -- Depending on how we  
41   feel about those other two species, and so let's come back at 4:15,  
42   and we'll be ready to do that.

43  
44   (Whereupon, a brief recess was taken.)

45  
46   **CHAIRMAN NANCE:**   We're going to go ahead and come back on.   We've  
47   had some good -- Anyway, Ryan, do you want to go first and just  
48   kind of -- We have a couple of different scenarios, and we

1 certainly have numbers that I think the SSC, in general, feels we  
2 that we could provide an OFL and ABC for this.

3  
4 For data for the shallow-water complex, we need to update those in  
5 FES, and we need to go back in time, and we want to make sure that  
6 the numbers that we're bringing to the table to be able to present  
7 are the numbers, and we don't want to be saying, well, sorry, we  
8 made a mistake in this context, and so I will go ahead and turn it  
9 over to Ryan for a moment of where we're at, and then I would like  
10 to move forward, depending on -- We as a body, and we can wait --  
11 Ryan. Luiz.

12  
13 **DR. BARBIERI:** Well, just to make sure that I understand then what  
14 you're saying, Mr. Chairman, so we're going to move forward with  
15 catch advice for scamp, based on the outcome of the assessment,  
16 and then wait until we have additional data, and the conversion  
17 confirmed from CHTS landings to FES units, to complete advice for  
18 the complex as a whole?

19  
20 **CHAIRMAN NANCE:** Yes, and Ryan and Katie have some -- When they  
21 were going through the data, we want to go point-by-point of what  
22 we need, so that we can do that in the correct manner, and we're  
23 going to have to pull some data, and put it into FES, and those  
24 types of things, so that we're comfortable with this data, to be  
25 able to run those, and so we'll be able to present that at the  
26 next meeting and then be able to present that to the council for  
27 the shallow-water grouper complex. I think that's the best way  
28 forward.

29  
30 **MR. RINDONE:** So -- Hand.

31  
32 **CHAIRMAN NANCE:** Peter. Then I'm going to turn it over to Ryan.

33  
34 **MR. PETER HOOD:** Peter Hood, Southeast Regional Office. I did  
35 reach out to our IFQ staff, and they can come up with a number, or  
36 a weight, of gag caught under the deepwater quota and the shallow-  
37 water quota, and I know that question came up, and so, at some  
38 point, we can figure out what percentage of --

39  
40 **CHAIRMAN NANCE:** For scamp, right?

41  
42 **MR. HOOD:** For scamp. I'm sorry. We've been talking about so  
43 many different species, but, yes, scamp. Absolutely. Sorry about  
44 that.

45  
46 **CHAIRMAN NANCE:** If you would have said pink shrimp, we would have  
47 been -- But scamp is okay.

1 **MR. HOOD:** Or maybe I should talk about Spanish mackerel.

2  
3 **CHAIRMAN NANCE:** Thank you, Peter.

4  
5 **MR. RINDONE:** I think the other thing that we might ultimately  
6 need, Peter, is the historical grouper landings too, for the  
7 shallow-water grouper complex, going back into at least the early  
8 1990s or so, if we were going to do any comparison, as far as like  
9 reference years, because I know that -- Like I can get -- The data  
10 that are in this table that's on the screen right now are from the  
11 2022 grouper-tilefish IFQ report, but, to get the pre-IFQ landings  
12 by year, that would be something, I think, that -- I don't know if  
13 we're ultimately going to need to use it or not, but, if we're  
14 going to consider variations of reference years, we might end up  
15 needing some of those data.

16  
17 **MR. HOOD:** Yes, and definitely we can do that. That's not a  
18 problem. For scamp and the other grouper species.

19  
20 **MR. RINDONE:** Okay, and so, in talking with Katie, one of the  
21 things that you guys have from the SEDAR 68 assessment is  
22 projections, obviously, for OFL and a projection for ABC, if you  
23 use the yield at 75 percent of the FMSY proxy, and so that tells  
24 you, even within the shallow-water grouper complex landings, you  
25 know, how much scamp could ultimately be landed.

26  
27 If you were looking at that, in terms of trying to prevent  
28 overfishing of scamp within the shallow-water grouper complex,  
29 then that makes scamp and yellowmouth a choke species, of sorts,  
30 because, once the landings of those specific species reach a  
31 certain amount, then you wouldn't be able to allow any additional  
32 landings of those species, and where that becomes problematic is  
33 in the IFQ program, because that allocation isn't species-  
34 specific, and it's for that complex as a whole. That would be a  
35 management problem that would have to be overcome, somehow or  
36 another, for keeping the family together, so to speak.

37  
38 **CHAIRMAN NANCE:** If I'm -- Just to be clear, if we put an amount  
39 for scamp, and we can't have that go over that, obviously, for the  
40 OFL, but that becomes the new limit for the entire complex, and is  
41 that what we're saying?

42  
43 **MR. RINDONE:** It's not that it becomes the limit for the whole  
44 complex, but it's that, once that amount is reached for scamp,  
45 then, ostensibly, you can't catch any more scamp, or scamp or  
46 yellowmouth, because you risk overfishing scamp or yellowmouth,  
47 and so, in effect, you can have the complex, but what it would  
48 result in is that fishing for the complex as a whole would have to

1 stop because one species landings reached a certain point, or one  
2 group of species, since scamp and yellowmouth are considered  
3 together with this.

4  
5 **CHAIRMAN NANCE:** But, if we put in the total, we have the scamp  
6 number based on an assessment, and we have black grouper and  
7 yellowfin based on Tier 3, and we have an additive total for the  
8 complex, and is that -- Do each of the species -- Once a limit is  
9 reached, let's say on black grouper, does that preclude it from  
10 being caught -- Does that do the same thing to the complex?

11  
12 **MR. RINDONE:** Well, not the way that it's currently set up. I  
13 mean, the way that it is right now, the landings, for each of those  
14 species, were considered for a reference year, and then they were  
15 summed together, right, and then plus the black grouper projections  
16 from SEDAR 16, or whatever it was.

17  
18 If we were to repeat that here, I mean, I guess, in practice, it  
19 could be repeated like that, but, you know, it would be done  
20 knowing what the scamp and yellowmouth population can sustain under  
21 the auspices of using an MSY proxy of F 40 percent SPR and under  
22 the assumption of low recruitment in the projection period. Again,  
23 I guess the thing, just to remind, is that, you know, with these  
24 projections, like the Science Center has mentioned, this is  
25 forecast into the projection period and not -- It's just based on  
26 what you guys had requested for that five-year period, and it's  
27 not meant to be inferred for the entirety of -- You know, to  
28 equilibrium.

29  
30 **CHAIRMAN NANCE:** Josh, please.

31  
32 **DR. KILBORN:** Thank you. I just want to make sure I understand  
33 what you're saying. Are you saying that, if we set the limit for  
34 scamp at eighty fish, but for the whole complex at 100 fish, I  
35 could still reasonably go out and harvest 100 scamp and be within  
36 my legal right, and is that correct?

37  
38 **MR. RINDONE:** The way the complex is set up right now, and the way  
39 that management functions right now, yes, and so if, for whatever  
40 reason, there were no landings of black grouper or yellowfin  
41 grouper or scamp, and then there were -- I don't recall  
42 specifically how many pounds there are for the IFQ program, but  
43 let's say it's 500,000, and you caught 500,000 pounds of  
44 yellowmouth grouper, okay, because the complex itself is still  
45 under the complex-combined ACL.

46  
47 **CHAIRMAN NANCE:** Tom, please.

1 **DR. FRAZER:** We just assume that the ACL and the ABC are synonymous  
2 in this case, right, and one way around that is just to actually  
3 set an ACL, right, that allowed -- That would afford you a little  
4 more flexibility.

5  
6 **MR. RINDONE:** Which we could do at the council level when we  
7 consider a document. We can apply the ACL/ACT Control Rule, based  
8 on the information that we have on a species and how we manage  
9 them, to create some kind of a buffer there, and so you could --  
10 Which we don't currently do, but you could have that additive  
11 approach that was used before, and you could use a more recent  
12 reference period, say, you know, simply the last ten years, or  
13 2012 to 2021, as an example, and then you could press forward from  
14 there, in a manner similar as was done for the ACL/AM Amendment,  
15 and you could that for black grouper and yellowfin grouper, and  
16 then, for scamp and yellowmouth, you would port over and add in  
17 your OFL and ABC projections.

18  
19 I mean, I have a table where I've fiddled with all of that, and  
20 that is one method of doing it, and Katie has an alternative that's  
21 based more on the results of the SEDAR 68 assessment and average  
22 landings from the different species, but she should talk to that.

23  
24 **DR. SIEGFRIED:** Thanks, Ryan, and so I know it's better to be able  
25 to show it on the screen, and I can do that at some point, if it's  
26 wanted, but the concern that we each raised to each other, Ryan  
27 and I, during the break, and I think both concerns are valid, in  
28 that, if I use the ratios of yellowfin and black grouper to scamp  
29 and yellowmouth grouper, during the time period offered here on  
30 the screen, 2010 to 2020, I get black grouper as much as 31 percent  
31 of the landings.

32  
33 That's in the recreational sector, and so, if we applied a  
34 percentage, or a proportion, of yellowfin and black grouper based  
35 on the scamp and yellowmouth results, you would actually be sort  
36 of dinging the black grouper catches, in a way, where we don't  
37 have an assessment for those species, and so I see that as valid,  
38 and that's why my approach is not perfect.

39  
40 The problem I have with what Ryan sort of drafted up is what he  
41 explained as sort of the concern that we could, and what Josh just  
42 mentioned, that we could potentially overfish scamp and  
43 yellowmouth, by going with a complex, especially since it's so  
44 close to MSST now.

45  
46 **MR. RINDONE:** But the ACL isn't necessarily going to protect you  
47 to the degree that you might need for scamp, because -- What are  
48 you getting for an OFL, Katie?

1  
2 **DR. SIEGFRIED:** This is just quick-and-dirty, and so please see it  
3 that way.  
4

5 **MR. RINDONE:** Yes, and these are all rough at this point.  
6

7 **DR. SIEGFRIED:** So the ABC that I was going off of was the 203,600  
8 constant catch, for scamp and yellowmouth alone. If you raise  
9 that ABC to include the complex, it would be 251,000, which is  
10 very small compared to the totals that you have on the average  
11 total tab on the screen, and so that raised concerns with Ryan,  
12 which I see as valid.  
13

14 **MR. RINDONE:** So, on my end of it, if we did what I was explaining,  
15 based on Tier 3a for black grouper and yellowfin grouper, and then  
16 using the SEDAR 68 projections and adding everything together, you  
17 get an OFL of approximately 641,000 pounds in 2024, and then, if  
18 you used an ABC at one-and-a-half standard deviations, you get  
19 about 526,000 pounds. If you use an ABC of one standard deviation,  
20 you get about 477,000 pounds, but, within that, you know, from the  
21 SEDAR 68 assessment, that the ABC for scamp and yellowmouth is  
22 only 203,000 pounds of that 526,000 or that 477,000, and so, if  
23 landings of scamp and yellowmouth exceed that 203,000 pounds, or  
24 whatever it is, then you're going to have a stock assessment, and  
25 projections, that would tell you that that's more than the scamp  
26 and yellowmouth portion of that complex should be able to handle  
27 within a given year.  
28

29 **DR. SIEGFRIED:** If you go with that 477,000 ABC that Ryan just  
30 calculated, based on the recent past, you have around 75 percent  
31 is going to be scamp and yellowmouth, and that's 357,000, which  
32 is, you know, a half more than what we're recommending from the  
33 assessment.  
34

35 **MR. RINDONE:** So, if we use the ACL/ACT Control Rule, and we  
36 establish a buffer, even if it's a considerable buffer, I mean,  
37 that in and of itself, may not be enough to do it, and there may  
38 have to be other management considerations to either improve the  
39 condition of scamp as a stock or otherwise drop harvest in some  
40 measurable way.  
41

42 **CHAIRMAN NANCE:** Will, go ahead and add to this discussion, please.  
43

44 **DR. PATTERSON:** Thank you, Mr. Chair. I'm not sure that I can  
45 add, but this whole conversation is, in scope, very perplexing to  
46 me. You know, it was kind of a head-scratcher, back when it was  
47 announced that scamp would be the first species to go through the  
48 research track approach, and there were concerns, you know, raised,

1 at the time, and not specific to scamp, but about the setup of  
2 doing, you know, a one-and-a-half or two-year research track  
3 process for a given species and then having to do an operational  
4 assessment after that to produce management advice, given the  
5 issues with throughput and assessments being performed in the  
6 region, not just for the Gulf Council, for the other councils as  
7 well, because they share a science center.

8  
9 Scamp was always just kind of a headscratcher, and now, you know,  
10 the discussion about taking what is a really nice piece of science,  
11 of work, that Skyler led, and a big team put together, and, you  
12 know, mixing and matching and put it together back in this pile,  
13 it just seems like we bought a Ferrari, and we're going to park it  
14 in our junky garage and shut the door.

15  
16 I don't get it, and it gets back to the rational for pursuing this  
17 for scamp, and, you know, we're kind of throwing away certainty.  
18 You know, the taxpayers, the government, spent a lot of money here  
19 for certainty on scamp, and I know it goes beyond just the Gulf,  
20 and the South Atlantic is involved, and there are concerns about  
21 the population structure and how to partition that, but I don't  
22 know, and this -- Sorry, Jim, and I can't add any clarity to the  
23 conversation, because I'm just more and more befuddled as we talk  
24 about this.

25  
26 **CHAIRMAN NANCE:** Will, I appreciate your opinion, for sure, and I  
27 feel very similar to you, in the fact that we have a very nice  
28 assessment here, and I'm just trying to -- Hopefully we're not  
29 driving down the street with the Volkswagens, but having to be  
30 able to utilize what we have, with a constraint that we have it as  
31 part of a complex, and that's kind of where I am struggling,  
32 because I feel very comfortable with the values that we have for  
33 scamp, and how do we deal with those nice values and stick it into  
34 a complex setting with the other species that are certainly a lot  
35 less -- The values are a lot less accurate, let's say. Anyway.  
36 Roy.

37  
38 **DR. CRABTREE:** I just think there are a lot of management issues  
39 here, in terms of controlling the catch, that the council will  
40 need to sort out. We have a nice assessment that everyone is  
41 comfortable with, and we can give them an ABC for scamp, and we  
42 can do that today, but, if they want us to come back in and look  
43 at the other two species, we can do that, and we have the numbers  
44 to look at.

45  
46 **CHAIRMAN NANCE:** Maybe that's what we do.

47  
48 **DR. CRABTREE:** Keeping scamp in a complex, and managing things in

1 a complex, it gives you less control over the catches, and so the  
2 risk of exceeding the catch levels is there, and the council will  
3 have to figure out how it wants to deal with that.

4  
5 **CHAIRMAN NANCE:** Ryan, please.

6  
7 **MR. RINDONE:** It's not if they want you to provide catch limits  
8 inclusive of black grouper and yellowfin grouper. They do, and so  
9 the expectation is that you guys will provide catch limits for --  
10 Well, we have those data in this file, at least for the  
11 recreational sector, going back to 1986, and then, for the  
12 commercial sector, going back to 2010, and, I mean, given the time  
13 of day, I think we're kind of running out of room to be able to  
14 work up something meaningful with that, and so I think that would  
15 be something, Mr. Chair, that we would need to revisit later.

16  
17 **CHAIRMAN NANCE:** Well, I think we have time today for scamp.

18  
19 **MR. RINDONE:** We have time today if you guys want to just  
20 specifically address scamp and yellowmouth and then, regardless of  
21 whether we go with what I had discussed or what Katie had discussed  
22 or with something else, you know, at least you guys have secured  
23 the results of the assessment in a way that the council can  
24 consider, regardless of whether the shallow-water grouper complex  
25 is kept together or somehow subdivided from there.

26  
27 Yes, I think you can do that, and I think that a component of the  
28 next discussion though probably will need to involve some  
29 distillation of how the program works, and there might be some  
30 social and economic advice that is given to the council, based  
31 upon that, as well.

32  
33 **CHAIRMAN NANCE:** Perfect, and so here's what I would like to do,  
34 I think, and I think there's a motion out there, and we can deal  
35 with that motion for scamp, and then, once we deal with that,  
36 however that turns out, we then -- We need to be specific. I think  
37 we kind of have an idea of what we want, but we probably need to  
38 specify what our next steps are, so we leave this meeting all with  
39 the same idea, or do we wait and hear what the council has to say,  
40 Tom, or do we want to -- I think we know what we're going to have  
41 to give them, and so I think we can come up with that, but I would  
42 like to hear your --

43  
44 **DR. FRAZER:** I mean, I think the only thing that's going to happen,  
45 at the council meeting, is that the SSC Chair is going to give an  
46 update of what was discussed, right, with regard to scamp and the  
47 shallow-water grouper complex, and so you could say, during our  
48 last SSC meeting -- During our SSC meeting, you know, we went

1 through the scamp assessment, and we actually feel good about where  
2 the OFL and the ABC and the catch advice is, but, you know, based  
3 on our discussion, in order to bring you the full complement of  
4 information at our next SSC meeting, we're going to generate new  
5 information for yellowfin, right, and black, I guess, right, and  
6 then our goal then is to bring you the full suite of information  
7 at your next council meeting, in August or whatever.

8  
9 Whether you guys do scamp today or at your next meeting is  
10 irrelevant, because the council is not -- In my opinion, it's not  
11 super meaningful, because the council is not going to really do  
12 anything until they have the whole bundle of wax.

13  
14 **CHAIRMAN NANCE:** Sean, please.

15  
16 **DR. POWERS:** So it's doubtful that the council will say let's  
17 manage scamp separately?

18  
19 **DR. FRAZER:** They may do that down the road, right, but certainly  
20 -- They certainly wouldn't, in my opinion, wouldn't make that  
21 decision in the absence of having the other information available  
22 to them, Sean.

23  
24 **CHAIRMAN NANCE:** Josh, please.

25  
26 **DR. KILBORN:** Is it up to us to make a recommendation about whether  
27 or not we think that scamp should be managed separately, or that's  
28 their call, right?

29  
30 **CHAIRMAN NANCE:** That's their call.

31  
32 **DR. KILBORN:** Okay. Thank you.

33  
34 **CHAIRMAN NANCE:** Yes. Katie.

35  
36 **DR. SIEGFRIED:** Again, and sorry if this is out of turn, but, if  
37 you have -- The numbers that Ryan has to calculate the portion of  
38 the OFL and ABC that he was just doing, side-by-side with me, are  
39 those numbers still valid for yellowfin and black grouper?

40  
41 **CHAIRMAN NANCE:** They are valid, but I think what the intent is,  
42 it's do we need -- We need to look at the numbers that are preceding  
43 these, to make sure we have a full suite of what we're looking at,  
44 in order to make a more informed decision, and so, instead of  
45 quickly doing something today, I would rather get other numbers  
46 and be a lot more science involved in what we're doing, and I'm  
47 more comfortable in that setting to be able to provide numbers  
48 that each of them are comfortable with, instead of trying to throw

1 this out in fifteen minutes. That's just me, but I hear what  
2 you're saying though, Katie.

3  
4 Let me ask the -- Do we -- We can either move forward, and we have,  
5 I think, a valid -- This is me talking, but we have a valid  
6 assessment, and we have an OFL and ABC, and do we want to make  
7 that recommendation today? Do we want to put that off and make  
8 that recommendation in May, after we have the full suite, and,  
9 that way, a recommendation for scamp, with OFL and ABC, and the  
10 other guys are all stuck together in one presentation by Dr.  
11 Powers, or --

12  
13 **DR. BARBIERI:** I agree, because I think that, the way that this  
14 meeting was planned, right, and we have an agenda, and we came in  
15 and received the updated -- Right?

16  
17 **CHAIRMAN NANCE:** Yes.

18  
19 **DR. BARBIERI:** Projections for scamp, and all the stuff about the  
20 assessment review and the previous projections are fresh in our  
21 minds, and we closed the loop on this. I mean, this is us providing  
22 management advice to the council, based on what we deemed to be  
23 the best scientific information available.

24  
25 Now, it doesn't mean that the council has to use this information  
26 immediately to change their management, and, actually, the advice,  
27 I think, starts with 2024, and so there is time to do this and add  
28 the other species, when the time comes, and so I cannot see why  
29 doing it today would be counterproductive. I mean, why would that  
30 --

31  
32 **CHAIRMAN NANCE:** Dr. Saul, do you have a motion?

33  
34 **DR. SAUL:** Yes, and I sent it to the email thing, but I can read  
35 it.

36  
37 **CHAIRMAN NANCE:** Go ahead and -- Jessica, could you put that up  
38 for us, please? Thank you very much. Let me -- Dr. Saul made  
39 this motion. The SSC moves to --

40  
41 **DR. BARBIERI:** (Dr. Barbieri's comment is not audible on the  
42 recording.)

43  
44 **CHAIRMAN NANCE:** What's that?

45  
46 **DR. BARBIERI:** In the second column, the second column there, I  
47 think there is a mistake there, ABC equals OY, and maybe this was  
48 recycled from a previous motion, and it's just ABC, which is based

1 on yield at F equals 75 percent at F 40 percent SPR.

2  
3 **CHAIRMAN NANCE:** So what do you want to remove?

4  
5 **DR. BARBIERI:** Backspace, backspace, backspace. There we go.

6  
7 **CHAIRMAN NANCE:** Thank you. Okay. The motion -- Do you want to  
8 go ahead and read that motion for us, Steve, since it's your  
9 motion?

10  
11 **DR. SAUL:** The SSC moves to accept the updated projections for  
12 SEDAR 68, the Gulf of Mexico scamp operational assessment.  
13 Accordingly, the SSC recommends that catch level recommendations  
14 for OFL and ABC for the period 2024 through 2026 be set as the  
15 yield (million pounds gutted weight) at F at 40 percent SPR and  
16 ABC at the yield (million pounds gutted weight) at F 75 percent of  
17 F at 40 percent SPR.

18  
19 **CHAIRMAN NANCE:** Thank you. Do we have a second for that motion?  
20 Michael Allen will second that motion. Is there discussion? Jim,  
21 please.

22  
23 **DR. TOLAN:** Thank you, Mr. Chairman. I am going to take, again,  
24 the contrarian view, because my reading of the scope of work for  
25 this item says that the entire shallow-water grouper complex be  
26 updated for projections, and so I am going to vote against this.  
27 Thank you.

28  
29 **CHAIRMAN NANCE:** Okay. Sean.

30  
31 **DR. POWERS:** So, I understand where you're coming from, Jim, but  
32 this is a part of doing that. I mean, the fact that we're not  
33 doing the whole thing they asked us to do doesn't bother me, and  
34 this is just a part, although it is interesting, and it seems like  
35 we have abandoned the ABC Control Rule and P\*, right, because, I  
36 mean, we're just defaulting now to 75 percent, which, actually, in  
37 this species, I don't have a problem with, because it's  
38 hermaphroditic, and there's a lot of things that we can't predict,  
39 but there is a trend that we seem to be doing, just defaulting to  
40 75 percent.

41  
42 **CHAIRMAN NANCE:** It's the Restrepo method.

43  
44 **DR. POWERS:** But that's not our rule.

45  
46 **CHAIRMAN NANCE:** I know, but you're absolutely right, and I think,  
47 until -- We seem to -- You're right, and we seem to have gone to  
48 this quickly, and, as we come to develop our ABC Control Rule,

1 we'll come off of this, but, right now, I think we feel more  
2 comfortable with this than P\*.

3  
4 **DR. POWERS:** I agree, for this species, because of its life  
5 history.

6  
7 **CHAIRMAN NANCE:** Jim, please.

8  
9 **DR. TOLAN:** To that point, having been part of this assessment,  
10 and as long as it took, and what went into it, and I think the  
11 analysts did a great job on it, and I don't want to abandon it.  
12 These are great numbers to be able to put forward, but I just --  
13 My reading of the scope of work says that the council wanted the  
14 entire complex updated, and we have those numbers, and it may take  
15 a little bit of time to get there, but I think we should give them  
16 what they asked for, and so thank you.

17  
18 **CHAIRMAN NANCE:** Thank you. I appreciate that. Luiz.

19  
20 **DR. BARBIERI:** To that point, because I think this is important,  
21 Jim, is whether we do have the numbers, right, that we have a  
22 degree of certainty that we can do something here, perhaps  
23 tomorrow, if we punt on this motion. If we have them, we'll go  
24 ahead and do it, but, if we don't -- I mean, my understanding is  
25 that we don't have the numbers in a way that -- Right?

26  
27 **CHAIRMAN NANCE:** My understanding is we may have a little bit of  
28 -- We may have to go back and get those numbers, and it may not be  
29 available, and we may have to put them into FES.

30  
31 **DR. BARBIERI:** Well then let's ask -- Who has the numbers and can  
32 confirm that we have them now and have confidence that they  
33 represent what they have to for us to provide OFL and ABC advice?

34  
35 **MR. RINDONE:** Sorry. I was reading something else and trying to  
36 do eleven things, and the numbers for what?

37  
38 **CHAIRMAN NANCE:** To be able to come up with projections.

39  
40 **DR. BARBIERI:** For the whole shallow-water.

41  
42 **MR. RINDONE:** So we have -- I mean, it depends on what reference  
43 period of years you guys want to use. We have information back to  
44 2010, to the start of the IFQ program, for commercial, and then we  
45 have data back to 1986 for the recreational sector, and so, I mean,  
46 if you were only looking at say the last ten years, or some fraction  
47 thereof, yes, we could do that. If you wanted to look at anything  
48 longer, we have to wait until we can get the data that I was

1 discussing with Peter for the historical commercial landings, as  
2 far as like adding together or anything like that, or saying, you  
3 know, this is what scamp and yellowmouth is, and then this is what  
4 black grouper and yellowfin grouper is, and so it really depends  
5 on your choice of reference years.

6  
7 **CHAIRMAN NANCE:** But I do think, for me, to be able to see those  
8 numbers, be able to discuss those in a way that we're all satisfied  
9 with the numbers, and be able to present that as a body to the  
10 council -- I don't want to be rushed in doing that, and I would  
11 rather have a time slot, and we can have that in May, a time slot  
12 where we can look at those numbers, and we can sit down, and we  
13 can be comfortable with them and be able to send those to the  
14 council with, I think, approval. Sean.

15  
16 **DR. POWERS:** I still don't understand why this prevents us from  
17 acting on this motion, because, no matter what, it's a step we  
18 have to do, and I couldn't imagine that we would have one big  
19 motion on the whole shallow-water grouper complex anyway, and so,  
20 at some point, and whether we make the second decision tomorrow or  
21 the next day, we would be at the OFL and ABC level, because we  
22 have an assessment, and we need to act on that assessment, and so  
23 I don't see why we wouldn't proceed with this.

24  
25 **CHAIRMAN NANCE:** Jim, please.

26  
27 **DR. TOLAN:** Thank you, Mr. Chairman. Getting back to the  
28 discussion of the numbers, it was my understanding that that Excel  
29 table that went out for our review -- They were in FES currency,  
30 and so they were the proper numbers to work with, and so we have  
31 the information in front of us. I don't know that we have the  
32 time to do it as quickly as we would like, but I still think, and  
33 this is going to be my last comment for this discussion period,  
34 and I still think it's the scope of work that needs to be addressed.

35  
36 **CHAIRMAN NANCE:** Jim, I understand fully what you're saying. There  
37 are some that would like to go back and look at more previous data,  
38 and those have to be updated, and that's why I was saying the FES  
39 numbers, and so those have to be updated to be able to put the  
40 stream in the same context throughout the entire thing, and so we  
41 have a larger dataset to look at, so we're comfortable with,  
42 instead of using the last ten years, and that's all we have, and  
43 maybe fifteen years we're more comfortable with, those types of  
44 things, so we have a better picture of it. Any other discussion  
45 on this motion? Seeing none -- Harry. Yes, sir.

46  
47 **MR. BLANCHET:** I am very appreciative of where Jim is coming from,  
48 and I also understand that we've got some momentum going here, and

1 I think that it's worth characterizing. However, and I'm trying  
2 to talk and think at the same time, and so forgive me if I struggle,  
3 and I appreciate -- I think that the first sentence stands in the  
4 motion.

5  
6 I think I will make an unfriendly amendment, at "accordingly", and  
7 what I would say is something like, "if the results of the  
8 assessment were applied using a Tier 1 ABC Control Rule, the catch  
9 level recommendations for" -- Then follow with the -- Then just  
10 delete until "OFL and ABC". Don't delete "OFL and ABC".

11  
12 **CHAIRMAN NANCE:** I am just thinking that changes this. Go ahead.

13  
14 **MR. BLANCHET:** That would be set at this yield, and so what you're  
15 doing there is you're providing the council with information about  
16 where we are with this assessment, and without establishing --  
17 Because my concern with this is, okay, and this is more in the  
18 council's bailiwick than us, is the tracking of some of the -- You  
19 could end up with your entire quota for the Gulf scamp being taken  
20 in the first wave of recreational harvest in south Florida, and  
21 then you're shutting down a lot of harvest across just -- You've  
22 got a huge variance in those wave estimates, but you're --

23  
24 That is, to me, part of the reason that that level of precision  
25 was laid out in that original control rule, was because of the  
26 intrinsic imprecision of that annual harvest rate, that one little  
27 glitch in there and you're shutting down the whole thing, for a  
28 long time, and, rather than doing that, looking at more long-term  
29 trends and trying to get something that is not quite as stuttering  
30 as you get when you're trying to monitor a catch limit that is  
31 that small. I don't know if that helps our not.

32  
33 **CHAIRMAN NANCE:** Let me ask -- Do you want to make this as a  
34 substitute motion? I think it changes dramatically what was  
35 presented in the first motion, and so I would certainly entertain  
36 if you want to make this a substitute motion.

37  
38 **MR. BLANCHET:** Yes, I will go with that.

39  
40 **CHAIRMAN NANCE:** Okay. Harry, that's your substitute motion? Is  
41 that a yes or no?

42  
43 **MR. BLANCHET:** Yes.

44  
45 **CHAIRMAN NANCE:** Thank you. Do I have a second for that substitute  
46 motion? Does anybody second for that motion? It looks like that  
47 motion failed without a second. Will.

1 **DR. PATTERSON:** I call the question on the original motion, please.  
2  
3 **CHAIRMAN NANCE:** Thank you, Will. Okay. I am going to read the  
4 motion, and then we'll vote. We'll have a roll call vote on it.  
5 The motion is the SSC moves to accept the updated projections for  
6 the SEDAR 68 Gulf of Mexico scamp operational assessment.  
7 Accordingly, the SSC recommends that catch level --  
8  
9 **MR. RINDONE:** It's scamp and yellowmouth.  
10  
11 **CHAIRMAN NANCE:** Thank you. Scamp and yellowmouth. Something  
12 happened to the other sentence. Okay. Accordingly, the SSC  
13 recommends that catch level recommendations for OFL and ABC for  
14 the period 2024 to 2026 be set at the yield (millions of pounds  
15 gutted weight) at F 40 percent SPR and ABC as yield (millions of  
16 pounds gutted weight) at F equals 75 percent of F 40 percent SPR.  
17 Let's go ahead and have a roll call vote on that, please, Jessica.  
18  
19 **MR. RINDONE:** I think it's the yield at -- The yield at 75 percent  
20 of F 40 percent SPR. It's not the yield at F equals.  
21  
22 **CHAIRMAN NANCE:** Okay. So take out "F equals". I think that's  
23 correct.  
24  
25 **MR. RINDONE:** Steve has got his hand up.  
26  
27 **CHAIRMAN NANCE:** Yes, Steve.  
28  
29 **DR. SAUL:** A quick clarifying question. Did SEDAR 68 include  
30 yellowmouth, or was that just scamp?  
31  
32 **MR. RINDONE:** It's scamp and yellowmouth grouper. It's both  
33 species.  
34  
35 **DR. SAUL:** It is both combined? Okay.  
36  
37 **CHAIRMAN NANCE:** Thank you. Jessica is prepared on this one. The  
38 names are crossed out. Okay, Jessica.  
39  
40 **MS. MATOS:** Rich Woodward. Will Patterson.  
41  
42 **DR. PATTERSON:** Yes.  
43  
44 **MS. MATOS:** Paul Mickle.  
45  
46 **DR. MICKLE:** Yes.  
47  
48 **MS. MATOS:** Harry Blanchet.

1  
2 MR. BLANCHET: Yes.  
3  
4 MS. MATOS: Jason Adriance.  
5  
6 MR. ADRIANCE: Yes.  
7  
8 MS. MATOS: Luke Fairbanks.  
9  
10 DR. FAIRBANKS: Yes.  
11  
12 MS. MATOS: Mandy Karnauskas.  
13  
14 DR. KARNAUSKAS: Yes.  
15  
16 MS. MATOS: Jim Tolan.  
17  
18 DR. TOLAN: No.  
19  
20 MS. MATOS: Sean Powers.  
21  
22 DR. POWERS: Yes.  
23  
24 MS. MATOS: Trevor Moncrief.  
25  
26 MR. MONCRIEF: No.  
27  
28 MS. MATOS: Doug Gregory.  
29  
30 MR. GREGORY: Yes.  
31  
32 MS. MATOS: John Mareska.  
33  
34 MR. MARESKA: Yes.  
35  
36 MS. MATOS: Jack Isaacs.  
37  
38 DR. ISAACS: Yes.  
39  
40 MS. MATOS: Steven Saul.  
41  
42 DR. SAUL: Yes.  
43  
44 MS. MATOS: Steven Scyphers.  
45  
46 DR. SCYPHERS: Yes.  
47  
48 MS. MATOS: Jim Nance.

1  
2 **CHAIRMAN NANCE:** Yes.  
3  
4 **MS. MATOS:** David Griffith. Roy Crabtree.  
5  
6 **DR. CRABTREE:** Yes.  
7  
8 **MS. MATOS:** Luiz Barbieri.  
9  
10 **DR. BARBIERI:** Yes.  
11  
12 **MS. MATOS:** Mike Allen.  
13  
14 **DR. ALLEN:** Yes.  
15  
16 **MS. MATOS:** Cindy Grace-McCaskey.  
17  
18 **DR. GRACE-MCCASKEY:** Yes.  
19  
20 **MS. MATOS:** Josh Kilborn.  
21  
22 **DR. KILBORN:** Yes.  
23  
24 **MS. MATOS:** David Chagaris.  
25  
26 **DR. CHAGARIS:** Yes.  
27  
28 **CHAIRMAN NANCE:** Thank you. Skyler, I'm hoping you're still on,  
29 but we greatly appreciate your time and effort in running this  
30 assessment. As Jim pointed out, and I think I was on this one  
31 too, and it was -- We went through a lot of detail, and I think we  
32 moved forward on it, and I thought it was a great assessment, and  
33 I appreciate all of your effort.  
34  
35 **DR. TOLAN:** I think we set the world record for the longest SEDAR.  
36  
37 **CHAIRMAN NANCE:** Yes.  
38  
39 **DR. TOLAN:** It took forever.  
40  
41 **CHAIRMAN NANCE:** Thank you, Skyler, for your willingness to  
42 participate and to present this to us today. Okay. Let's -- Do  
43 we need to -- Do we understand what we want, what we need, in order  
44 to proceed in May, Katie and Ryan? Do we have an idea of what --  
45 We need recreational catch, commercial catch, all in values that  
46 are consistent, and how far back do we need those? I know John  
47 was interested in -- There he is back there, hiding. How far back  
48 do you want, John? Okay. 1986. Okay.

1  
2 1986 forward, so that we have the ability to look at some various  
3 timeframes, to be able to make informed decisions as a body, and  
4 I think the intent is then to take those values, either use the  
5 average or deviations from the average that we feel comfortable  
6 with, and be able to then add those to the shallow-water complex,  
7 so that they are in line with what we have said for scamp and give  
8 total values for the complex. Katie, please.  
9

10 **DR. SIEGFRIED:** Do you know what timeframes you would like us to  
11 explore before the meeting?  
12

13 **MR. RINDONE:** Well, I mean, easy ones would be what was done in  
14 the ACL/AM Amendment and then the last ten years, and then, you  
15 know, once you guys are looking at the data from 1986 through 2021,  
16 if there is some interesting behavior that you think either should  
17 be captured or should be ignored, then you can make judgements  
18 based on that.  
19

20 **CHAIRMAN NANCE:** Luiz, please.  
21

22 **DR. BARBIERI:** I agree with that, but I just wanted to point out,  
23 for some of the newer SSC members, who haven't really gone -- Who  
24 didn't go through that process of setting the Tier 3 catch levels,  
25 based on average landings, you know, I think it would be helpful  
26 to go through the generalized ACL amendment, right, and see what's  
27 there, a description of what was done, and I don't know if we have,  
28 you know, the ability to pull up some of the old reports that  
29 describe, you know --  
30

31 **CHAIRMAN NANCE:** We can certainly put those as background.  
32

33 **DR. BARBIERI:** Right, as background, because I think that people  
34 would benefit from seeing what -- There is a reasoning in the  
35 development, during the development, of the ABC Control Rule for  
36 those criteria to be set, and this -- You know, I think John's  
37 point, in terms of looking at the longer time series, that we  
38 follow the same criteria now that we followed then.  
39

40 **CHAIRMAN NANCE:** John, please.  
41

42 **DR. FROESCHKE:** We could put together a presentation, and we could  
43 even break out the measles plots, I believe we called them, because  
44 they had big red dots, but, anyway, we could do that, and I think,  
45 as far as Katie, I mean, if we just get the data, I mean, we can  
46 work with that on the fly and present the summaries of whatever  
47 data, and just have it here at the council, if somebody wants to  
48 see something else, or if the SSC, and so that part doesn't seem

1 like a heavy lift, and I think we have the recreational data, but  
2 we just need the commercial data extended back.

3  
4 **CHAIRMAN NANCE:** Okay. The commercial data is the Regional Office,  
5 and is that correct? Katie.

6  
7 **DR. SIEGFRIED:** I guess I wonder why you would want it for the  
8 pre-IFQ period.

9  
10 **DR. FROESCHKE:** Well, I mean, when we looked at this -- That was  
11 what we looked at when we did the generic, and I'm not certain  
12 that we would go with that period, but, I mean, one of the  
13 assumptions that we would want to look at is stationarity over the  
14 reference period and things like that, and we did not include any  
15 of the IFQ period, to my knowledge, or, if we did, it was only a  
16 couple of years in the first time, and so, at minimum, I would  
17 think we would want to be able to reproduce the same set of time,  
18 years, that was selected in the original Generic ACL Amendment,  
19 which was probably on the order to 2000 to 2009, or something like  
20 that, and so some of them we did go back quite far, and I don't  
21 recall this one off the top of my head though.

22  
23 **CHAIRMAN NANCE:** Okay. Was there a comment online?

24  
25 **MR. RINDONE:** Well, I have one, operationally.

26  
27 **CHAIRMAN NANCE:** Okay. Go ahead, Ryan.

28  
29 **MR. RINDONE:** I mean, it would seem, at least on the surface, that  
30 consideration of pre-IFQ years is going to also interject some  
31 assumptions about how commercial fishing effort was during that  
32 period, and I think that there's enough information that you guys  
33 can get off of the IFQ program reports, which are all publicly  
34 available on the SERO website, and I can pass around the most  
35 recent one for you guys to flip through, but there's a lot of  
36 information in there that suggests that there definitely has been  
37 some changes in the way that effort functions within the commercial  
38 fishery since the institution of the IFQ program.

39  
40 The way in which discards, you know, occur, and on which species  
41 and time of year and all of that stuff has changed from the pre-  
42 IFQ years, and, since there's not a projected, you know,  
43 discontinuing of the IFQ program on the horizon, the assumption  
44 would be that what we currently are experiencing, as far as effort  
45 and discards and everything else, would continue into at least,  
46 you know, the near-term, and so that would be something to think  
47 about, if years pre-dating the institution of the grouper-tilefish  
48 IFQ program are considered.

1  
2 **CHAIRMAN NANCE:** Thank you. Tomorrow -- We still need to have  
3 public comment, before we leave, but, tomorrow, I just want to  
4 give you -- We have discussion from Josh Kilborn, and we'll start  
5 out with that one. That's the Explicit Temporal Modeling of  
6 Recruitment Residuals from Stock Synthesis. We have greater  
7 amberjack discard mortality, with Dr. Sean Powers and Kelly Boyle.  
8 We have the Gulf of Mexico Great Amberjack Count, and then we have  
9 Dr. John Ward with Examination of an Alternative Allocation  
10 Approach, and we also have a Review of Wenchman and Mid-Water  
11 Snapper Historical Landings, and we'll have that presentation  
12 also, and so we have a pretty full day tomorrow to be able to do  
13 that.

14  
15 With that outline, let's go ahead, and do we have any public  
16 comment? It's open to the public, whether here or online, and  
17 please let the council staff know that you would like to present.  
18 Michael. Dr. Drexler, come on up.

19  
20 **PUBLIC COMMENT**  
21

22 **MR. MICHAEL DREXLER:** Thank you, Chair and SSC. I am Michael  
23 Drexler, with the Ocean Conservancy. I have a couple of comments.  
24 I appreciate the discussion today, and I didn't plan on commenting,  
25 but there was a lot of interesting discussion.

26  
27 On the shallow-water grouper complex, I appreciate everyone  
28 proceeding with caution on the complex. I checked the SERO ACL  
29 site, and it looks like quota attainment has been around 50 percent  
30 for a very long time, for the commercial and the combined stock,  
31 and the increases, or changes, in quota that we're seeing  
32 recommended here, compared to historical levels for scamp, aren't  
33 that far off, and so, depending on how you lump and split your  
34 complex, you could be in a situation where you're potentially  
35 increasing a quota on a stock that doesn't attain its full quota,  
36 and it could be approaching an overfished condition or a prevailing  
37 ecological condition, and so just -- I think the assessment and  
38 everything looks great, and just kind of some observations as you  
39 move forward with that complex, stock complex, issue.

40  
41 Regarding reference points, I appreciate the work that Bill has  
42 done and presented. Right now, we're seeing a lot of Gulf stocks  
43 struggling, and I would argue that a lot of our current assumptions  
44 are not achieving something equivalent to MSY, or optimum yield,  
45 and it would be nice to see the Gulf move towards more resilient  
46 reference points, especially given that we don't know, for  
47 instance, how climate change is going to impact our stocks decades  
48 from now, and we may be already seeing some of those changes.

1  
2 I think there's two principles to keep in mind, increasing the  
3 long-term resilience of our stocks while also increasing short-  
4 term adaptability, through things like interim assessments, and so  
5 Bill's SPR analysis I think gave the SSC some good advice on some  
6 recommendations to increase that long-term resilience, but,  
7 overall, that's one point in the council's risk policy and harvest  
8 control rules, and I hope the work of the ABC Control Rule  
9 discussion can keep moving forward.

10  
11 Chris Free et al. published a paper, Harvest Control Rules in the  
12 U.S. Federal Fisheries Management and the Implications for Climate  
13 Resilience, and there was key, really easy recommendation in that  
14 paper, and it was to move from constant-F-based harvest control  
15 rules, which we mostly do here, with the exception of when a stock  
16 is rebuilding, to these ramped-F controls that we see in the  
17 Pacific, and that's one very easy, clear recommendation that he  
18 teased out simulation and that we could do to increase the long-  
19 term resilience of our stocks.

20  
21 Last, I just want to lend support for the use of agent-based  
22 models. I've been working, learning, with Steve Saul for a long  
23 time on these agent-based models, and, in the Gulf fisheries  
24 context, I think, you know, they could be really useful as they  
25 integrate all the layers of the fisheries system, biological and  
26 ecological, and allows you, by integrating them in a simulation  
27 framework, to use information from each of these components of the  
28 fishery and combine them, and so, some of the work we did in  
29 Indonesia, it was a situation where biological data wasn't great,  
30 and we did about a hundred fishermen surveys.

31  
32 The fishermen survey data had actually a higher kind of pedigree,  
33 and we believed it more than the biological data, and you could  
34 see that either something -- Fishermen were reporting that profits  
35 were increasing, and that couldn't be true, given the current  
36 biological assumptions we had, and so it really allows you to kind  
37 of integrate those pieces of information in a useful way.

38  
39 Second, they're spatial, and so they're good at things like looking  
40 at how fishers might redistribute their effort, based on a closure  
41 or other measures, and then, last, once you have a model you  
42 believe, you can really apply their policies, and, of course, we  
43 have a lot of technical interactions and overlapping fisheries in  
44 the Gulf of Mexico, but the model -- The agents adapt to anything  
45 you put in them, and so, if you're looking at a spatial closure,  
46 you can also look at bag limits, or a lot of the complex policies  
47 we have here, and then, last, I would certainly support development  
48 of a management layer in recreational for the type of work that

1 Steve is doing, and so thank you all for your discussion, and I  
2 will see you tomorrow.

3  
4 **CHAIRMAN NANCE:** Thank you. Any SSC questions? I appreciate you  
5 being here. Anybody else online, Jessica? Okay. Then we'll go  
6 ahead and adjourn.

7  
8 (Whereupon, the meeting recessed on March 8, 2023.)  
9

10 - - -

11  
12 March 9, 2023

13  
14 THURSDAY MORNING SESSION

15 - - -

16  
17  
18 The Meeting of the Gulf of Mexico Fishery Management Council  
19 Standing and Special Reef Fish, Special Socioeconomic, Special  
20 Ecosystem, and Special Shrimp Scientific and Statistical  
21 Committees reconvened on Thursday, March 9, 2023, and was called  
22 to order by Chairman Jim Nance.

23  
24 **CHAIRMAN NANCE:** Good morning, everyone. It's nice to be here for  
25 day three of our SSC meeting. Our first item of business is Item  
26 Number VIII, and we have Dr. Kilborn here to be able to present to  
27 us on Explicit Temporal Modeling of Recruitment Residuals from  
28 Stock Synthesis, and, Ryan, would you give us the scope of work  
29 for that item, please?  
30

31 **DISCUSSION: EXPLICIT TEMPORAL MODELING OF RECRUITMENT RESIDUALS**  
32 **FROM STOCK SYNTHESIS**  
33

34 **MR. RINDONE:** Sure thing. Dr. Kilborn is here to present the use  
35 of asymmetric eigenvector mapping, and that is for temporal  
36 factors, to try to account for variability in Stock Synthesis new  
37 recruit estimates for a number of different species. He's going  
38 to focus on some of his work that highlights a few species that  
39 show regular periodicity in their recruitment deviations and  
40 relationships with environmental covariates that operate at those  
41 same timescales.

42  
43 You should consider whether this work may be useful to the stock  
44 assessment models in ultimately informing fisheries management  
45 decisions, and, if so, you guys can consider, with input from the  
46 Science Center, how this work might be incorporated into SS 3  
47 modeling or other assessment-related activities. Dr. Kilborn said  
48 he loves questions.

1  
2 **CHAIRMAN NANCE:** Okay. Josh, we're glad to have you here today.

3  
4 **DR. KILBORN:** Thank you. I appreciate it. The first thing you  
5 will notice is that I'm terrible at making titles and title slides,  
6 and so I have an extra-long title of *Asymmetric Eigenvector Mapping*  
7 *Applications to Account for Temporal Variability in Fishery*  
8 *Resources and Recruitment Deviations*.

9  
10 That's a mouthful, because you also gave me two hours to talk, and  
11 so I have ninety-nine slides to go through, and so get ready, but  
12 I want you to kind of think about things a little bit differently  
13 than how we normally think about stuff, right, and this is a little  
14 bit of a more nontraditional approach to modeling recruit  
15 deviations and various other things.

16  
17 Like Ryan said, and like I've already kind of stated, I'm going to  
18 go through some temporal autocorrelation exercises and models, and  
19 I'm going to relate them back to recruitment deviations from Stock  
20 Synthesis, but I'm not using the modeled recruit deviations. I am  
21 using a slightly different version, and I will show you what those  
22 are in a minute.

23  
24 When we get to the environmental and ecological considerations,  
25 that's not really the main point of this talk here today. I'm  
26 going to touch on that stuff, because I think it's important, and  
27 worth discussing, but I'm more interested in the temporal modeling  
28 exercises and, you know, the results we get from that, and I'm  
29 interested to see what you think about that stuff, but we'll  
30 definitely talk about these environmental considerations, and I  
31 actually presented the sargassum stuff to the Full Council, I don't  
32 know, maybe a year or two ago, and so I'll touch on some of that  
33 stuff again, but then I've got some additional work that looked at  
34 some more reef fish species and the ecosystem status report  
35 indicators.

36  
37 The other thing I'm going to talk about is this concept of an  
38 ecosystem trajectory in multivariate space, and I am kind of  
39 calling the Gulf of Mexico a complex adaptive fishery ecosystem,  
40 right, and the way that I have parameterized my model is, you know,  
41 focused on fishery resources, and so that's why I'm kind of calling  
42 it a fishery ecosystem, but the idea is that the Gulf of Mexico is  
43 this complex adaptive system, right, and it's a collection of  
44 resources that have synergy, and they have their own, you know,  
45 activity and states and emergent properties over time, right, and  
46 so I want us to kind of think about our system as a whole and how  
47 it's changing over time, with respect to its underlying resources,  
48 and then, like Ryan said, eventually, I would like to get your

1 input on, you know, if this is even worth pulling on these threads,  
2 if they're useful for management and all that good stuff.

3  
4 Let's start with talking about some of these methods, right,  
5 because, like I said, these are fairly non-traditional for what we  
6 normally see in Stock Synthesis, and in stock assessment, and so  
7 I'm going to start with redundancy analysis. The idea here is  
8 that we have a multivariate system of indicators that represent  
9 the stuff we care about, right, living marine resources, their  
10 structure, their function, any number of parameters that can  
11 describe a system.

12  
13 I am going to be using recruit deviations, in most cases, but I've  
14 got some other stuff at the end of this talk, where we're looking  
15 at, you know, the whole system in the Gulf of Mexico, and so that  
16 will be a slightly different parametrization.

17  
18 Then, on the other side of that equation, we have, you know, the  
19 stuff that we hypothesize affects those things that we care about,  
20 right, and this can be anything, from anthropogenic activity, like  
21 fishing, or pollution, or climate, you know, indicators,  
22 environmental factors, and all kinds of different things, but this  
23 is a directional relationship, right, and we're checking for a  
24 directional response on those indicators from the predictors, and  
25 so it is a hypothesis-testing framework that we can, you know,  
26 look to see if there's an effect on one set of variability on the  
27 response indicators.

28  
29 Another way to think about redundancy analysis is that it's a  
30 constrained form of principal components analysis, or PCA, right,  
31 where we end up with these orthogonal axes that are linear  
32 combinations of the underlying response data, but, like I said,  
33 redundancy analysis has that extra set of information in it, and  
34 so we're actually summarizing the multivariate relationships  
35 between the responses and the predictors, and we're visualizing  
36 them in this canonical framework, where the different axes are  
37 sorted by the percent variability explained in our model, right,  
38 and so the horizontal axis always has the most variability  
39 explained, and then the vertical axis the second most, and so on.

40  
41 One of the things that's really nice about these plots is that we  
42 can look at any two observations, or objects, and kind of relate  
43 them to each other with respect to their underlying variables,  
44 right, and so, in most of these visualizations that you will see,  
45 the observations are a year, and so the idea being that, if two  
46 years are close together, they're more similar, with respect to  
47 the underlying resources or whatever the response information was,  
48 and, if they're very far apart, they're not.

1  
2 The other thing that you kind of have to pay attention to on these  
3 plots is these directions of these vectors, right, and so the blue  
4 ones are for the response vectors, and the red ones will be for  
5 the predictors, and, basically, the direction that they're  
6 visualized is their relatively higher direction, right, and there  
7 is an unvisualized kind of negative direction on all of these  
8 vectors that you kind of have to remember is the relatively lower  
9 side of that gradient, right, and I'm using the term "relative"  
10 because we're not talking about absolute magnitude here, right,  
11 and we're basically saying that, if something is at the positive  
12 end of a gradient, then that observation is relatively higher than  
13 the observations at the other end of that gradient, and it doesn't  
14 mean that one has something and the other has nothing, but it's  
15 just relatively more or less.

16  
17 All right, and so this is the redundancy analysis, by plot, for  
18 the Gulf of Mexico complex adaptive fishery ecosystem, and, really,  
19 the point here is just to show you what one of these things looks  
20 like, right, and it's a mess.

21  
22 The cool thing is though that, you know, we were able to explain  
23 about 73 percent of the variability in the total system using this  
24 kind of framework, but I'm not going to talk about this model  
25 today, and I just wanted you to kind of see what a complete  
26 redundancy analysis looks like.

27  
28 Okay, and so that's one piece of all of this, and the other part,  
29 that is the more important part, is the asymmetric eigenvector  
30 mapping, or AEM, framework, and this is basically a way for us to  
31 take this redundancy analysis and inject time directly into the  
32 model and explicitly account for it, and the way that we do that  
33 is basically taking the time series and decomposing it into all of  
34 the different temporal autocorrelation structures that could exist  
35 throughout the time period, right, from a very long cycle, that  
36 exists over the entire time period, to very short cycles, at the  
37 minimum scale possible in that analysis, right, and so, if you're  
38 looking at annual values, then the most you could really get is,  
39 you know, a yearly oscillating signal.

40  
41 We take those indicators, right, those temporal AEMs that are  
42 derived from our time series, and, depending on how long that time  
43 series is, and how coarse or fine the resolution is, we could end  
44 up with potentially hundreds of asymmetric eigenvector maps, and,  
45 at that point, we need to kind of go through a variable selection  
46 process to determine which ones best account for the variability  
47 in our response data, right, and so either, you know, fisheries  
48 abundance levels, or things like that, or, in some of the cases

1 later on, recruit deviation values and trying to explain them using  
2 these synthetic temporal eigenvectors, or eigenfunctions.

3  
4 Once we have selected some that appear to do a decent job, then we  
5 go ahead and put those through the RDA, and what we get back is  
6 two things, a temporally-structured model of recruit deviations,  
7 or whatever the response is, and then a non-temporally-structured,  
8 or detrended, model, essentially, right, and I can take the  
9 canonical axes from those outputs and then use them in another  
10 step-wise selection process, using AIC, to try to start figuring  
11 out are there any environmental factors, or other covariates, that  
12 relate back to those temporal autocorrelation structures that can  
13 describe our response, right, and so kind of getting at this  
14 ecological forcing concept, and we can do it within the temporally-  
15 structured model and then do the same thing with the non-  
16 temporally-structured stuff, to see if there is, you know, some  
17 other things that might be explaining the residuals. Okay, and is  
18 everybody still with me? All right. Cool.

19  
20 The next thing, and we're not going to get to these results for  
21 about an hour, and so bear with me. Hopefully it won't take that  
22 long, but the ecosystem trajectory stuff is another kind of thread  
23 that I've pulling at that I think is really interesting, but I am  
24 really curious to feel out how you all think about it.

25  
26 The idea really kind of goes back to the ball and cup analogy,  
27 right, and so here's an image from this nice -- This Schaeffer and  
28 Carpenter review paper about regime shifts and ecosystem state  
29 changes and all of that stuff, and the idea being that, if we have  
30 this kind of surface, this green surface that's visualized here,  
31 and, if that represents our system conditions, right,  
32 environmental states or whatever, you know, we're interested in as  
33 the hypothesis system, as those conditions change, right, and they  
34 kind of move up and down and create these hills and valleys in the  
35 system, the ball, as it moves along that system conditions plane,  
36 is going to change position, right, and, as it changes position,  
37 that's representative of the system state changing in response to  
38 those conditions changing.

39  
40 Where it's located along the surface kind of describes the state  
41 of our system, right, and we can, ideally, take this kind of same  
42 concept and put it into this canonical axis kind of ordination  
43 diagram framework, right, where, you know, as our system moves  
44 through this canonical space, we can start to sort of understand  
45 are there states here, are there any regime shifts, or changes,  
46 and are there stable periods, or unstable periods, and what's going  
47 on, over time, with respect to all of the different resources that  
48 we're managing, or deviations, or whatever the case may be.

1  
2 There is another really nice paper that came out by Lamothe et  
3 al., in 2109, that kind of links this concept back to ecosystems  
4 and the stability, or the resilience, of those resources, right,  
5 and that's where I think this is an important concept for us,  
6 because, if we can kind of look at our system, and determine, all  
7 right, is it making fast changes, or very slow changes, over time,  
8 and are they directional, or nondirectional, or are we coming back  
9 to our original position, or are we just having these disturbances  
10 that go back to normal after the disturbance is over, or do we  
11 have a hysteresis effect, or something completely different,  
12 right, and I think it's useful to know if we have a system that's  
13 operating in a known way, that we could predict, or at least  
14 understand, how our future, you know, might shape up.

15  
16 Okay, and so that's the kind of theory behind the various methods  
17 that I'm going to be using, and so now I'm going to go through the  
18 different models and the data sources that I ran them, and, if  
19 anybody has any questions at any point, let me know. I do have  
20 some discussion points baked into the talk here, but, if you have  
21 any questions, feel free to stop me.

22  
23 Okay, and so the things that we care about, right, the response  
24 indicators, for the most part, are going to be stock recruitment  
25 deviations, right, and, when I talk about that, what I mean is --  
26 So this is for greater amberjack, and the solid line, with the  
27 white dots, is the Beverton-Holt curve, right, the stock-  
28 recruitment relationship from the stock assessment model. The  
29 points are the actual predicted recruitment values from Stock  
30 Synthesis, and what I am modeling are the differences between those  
31 two things, right, and so I'm looking at just those, you know, red  
32 values there, and so this is the time series that I am looking at  
33 with respect to greater amberjack recruitment deviations.

34  
35 Just to kind of conceptualize it a little bit more, the idea is  
36 that the stuff above, you know, the line is where the Stock  
37 Synthesis is estimating higher than the Beverton-Holt curve, and  
38 below zero is where Stock Synthesis is estimating below the  
39 Beverton-Holt curve, and we're seeing that scenario far more than  
40 the other scenario.

41  
42 I also looked at some reef fish species, in the context of a kind  
43 of multivariate project that I was working on, and so some of these  
44 got combined together in multivariate models. The amberjack stuff  
45 was treated independently, and the reef fish kind of got a little  
46 bit of a different treatment, and we'll talk about kind of how  
47 that worked out later on, but, on the top, we have kind of that  
48 Beverton-Holt versus the Stock Synthesis outputs, and, on the

1 bottom panel, those are the time series of the recruit deviations  
2 that I will be looking at.

3  
4 We have the same thing for three different snapper species, gray,  
5 red, and vermilion, and then those are the recruit deviation time  
6 series there, and then I also have gray triggerfish, and this one  
7 was also treated independently on its own, and so that is the time  
8 series of recruit deviations. Okay, and so that is all the stuff  
9 that I was using as responses in the asymmetric eigenvector  
10 exercises.

11  
12 When it comes to the time components -- Like I said before, this  
13 is all dictated by the time series itself, right, and so one of  
14 the things that is a little kind of quirky about redundancy  
15 analysis, and many multivariate methods, is that you kind of need  
16 all of your data to actually match up, right, and so, if I have a  
17 -- If I am eventually going to be bringing in a dissolved oxygen  
18 variable, and I am missing some information within that, you know,  
19 would match up to my other values for my recruit deviations, then  
20 I have to kind of either truncate my time series, so that everybody  
21 has data for all of the observations, or I need to start tossing  
22 out variables or imputing missing variables or things like that.

23  
24 Given some of the focus of the models for the amberjack, where we  
25 were really interested in looking at sargassum coverage influence,  
26 some eutrophication questions, some general ecological questions,  
27 and some habitat questions, the data that I had for those specific  
28 models kind of changed the times available, right, and so the  
29 amberjack time series was relatively long, and it was limited.

30  
31 The analyses were limited though by the environmental factors that  
32 I ultimately wanted to bring into the picture, right, and so I  
33 have four different temporal models that were used in the amberjack  
34 exercises, and those time scales were based on the environmental  
35 data.

36  
37 For the reef fish, like I said, that project had a slightly  
38 different focus, and it was more geared for the multivariate kind  
39 of questions, and multispecies questions, and so we did try to  
40 combine the recruit deviations together for some of these ones,  
41 and so I had three different models here, one of them with all of  
42 the reef fish species that I discussed earlier, one with just  
43 snappers, one with hogfish and red grouper, and then one only with  
44 gray triggerfish, and, again, by changing, you know, the  
45 parameterization of those models, it changed the available time  
46 series, and so we have slightly different coverage periods for  
47 those different models.

1 The point of that though is that that's going to change the  
2 asymmetric eigenvectors that are ultimately available to us for  
3 those models, right, because that's based on the length of the  
4 time series and the coarse resolution.

5  
6 Okay, and so, like I said before, the main point of a lot of these  
7 was to ultimately bring in those environmental and anthropogenic  
8 climate covariates, and so, in the case of the amberjack, I had -  
9 - So I had some data that were very finely resolved in time, like  
10 monthly data, and that was the sargassum data, and so, because I  
11 was interested to see how the effect of sargassum coverage related  
12 to the different stages of the amberjack ontogeny, I broke up their  
13 early life history kind of into two periods, right, the spawning  
14 and larval dispersal period and then the pelagic and juvenile  
15 recruitment period, and so, if you look at this image -- There's  
16 a lot going on here, but the idea being that, starting in January,  
17 and going through May, the prevailing currents, and the amberjack  
18 stock, are kind moving southbound.

19  
20 Then, in the summer, June and July and August, they kind of start  
21 moving back up northbound, and they sort of do, you know, their  
22 annual migrations and things, and as well as -- You know, like I  
23 said, those are the prevailing currents on the West Florida Shelf  
24 and throughout the Gulf.

25  
26 The spawning and dispersal periods are marked by the yellow and  
27 blue colors, but the other thing about the spawning and dispersal  
28 period is that period is closed to commercial fishing, March  
29 through May, and then, in the pelagic recruitment period, the June  
30 and July months are closed for recreational fishing, and so, you  
31 know, that's going on in there, and then, if you kind of track the  
32 gray squares, that's more or less where, you know, the peak  
33 spawning period for this species, in March and April -- Kind of  
34 that's where that class is kind of moving throughout the time  
35 period, right, and so the idea being that the class that was  
36 spawned in the peak spawning period of March and April is generally  
37 setting into their pelagic juvenile feeding period in the  
38 summertime.

39  
40 Anyway, that was kind of the rationale for breaking apart the  
41 monthly data that I had, which was the sargassum data, and those  
42 were coverage values of sargassum in these different experimental  
43 units, and I've got seven different management restricted areas,  
44 like the Flower Garden Banks, the Madison-Swanson, Edges, Middle  
45 Grounds, Steamboat Lumps, and things like that, and then I've got  
46 some kind of large-scale areas that cover the central Gulf of  
47 Mexico.

1 I've got that little mouth of the Gulf of Mexico area right there,  
2 you know, at the middle, down by Cuba and the Yucatan, and, really,  
3 the idea was just to see if any of those things had an effect on  
4 coverage values.

5  
6 When I got to the different -- To those two different time periods  
7 for the spawning and dispersal model and the juvenile recruitment  
8 model, I had to kind of go through and look at the correlations  
9 between all of those different time series, because I can't have  
10 things that are highly, highly correlated in the same analysis,  
11 and so some of those areas that I was showing you kind of dropped  
12 off, and these are the ones that ultimately remained, and this is  
13 just kind of an ugly visualization of these data, but I just wanted  
14 you to see that there are kind of peaks in periodicity over time  
15 in the sargassum coverage, in both the spawning and dispersal  
16 period as well as the pelagic and recruitment period, and so that's  
17 what we were trying to see, if there was any effect of that areal  
18 coverage on the recruit deviations for amberjack.

19  
20 The rest of the data that I acquired for the environment and the  
21 climate and other factors in the Gulf were drawn from these two  
22 ecosystem status reports that Mandy put together, which are  
23 awesome, by the way, Mandy. These are like my favorite things in  
24 the whole world, and I don't know why more people don't use them,  
25 but they're awesome, and you guys should use them more.

26  
27 Anyway, there's a ton of information in both of those reports,  
28 and, for amberjack, I was able to pull out some general ecological  
29 variables related to the Mississippi/Atchafalaya River Basin,  
30 things related to flooding and flow rates, precipitation values,  
31 and I've got some other perturbation-like variables, related to  
32 hurricanes and oil spills, and we've got things related to climate  
33 and temperature, like sea surface temperatures, AMO values for the  
34 Atlantic Multidecadal Oscillation, zooplankton levels in the  
35 springtime, and then I have that specific eutrophication model  
36 that was looking at dissolved oxygen, nitrogen oxides, and total  
37 phosphates.

38  
39 Then the last model that I mentioned before was that really long-  
40 term kind of artificial habitat model for greater amberjack that  
41 had only two predictors in it that were the number of artificial  
42 reefs and the number of oil platforms, and I have actually used  
43 these data again later on, and these have been changed to net  
44 change in those variables, and so, you know, there is some  
45 flexibility in the way that you can use some of these variables as  
46 well. Okay, and so that was all for the amberjack stuff.

47  
48 For the reef fish, similar kind of, you know, set of information

1 that I was trying to collect, and we just had different time  
2 periods that I was assembling them over, and slightly different  
3 focuses for the assemblages of reef fishes, but this one was the  
4 climate and sea surface temperature model that I looked at, and  
5 then I had a food web and overfishing model that also included  
6 waterbird indicators, like pelicans, magnificent frigate birds,  
7 the spoonbills, white ibises, and wood storks, and then I also  
8 have the Ryther index of overfishing included in here as well.

10 Then these are the eutrophication indicators that were used in the  
11 reef fish models, and they're no different, really, than the other  
12 ones, but just different time series.

14 Okay, and so getting into the results now, starting with the  
15 amberjack, and so I had four different, or five, actually, models,  
16 and the sargassum model was actually two models, but only in the  
17 environmental context, right, and, in the context of the AEMs, the  
18 sargassum model was just a sixteen-year model, right, and so I can  
19 look at the response there, you know, once, and then relate those  
20 asymmetric eigenvectors back to both of those environmental models  
21 later, but, in all cases in amberjack, I was able to find temporal  
22 autocorrelation variables that did a decent job of explaining  
23 variability in those recruit deviations, and so, if we look a  
24 little bit closer at them, and specifically the time periods that  
25 they cover, you know, we can see that, in the case of the  
26 eutrophication model, right, which went from 1987 to 2014, there  
27 were two different temporal signals that were kind of prevalent in  
28 that model.

30 They were able to capture 22 percent of the deviations, of the  
31 variability in those deviations, and it's explained by this twenty-  
32 eight-year kind of continuous trend and this eight-year kind of  
33 cycle, right, and then the other model that I'm showing here was  
34 just an eight-year cycle, and that one had a 32 percent explained  
35 variability for its deviations. The other two models were right  
36 around 17 and 18 percent, respectively.

38 Again, the point here -- The point that I really want to make here  
39 is that between 17 and 30 percent of the variability in recruit  
40 deviations was able to be modeled using these synthetic  
41 autocorrelation structures over time, and so I'm seeing these kind  
42 of decadal signals present in many of the models, and a long-term  
43 multidecadal signal present as well, in at least one of the models.

45 The question that I ultimately have, and that we can discuss a  
46 little bit later, is why is this happening? Like, if it's not an  
47 environmental process, that's a problem, in my opinion, and maybe  
48 it's not, because I'm not a Stock Synthesis modeler, and I don't

1 really know the mechanics of that model as well as some of you do,  
2 but it seems strange, to me, that I can model recruit deviations,  
3 using synthetic temporal variables, as well as I can.

4  
5 In any case, as we extend that out into that environmental kind of  
6 forcing model, we did find some additional environmental  
7 covariates that seem important to amberjack, right, and, you know,  
8 these highlighted values are just kind of showing you, on the top,  
9 of the proportion explained by the fitted model, you know, the oil  
10 platforms and the artificial reefs did an excellent job, in the  
11 habitat model, of capturing that variability, and so, you know,  
12 that model -- The temporal model accounted for 17 percent of the  
13 variability in the recruit deviations, and, of that 17 percent,  
14 the oil platforms, and the artificial reefs, accounted for 91  
15 percent of that variability, and so 16 percent of the total  
16 variability in recruitment variations could be modeled by these  
17 oil platforms and the artificial reefs, right, and so that seems  
18 important.

19  
20 The ecological model didn't actually have a significant asymmetric  
21 eigenvector model, right, and so there was no temporal model there,  
22 but I was able to explain 24 percent of the variability in recruit  
23 deviations using the AMO index and those oil platforms, again, and  
24 so, again, interesting stuff going on with respect to the oil  
25 platforms and the artificial structures and amberjack, and I'm  
26 sure we'll talk about that again later on today.

27  
28 The eutrophication models, and the sargassum models, weren't as  
29 helpful as we hoped they would be, but we did get some interesting  
30 results there related to dissolved oxygen, which I think could be  
31 related to -- Well, I don't know exactly what it's related to, but  
32 some of the my thoughts, I think, lead me to believe that it might  
33 have something to do with larval success, right, and, if you have  
34 low oxygen -- There's plenty of literature on amberjack in  
35 aquaculture that basically shows that, at depressed dissolved  
36 oxygen levels, the larvae don't do as well. They don't function  
37 as well, and they don't survive as well, and so maybe that has  
38 something to do with it. It's unclear at this point.

39  
40 The fact that the Middle Grounds showed up as an important factor,  
41 during the juvenile and larval period, I think is interesting, and  
42 so, basically, what's that saying is that, you know, we can account  
43 for 7 percent of the recruit deviation variability by looking at  
44 the Middle Grounds areal coverage of sargassum in that spawning  
45 and larval period, and so, if you dig into the literature, one of  
46 the things that you will find is that, in the Middle Grounds,  
47 occasionally the physics become right, such that they are able to  
48 entrain larvae in that region, and, if we're entraining larvae and

1 sargassum at the same time, then we could be potentially setting  
2 up a really nice habitat for those juveniles to kind of do some of  
3 their early life stage business, and so maybe getting at that  
4 match-mismatch hypothesis.

5  
6 Now let's move into the reef fish stuff, and, again, this one was  
7 taking a little bit more of a multivariate approach, and, as a  
8 result, I didn't really get good results, which kind of bummed me  
9 out, but, if you think about it, that kind of makes sense, maybe,  
10 because, at the end of the day, when you're putting things together  
11 in a matrix, you know, you're hypothesizing that those variables  
12 need to be together, because they describe some kind of system,  
13 right, and I have, somewhat arbitrarily, put together hogfish and  
14 red grouper deviations and all of the snapper deviations, and maybe  
15 I shouldn't have done that, right, because, if you think about why  
16 would you do that, the idea would be that those recruit deviations  
17 would theoretically respond in the same way to environmental  
18 conditions, or they have similar ontogenies, and they maybe are  
19 spawned at the same time, in the same place, and we have reason to  
20 believe that they would act similarly.

21  
22 I don't know that we got that right in this exercise, and so I  
23 think that might be part of the reason why the all-species model,  
24 the hogfish and red grouper model, and the all-snapper model,  
25 didn't have temporal signals that could explain that.

26  
27 Maybe they just don't have temporal signals, and that's fine too,  
28 but the point is that those are multivariate systems that are  
29 trying to be explained in that temporal context. Gray triggerfish,  
30 on the other hand, was one species that I was looking at, and that  
31 one had really good results, to the tune of almost 84 percent of  
32 the variability being explained by those three asymmetric  
33 eigenvector maps, right, and so those ADMs cover three different  
34 time periods, and they explained a really large proportion of the  
35 variability in those recruit deviations.

36  
37 Just to kind of remind ourselves what they look like, the triangles  
38 are the recruit deviations that we're trying to explain, and the  
39 green line is the fitted model from that, and that's the 84 percent  
40 that was explained, basically, right, and so that's what the model  
41 was able to capture, and then the blue line is what was left over  
42 after that, right, and so that's the detrended stuff, and so, like  
43 I said, 84 percent of the variability in those triangles is  
44 explained by these three eigenvector maps, right, and so we have  
45 an oscillating seven-year signal, and we have an oscillating  
46 thirteen-year signal, and a more or less continuous twenty-six-  
47 year signal that, you know, combined together into that composite  
48 time series that you see there, right, and that's kind of -- You

1 know, if we flip the sine on this whole thing, then it pretty well  
2 matches what we're trying to model, and so I think that's one of  
3 the reasons why we did such a good job.

4  
5 Here is a visualization of the contribution of each of those  
6 periodicities to the -- These are the site scores from the  
7 redundancy analysis, and these are kind of the fitted scores for  
8 an axis, and so these are the modeled outputs, basically, and so  
9 those AEMs, you know, we already know do an excellent job of  
10 explaining the outputs, but now we're seeing that, over the time  
11 series, different temporal autocorrelation structures become  
12 predominant at different periods of time, right, and so, in the  
13 early portion of the time series, it looks like AEM 1 is, you know,  
14 the more controlling factor, and that's the very long time period  
15 structure, whereas, in the middle of the time series, it seems  
16 more like a mix between AEM 2 and 4, and then, back at the end,  
17 maybe we're getting back into AEM 1 being a little bit more  
18 controlling, right, and they all have an influence, but how much,  
19 at what time, is the interesting point.

20  
21 Okay, and so this is basically the same stuff that I just said,  
22 more or less, and, you know, those three temporal structures did  
23 a great job, in the case of gray triggerfish. We've got some  
24 interesting, again, short-term, kind of decadal signals going on  
25 there, and then a long-term multidecadal signal present there as  
26 well.

27  
28 Okay, and so extending that stuff out into the ecological model,  
29 only for the gray triggerfish, also led to some fairly interesting  
30 results, and, in this case, mostly related to overfishing levels  
31 within the entire Gulf, right, and so, as our overfishing index  
32 changed, we could explain some of the recruit deviations for gray  
33 triggerfish, but, also, white ibises seem to be an important  
34 factor, or at least they are -- You know, the movement of their  
35 data was important.

36  
37 Sea-level rise and dissolved oxygen offshore in Texas in the fall  
38 is also important, and so those were all related back to the  
39 temporal models, right, and the non-temporal models also did have  
40 some explained variability, right, and so I was able to get at a  
41 large proportion of the total variability here looking at these  
42 temporal models and these additional sea surface temperature and  
43 dissolved oxygen features.

44  
45 Okay, and so we're at the discussion point for the AEMs, right,  
46 and my main question is why does this work at all? If this behavior  
47 is not related to an actual environmental mechanism, which we can't  
48 say for sure, right, from this analysis, and we would have to do

1 a lot more work for that, but the fact that all of these covariates  
2 were identified I think is interesting, and is worth discussion,  
3 but I am more interested in wondering, to myself, out loud right  
4 now, why is this working at all, right, and is this behavior  
5 expected from Stock Synthesis, and I can't answer that question,  
6 and so I'm hoping that you can help me with that.

7  
8 If it is expected, can we do anything to tune it, or inform bias  
9 corrections? Is it expected in a good way or a bad way? I would  
10 really -- I am interested to know.

11  
12 The other issue is that, like I said before, these AEMs are just  
13 proxies, right, and they are synthetic variables for unknown  
14 processes, and we're just modeling time, and we're seeing temporal  
15 structures, over time, but we can't necessarily relate them back  
16 to anything specific, in the Gulf, without additional work, and so  
17 I guess I will open the floor, at this point, to you all, to see  
18 if you have any questions or any commentary on that.

19  
20 **CHAIRMAN NANCE:** Thank you. Any questions or discussion from the  
21 SSC? David, please.

22  
23 **DR. CHAGARIS:** Hi, Josh, and thanks for the presentation, and, you  
24 know, I appreciate all your efforts to synthesize, you know, all  
25 these ecological data and recruitment data, but, to your first  
26 point up there, why would we expect AEMs to work at all for Stock  
27 Synthesis outputs, and I think you have to think carefully about  
28 what recruitment deviations are in Stock Synthesis.

29  
30 Most of these species, we don't actually have a recruitment survey,  
31 or index, and so we don't really know what's informing those  
32 deviations, and there's a lot of nuances, as far as they're  
33 probably chasing data in the age or length structure, and those  
34 data are, most likely, not representative, as far as space and  
35 time, and so there's an issue there, where recruitment deviations  
36 might be chasing some other residuals in the data.

37  
38 Then there's other nuances with Stock Synthesis, and I'm not sure  
39 how each model handles it, but there was a constraint to where the  
40 deviations had to sum to zero. Whether that's in all models or  
41 not, but that can really influence --

42  
43 **DR. KILBORN:** That was why I used the alternate form of the  
44 deviations. These are not the predicted deviations from the model.

45  
46 **DR. CHAGARIS:** Well, they are. You just --

47  
48 **DR. KILBORN:** Well, they're not the output, the estimated

1 deviations. They're not those, right, and they're a totally  
2 different time series to be calculated, but you're right that they  
3 are --  
4

5 **DR. CHAGARIS:** These points off the curve are the result of the  
6 estimated deviations.  
7

8 **DR. KILBORN:** That is fair, yes.  
9

10 **DR. CHAGARIS:** So, when they're constrained to sum to zero, that's  
11 affecting how they're above or below that curve, and so I, for one  
12 -- Unless we have a species that has an observed recruitment index,  
13 I, for one, don't necessarily believe the recruitment deviations  
14 out of Stock Synthesis are true recruitment deviations. They are  
15 there to address other residuals in the data, which may or may not  
16 be due to recruitment, and so I think that's a big hurdle to  
17 overcome, and I think what would help here -- I mean, what this  
18 does is it does identify other plausible hypothesis, like you said,  
19 that, you know, we could look further into, but things like -- A  
20 perfect example is on the previous slide, where white ibis had  
21 some significant effect on gray triggerfish, and that's,  
22 obviously, like a spurious correlation, and there's really no --  
23

24 **DR. KILBORN:** Why is that obviously spurious? I'm curious.  
25

26 **DR. CHAGARIS:** Well, trigger -- I mean, white ibis are a marsh  
27 bird.  
28

29 **DR. KILBORN:** I'm just curious.  
30

31 **DR. CHAGARIS:** So those types of things --  
32

33 **DR. KILBORN:** But, I mean, I don't think it's necessarily fair to  
34 say that the shoreline is disconnected from offshore fish  
35 productivity, or things like that, and, you know, what happens in  
36 the marsh could have an effect, right, and we don't know that --  
37

38 **DR. CHAGARIS:** Well, true, and that goes back to, you know, kind  
39 of a conceptual model of why marsh grass and marsh birds would be  
40 an indicator of gray triggerfish recruitment, and so that would  
41 need to be laid out, I think, for us.  
42

43 **DR. KILBORN:** I agree.  
44

45 **DR. CHAGARIS:** So I'm not real sure, you know, how to interpret a  
46 lot of this. I think it definitely opens more questions. You  
47 know, it provides more questions than answers, but I would -- It  
48 would be really cool if you could track down observed data, or

1 find species where we understand the recruitment better, outside  
2 of what SS estimates, and then, you know, try to fit these models  
3 to that, but thank you for bringing this to us.

4  
5 **DR. KILBORN:** Yes.

6  
7 **CHAIRMAN NANCE:** Thank you. Will, please.

8  
9 **DR. PATTERSON:** Thanks, Mr. Chair, and thanks, Josh, for making us  
10 think a bit here early in the morning. A tremendous amount of  
11 effort obviously went into putting this together, and Dave actually  
12 asked part of what I was interested in kind of discussing here,  
13 but, you know, along those same lines, for many of the species  
14 that you listed early on that you looked at, we -- When we go to  
15 project the populations forward, to estimate OFL and set ABC, we  
16 often use mean recruitment, because the steepness of the stock-  
17 recruitment relationship can't be estimated, or it doesn't -- You  
18 know, maybe there's a broad minimum for the likelihood for the  
19 stock-recruit function, and we can't zero-in on one single  
20 steepness value, or it just butts-up against the upper bound, and  
21 we say that there is no relationship in the data, and, you know,  
22 for amberjack and triggerfish, the first two examples that you  
23 went through here --

24  
25 You know, for triggerfish, the last assessment, you know, wasn't  
26 -- It was kind of shut down midstream because of issues in how  
27 recruitment was estimated in the previous assessment, of which I  
28 assume that you brought in recruitment deviations here, and so I  
29 wonder -- You know, that's not to say that the pattern in the  
30 information isn't informative, but the magnitude of productivity,  
31 at least, you know, often isn't estimable in these functions, and  
32 so, you know, it kind of goes back to that initial -- The  
33 recruitment information and what all those recruitment deviations  
34 are actually telling us.

35  
36 Again, you know, you've already sort of addressed this a bit, and  
37 Dave talked about it in his questions, but I'm just curious, you  
38 know, what your thoughts are there, and what are you actually  
39 fitting to here with the recruitment deviations, and then that  
40 gets to what are these patterns telling us about density and  
41 dependent processes that might be shaping what you see here.

42  
43 **DR. KILBORN:** That's a good question. I'm not sure I have a good  
44 answer for you, honestly. You know, the idea, with looking at  
45 these recruit deviations, was to try to capture -- So let me back  
46 up. Stock Synthesis is the best guess we have, right, and it's  
47 our best estimation of what's going on with any of these stocks at  
48 any given point in time, or at least that's how I interpret it,

1 and so I am interested in the question of, you know, we have this  
2 Beverton-Holt relationship, in most cases, that we use as the base  
3 stock-recruitment relationship for any given species, and we have  
4 a number of different parameters that are set within the assessment  
5 to define that model.

6  
7 Then Stock Synthesis does a whole bunch of estimations and models  
8 and things in the background, and, at the end of the process, we  
9 end up with an additional year of age-zero recruit value, and so  
10 looking at the difference between what Stock Synthesis is  
11 predicting and what our theoretical model is predicting is what I  
12 am, I think, looking at.

13  
14 To my mind, that tells me a little bit about -- Because I don't  
15 personally know a lot about the under-the-hood method of what Stock  
16 Synthesis is doing, I think a lot of that information is rolled up  
17 into this deviation value, right, and so, you know, we're getting  
18 the best guess from the model versus the best guess from our  
19 theory, and that's what is left over, and so that's what I'm trying  
20 to capture in these models, and so my thought process was that, if  
21 we can understand some of that, then we could hopefully kind of  
22 backtrack into the mechanics of Stock Synthesis and determine is  
23 there some sort of mechanistic process that is creating these  
24 cyclical oscillations in our data or are there actual, you know,  
25 environmental controls that we can identify and then try to examine  
26 later, and does that answer your question?

27  
28 **DR. PATTERSON:** Yes, in a way. I still -- So we actually did a  
29 project, in Alabama, where we produced a Stock Synthesis model for  
30 spotted seatrout in Mobile Bay, and then there was another spotted  
31 seatrout model that was done in Mississippi at about the same time,  
32 and we saw similar patterns in the recruitment deviations, and we  
33 tried to link those to climate indices, rainfall, et cetera, and  
34 reviewers didn't really like the whole deal, but, anyway, I get  
35 what you're looking at here, and trying to find that residual,  
36 trying to use the independent factors that could be driving that  
37 and look at the patterns, and so, conceptually, I think it's a  
38 great idea.

39  
40 Obviously, it's a huge amount of effort to pull everything together  
41 that you've done here, but I just worry about that -- You know, if  
42 we say we don't believe the stock recruitment relationships, then  
43 what does that mean for what -- You know, how much weight we give  
44 to the actual deviations that are being produced in the model.

45  
46 Then the second thing is, you know, Dave mentioned that, if you  
47 have actually empirical estimates, from a survey, of what  
48 recruitment is, then how does that line up with what you're seeing,

1 and I guess the best example maybe to look at there, or an example  
2 to look at, would be red snapper, where you have the age-zero  
3 catches in the fall groundfish survey often don't line up very  
4 well with what the recruitment deviations are estimating in the  
5 model, and that could be that there's some other process that's  
6 happening, well past settlement, which is driving eventual year  
7 class strength.

8  
9 That's not really been explored a whole lot, but, you know, it  
10 could be that what you're seeing in those recruitment deviations  
11 is actually happening. You know, it's an index of the year classes  
12 as they're entering the fishery, because most of the signal is  
13 coming from the age comps and not actually from that survey of  
14 age-zeros, and so then, you know, what is that actually telling  
15 you about the processes that you are trying to infer here?

16  
17 Anyway, it's a lot to think about, and I don't really have any  
18 suggestions, or answers, and it's a lot of uncertainty, and this  
19 is, I think, a cool first step to try to tease some of that apart,  
20 and I suspect, you know, looking ahead, that maybe some of your  
21 conclusions would be, and you just kind of alluded to them, about,  
22 you know, how do we -- How do we actually incorporate some of this  
23 into the assessments themselves and try to account for some of  
24 those environmental inputs, and I think that is tremendously  
25 needed, but, anyway, I'm just kind of thinking out loud here,  
26 because, you know, your talk is making me think about this stuff.

27  
28 **DR. KILBORN:** Yes, and that's the point. I appreciate the  
29 commentary, and I agree with you. You know, I've been presenting  
30 work like this for ten years now, and people don't like it, and  
31 I'm not going to lie, right, and it's weird and different, and  
32 it's not how we're used to thinking about things, and it doesn't  
33 actually address the mechanism, right, and that's a huge sticking  
34 point for a lot of people, and I totally accept that, and I  
35 understand that, but I do think that there's something going on  
36 here, right, and there is covariates at play that we're not paying  
37 attention to that have an effect on our resources, and we need to  
38 address that in some way.

39  
40 I don't know what the right way is, and, you know, I think -- You  
41 know, like the work that Dave does with the red tide I think is a  
42 really excellent example of a good way to bring environmental  
43 covariates into the process, and this isn't that, right, and this  
44 is kind of a first step that gets us towards the kind of work that  
45 Dave does, and so I do appreciate that commentary. Thanks, Will.

46  
47 **CHAIRMAN NANCE:** Thank you. Mandy, please.

1 **DR. KARNAUSKAS:** Thanks. This is really interesting work, and I  
2 appreciate you bringing this to us for some interesting discussion.  
3 I wanted to add to what Dave and Will said, and I think Dave's  
4 point on the spurious relationships -- Anytime you're bringing  
5 dozens of variables and putting them into an analysis, you do have  
6 to be careful that you're not creating some spurious relationships,  
7 just by the sheer number of variables, and so I do agree with that  
8 point.

9  
10 To Will's point on, you know, what the recruitment deviations  
11 actually mean, I agree that, you know, there's probably some useful  
12 signal in the deviations, but it's going to be a function of how  
13 the assessment is making use of available information, and I think  
14 this comes back to the discussion we had with Steve on the EDM a  
15 couple of days ago, where, you know, the environment is affecting  
16 the fish, and there's no doubt about that, or the organisms, but  
17 that environmental signal is kind of baked into the data and the  
18 processes, and so it's already sort of accounted for, in a way,  
19 and, you know, it's modeled in the stock assessment as process  
20 error.

21  
22 Whether that process error is being soaked up by like some time-  
23 varying parameters, or recruitment deviations, is -- You have to  
24 kind of go in and figure that out, and so, I guess, to get at  
25 Will's point, maybe a suggestion, and a way forward, is it can be  
26 informative, if you think that there's a mechanistic relationship  
27 between these variables and the stock, to actually put it into the  
28 integrated stock assessment, just to see what the integrated  
29 assessment does with that information.

30  
31 Does it downweight, or does it change the fits to age comp, to  
32 length comp, to the indices, and that can give you some information  
33 as to how the assessment is dealing with that information, what  
34 those recruitment deviations actually represent, and so that's  
35 maybe one suggestion, is you could actually try and link it to  
36 some process in the assessment and test that hypothesis and see if  
37 the fits are improved, and that might give you some information.

38  
39 Then I just had a question, and I have to admit that I don't fully  
40 understand the AEM and what it is, and I was wondering, and is  
41 this like a -- I'm familiar with dynamic factor analysis, where  
42 you're creating these like synthetic variables that represent some  
43 underlying process, and so I was just curious if you can --

44  
45 **DR. KILBORN:** It's similar to that. It's kind of similar to that,  
46 and it's a little bit more like a spectral decomposition, right,  
47 and so you can basically just decompose any time series into a  
48 number of sine waves, more or less, and that's more or less what's

1 happening here. It's just taking -- It actually was developed as  
2 a spatial method, and this is just a directional form of the  
3 spatial method, and the idea is that you can capture all of the  
4 different kind of scales of autocorrelation in whatever your  
5 sampling universe is, and so, in this case, it's time.

6  
7 So, basically, if I have a ten-year time series, like the longest  
8 period I can have is a ten-year period, right, and then it will  
9 decompose every possible periodicity within that ten-year cycle  
10 down to the smallest resolution available, which is an annual  
11 cycle, right, and so, if I have a one-hundred-year time series, I  
12 could have, you know, hundreds of these autocorrelation structures  
13 that just account for different periods of autocorrelation, and  
14 that's all that they are.

15  
16 **DR. KARNAUSKAS:** What is the assumed form of those functions then?  
17 Is it always cyclical or --

18  
19 **DR. KILBORN:** Yes.

20  
21 **DR. KARNAUSKAS:** Okay, and so you're imposing a cyclical form of  
22 a certain given frequency then.

23  
24 **DR. KILBORN:** Yes, and so there's multiple frequencies in the  
25 solution, and so the AEM decomposition results in a number of  
26 different frequencies, and the frequencies available depends on  
27 the length and the resolution of the time series, and so, if you  
28 have a hundred years, you can have, you know, all of the possible  
29 frequencies of periodicity in that, down to one year, from one  
30 year to 100, all of the possible things within that, but they're  
31 meant to be autocorrelation structures, right, and so that's a key  
32 point, right, and they're not just, you know, an up or a down or  
33 a temporal signal. They're meant to be autocorrelation.

34  
35 **CHAIRMAN NANCE:** Thank you. Paul, please.

36  
37 **DR. MICKLE:** Thank you, Mr. Chair. Josh, I really enjoyed the  
38 presentation, and I think you've got everybody thinking, which was  
39 really good, and I think there's a lot of promise in the  
40 directionality of some of these results, as far as autocorrelation,  
41 but I had a question on Slide 57. Jess, can we look at that one,  
42 real quick?

43  
44 It's really just to help me wrap my mind around it, but, when you  
45 have these different models, and, in a way, they're almost  
46 categorically based, and, when you look at the habitat, the habitat  
47 one, what is the N, and I see the different years, and so a  
48 different temporal scale, and so that's my first question, and I

1 have one or two to follow.

2  
3 **DR. KILBORN:** So those are -- Remember I said, at the very  
4 beginning, that I had to relate the habitat variables back to the  
5 response, and so that dictated the time series available for those  
6 specific models, and the habitat data, in this model, was just the  
7 oil platforms and the artificial reefs, and that time series was  
8 very long, and so, because of that, I was able to use a forty-six-  
9 year time period.

10  
11 When you have a forty-six-year time period, you get a number of  
12 different AEMs that you don't get when you have a twenty-nine-year  
13 time period, or a twenty-eight, or a sixteen, and so that's why  
14 all of the different models have different Ns, is because they  
15 cover different ranges of years, based on the available data. Does  
16 that answer your question?

17  
18 **DR. MICKLE:** Yes, and I had a suspicion that the N was temporal.

19  
20 **DR. KILBORN:** Yes.

21  
22 **DR. MICKLE:** So what are the years in the parentheses?

23  
24 **DR. KILBORN:** The years in the parentheses are the periodicity of  
25 that autocorrelation.

26  
27 **DR. MICKLE:** Gotcha. Okay. Thank you. All right, and so, in the  
28 habitat, it's almost static, in a way, and I guess there's a  
29 removal of structures and things.

30  
31 **DR. KILBORN:** Yes, pretty much.

32  
33 **DR. MICKLE:** But the ecological and the eutrophication, and even  
34 sargassum, I assume that you're pulling this out of literature and  
35 some of the reports that have been done, and there is gaps in the  
36 analysis. There's gaps in the data, right, and don't you have to  
37 have the --

38  
39 **DR. KILBORN:** They're all annual data.

40  
41 **DR. MICKLE:** Okay.

42  
43 **DR. KILBORN:** They're all annual values.

44  
45 **DR. MICKLE:** Okay. Annual values. All right. Thank you. That's  
46 all I have.

47  
48 **CHAIRMAN NANCE:** Thank you, Paul. Harry, please.

1  
2 **MR. BLANCHET:** I was about eight slides in, and I was looking for  
3 another cup of coffee, and I appreciate the getting me thinking  
4 this early in the morning. One of the things that struck me was  
5 that the triggerfish was really well described, but, when you look  
6 at what we have for recruitment deviations in triggerfish, there's  
7 not a whole lot -- It's driven, essentially, by cycles, and, if  
8 you look at what is in the other species, the change from X minus  
9 one to X to X plus one, it's a lot greater proportion to the total  
10 variability of the whole time series than in triggerfish.

11  
12 Triggerfish is a lot closer than any short time series, and so I'm  
13 not at all surprised that a -- That it fits well to a long cycle.  
14 I think it's a problem with the -- I don't mean to sound negative  
15 about it, but I think it's a problem with the quality, or quantity,  
16 of data that's going into that triggerfish assessment.

17  
18 That's been a challenging assessment, and so recruitment  
19 deviations coming out of it -- I just don't think they have the  
20 information to fully characterize what's going on in that stock,  
21 including recruitment, and it's giving us a good indication,  
22 perhaps, of short-term changes in the stock, and I have never felt  
23 real comfortable with the triggerfish assessment, just because it  
24 -- Just because of the issues with how do you age these things,  
25 and there's a lot of unknown factors.

26  
27 I will say that I really -- I appreciate you tossing out the white  
28 ibis relationship, because there you have a long-lived shorebird,  
29 and I can see that there could be some factors that relate both to  
30 white ibis abundance and triggerfish, but that's definitely  
31 something that could -- I think what this does is this gives us  
32 maybe a way to filter for what do we need to look at to better  
33 understand what's going on with some of these systems, because  
34 you're right that we can definitely do a better job of managing  
35 our projections, or our expectations, if we have a better  
36 understanding of what's driving these, but, as somebody said a  
37 long time ago, there's many a slip 'twixt the cup and the lip, and  
38 I think that's part of our issue too, is that we may have an  
39 understanding of the recruitment, but, as Will said, you don't  
40 necessarily see the signal from a true recruitment index actually  
41 showing up in the fishery, because stuff happens.

42  
43 I do appreciate though that this is very interesting, and I think  
44 it can be quite useful in a lot of aspects, outside of reef fish  
45 and outside of federal management, I think, but it's a great  
46 jumping-off point, and I really appreciate it. Thank you.

47  
48 **DR. KILBORN:** Thank you.

1  
2 **CHAIRMAN NANCE:** Will, please.  
3

4 **DR. PATTERSON:** Thank you, Jim. You know, these recruitment  
5 deviations are really where, you know, Stock Synthesis is putting  
6 other unexplained variance in basically what are productivity  
7 estimates, and I was just sitting here thinking about a  
8 conversation that I had with John Walter a few years back, when we  
9 were presenting information that the north-central Gulf red  
10 snapper size-at-age had declined in the years after Deepwater  
11 Horizon.  
12

13 Liz Herdter's thesis there at USF, working with Steve Murawski,  
14 she saw similar patterns for fish that were collected a little  
15 farther out on the shelf, and so you have these two pieces of  
16 evidence that that occurred in that region, and, at the time, the  
17 -- You know, the most recent red snapper assessment, and I think  
18 it was 2016, and the population in the eastern Gulf and the  
19 population in the western Gulf had both been increasing pretty  
20 rapidly after the reauthorized Magnuson Act provisions, but then  
21 that kind of came to a halt after 2010 in the eastern Gulf, and it  
22 has kind of plateaued since then, and, in the western Gulf  
23 population, spawning stock biomass, just continued to rise over  
24 time.  
25

26 We only had a couple of years of data after Deepwater Horizon when  
27 that assessment was done, and so John looked at the information  
28 about the changes in size-at-age and said, well, you know, Stock  
29 Synthesis is going to interpret this, or could interpret this, as  
30 recruitment, because of the growth function that's in the  
31 assessment is going to predict these fish are younger than they  
32 actually are, right, than they actually were, because you actually  
33 had a change in growth over that period.  
34

35 I am wondering if some of the correlation that you're seeing here  
36 in some of these density-dependent environmental factors could  
37 actually be picking up growth differences, and not necessarily  
38 recruitment differences, but that's where the model is putting  
39 that productivity fluctuation -- It's putting in that recruitment  
40 deviation, and it could explain why you have some disconnect  
41 between when we have empirical information on recruitment, like in  
42 the red snapper fall groundfish survey data, why that doesn't, you  
43 know, typically like up really well with the eventual estimates of  
44 year class strength, or recruitment deviations, because of the age  
45 comps later on.  
46

47 Anyway, you know, maybe we're looking at just an index of stock  
48 productivity in these deviations that is not actually completely

1 explained by recruitment, but could be -- You know, it could be  
2 growth, fluctuations in growth, and how those are related to these  
3 environmental parameters. Anyway, I think it bears digging into  
4 a bit more on the Stock Synthesis side, to try to figure out, you  
5 know, exactly -- As Mandy said, you know, what is that signal, and  
6 what are the ecological processes that are driving that signal,  
7 but, anyway, again, it's making us think, for sure.

8  
9 **DR. KILBORN:** Thanks, Will.

10  
11 **CHAIRMAN NANCE:** Ryan, please.

12  
13 **MR. RINDONE:** Dr. Tolan is staying in his hotel room this morning,  
14 because he's lost his voice, but he said to ask about the link  
15 between two of the species and the sargassum data, and he wanted  
16 to know where did the spatial data for sargassum coverage come  
17 from in relation to some very specific area, like the MPAs, the  
18 Middle Grounds, et cetera, because it was his understanding, of  
19 satellite passage and coverage issues and cloud cover  
20 interference, that there is limitations on long-term sargassum  
21 tracking.

22  
23 **DR. KILBORN:** Those data were obtained from Dr. Mengqiu Wang in  
24 Dr. Chuanmin Hu's lab at USF, and they're annual, or, excuse me,  
25 they're monthly mean values.

26  
27 **MR. RINDONE:** So I guess where did they get them?

28  
29 **DR. KILBORN:** Satellites, and they have a special algorithm that  
30 they use that's magic. I'm not sure if you all have been following  
31 the sargassum work coming out of that lab, but they've been able  
32 to identify what they're calling the great sargassum belt that  
33 literally covers, spans, the entire Atlantic Ocean, and it pops up  
34 at various times of the year, and they've gotten very, very good  
35 at detecting sargassum.

36  
37 **CHAIRMAN NANCE:** Thank you. Trevor, please.

38  
39 **MR. MONCRIEF:** I think Will pretty much stated my question, and  
40 Harry kind of got my brain thinking, but I think Will said it a  
41 lot more eloquently, and, pretty much, I was just going down the  
42 road of what Harry had mentioned, and, you know, is there some  
43 effect of, you know, with triggerfish, the quality of the data  
44 going in, and, obviously, a fishery-independent index, for that  
45 and amberjack, is, you know, somewhat spotty across-the-board, but  
46 you've got landings there, and I was just wondering, you know, how  
47 the quality of the data going in might be driving some of these  
48 findings, but I also wanted to say all the presentations we had

1 yesterday, and Josh's presentation this morning, I think it's been  
2 fantastic, and I think it leads to a lot of good thoughts and a  
3 lot of good discussions in the future, and so I appreciate the  
4 presentation, Josh, and I think you did a wonderful job explaining  
5 it.

6  
7 **DR. KILBORN:** Thank you.

8  
9 **CHAIRMAN NANCE:** Dave, please.

10  
11 **DR. CHAGARIS:** I thought Will brought up a good point. You know,  
12 I think what's implied here, with using recruitment deviations, is  
13 that there's a numerical response from the environmental effects  
14 on recruitment, and so the numbers of recruits, but it could be a  
15 functional response, as Will pointed out, and so affecting growth,  
16 or size-at-age, and so those might be other response variables to  
17 consider.

18  
19 I think that -- I definitely see value in this. You know,  
20 obviously, I'm uncomfortable with using the recruitment deviations  
21 as a response variable, but I think, if you were just a little bit  
22 more, you know, surgical in the data that you used, this could be  
23 really informative, because it's not that we -- I don't think  
24 anybody here disagrees with the idea that there is some  
25 environmental effect on these, and we need some way to tease that  
26 out, and I can see this helping us get there, and then we could  
27 drill down on some of these patterns that you see, to, you know,  
28 try to get a better understanding. I do have -- That was just a  
29 comment, and I do have one question though.

30  
31 **DR. KILBORN:** Can I ask a question about that comment?

32  
33 **CHAIRMAN NANCE:** Sure.

34  
35 **DR. KILBORN:** Are you saying that you think I should find better  
36 data from the Stock Synthesis outputs as response variables?

37  
38 **DR. CHAGARIS:** No. Empirical data.

39  
40 **DR. KILBORN:** Okay, because that's one of the things that I wanted  
41 to avoid, was pulling too much stuff out of Stock Synthesis,  
42 because what it's doing is wrapped up in those recruit deviations.

43  
44 **DR. CHAGARIS:** Right.

45  
46 **DR. KILBORN:** So you want other data.

47  
48 **DR. CHAGARIS:** Right.

1  
2 **DR. KILBORN:** I've got you. Okay. Thank you.  
3

4 **DR. CHAGARIS:** Then the question I had was, and you may have said  
5 this, but is it possible to incorporate time lags into this?  
6

7 **DR. KILBORN:** Yes, and so I've actually -- I have already started  
8 talking to people, and I have been trying to down the EDM road  
9 with this for a while now, because I think that's a really  
10 promising avenue.  
11

12 **DR. CHAGARIS:** Okay. Cool. Thank you.  
13

14 **DR. KILBORN:** Yes.  
15

16 **CHAIRMAN NANCE:** Mandy, please.  
17

18 **DR. KARNAUSKAS:** I just wanted to offer another perspective, as  
19 someone who has tried to stuff plenty of things into the  
20 assessment, and, I mean, that's been my job, for the past decade-  
21 plus, and so just kind of thinking forward, and let's say we start  
22 putting environmental stuff into the assessment, and what actually  
23 happens, and I think this is relevant for the SSC, and so, because,  
24 as Will and Dave mentioned, the recruitment deviations are poorly  
25 informed by actual recruitment, because rarely do we have  
26 recruitment surveys, and it's basically the age comp driving the  
27 recruitment deviations.  
28

29 Because we don't get the age comp until the fish actually appear  
30 into the fishery, the last two or three or four years of  
31 recruitment deviations are like paper fish, and they tend to be  
32 uninformed, because there is no information to inform those, that  
33 age comp, but the environmental data is usually up-to-date, and  
34 like you have the sargassum, or the SST, or whatever it is you're  
35 putting it into the assessment, and you have that to the present  
36 day.  
37

38 When you start putting the environment into the assessment and  
39 linking it to recruitment deviations, what happens is the  
40 recruitment deviations, for the last few years, are almost entirely  
41 informed by the environmental variable that you put in, and so you  
42 assume that, you know, whatever it is, white ibis, SST, oil  
43 platforms, it matches the past, but then it's almost wholly driving  
44 the recruitment deviations from the last few years, which,  
45 obviously, has major implications on the catch advice.  
46

47 If you take that out, you may have, okay, SST was way up this year,  
48 and so we think we're going to have this big recruitment boom, and

1 that's wholly based on the environmental information, and so what  
2 I'm getting at is that, when you include these environmental  
3 variables and link them to the recruitment deviations, it has major  
4 implications on the catch advice.

5  
6 If the SSC wants to go down the road of including this stuff in  
7 the stock assessment, or considering it, we're going to be faced  
8 with a question, and like do you believe that oil platforms have  
9 a big enough impact on this species that the catch advice should  
10 be shifted, and it's a weight-of-evidence question, and so I just  
11 am kind of looking forward, if we did go down this road, and those  
12 are the kinds of things that the SSC would be faced with, is do  
13 you think that this environmental -- Are you sure enough that this  
14 environmental variable is impacting the fish that you're willing  
15 to change the catch advice substantially.

16  
17 **DR. KILBORN:** Thanks, Mandy. I agree with that, and that's one of  
18 the reasons why I said, at the beginning, this is not a talk about  
19 environmental covariates, right, and this is about the asymmetric  
20 eigenvector maps, and I am -- You know, this slide that's up there  
21 right now is -- That's more of the punchline that I want you to  
22 focus on, right, is why can I explain these deviations with  
23 temporal synthetic autocorrelations structures, at relatively high  
24 levels of variability, and extending it back to the environmental  
25 covariates is a good idea, and something I think is worth doing,  
26 but everybody is right.

27  
28 There is no mechanism in this process, right, and we're kind of  
29 making best guesses about why some of these variables popped up in  
30 the results, but remember the reason they popped up is because  
31 they were highly related to these temporal structures, right, and  
32 so the oil platforms, and the white ibises, and the temperatures,  
33 and all that stuff is popping out because they display these  
34 temporal patterns.

35  
36 That is the take-home message. The temporal patterns are in these  
37 results, and the Stock Synthesis model is producing periodicity in  
38 the outputs, and that's what I am trying to figure out, if that's  
39 good, bad, indifferent, or what, and so, again, I take everybody's  
40 point on the environmental covariates, that, you know, there's a  
41 lot more work that needs to go into all of that stuff, if we're  
42 going to eventually fold any of it into management decision-making.

43  
44 I think this is a good jumping-off point for identifying some of  
45 those things that we might want to, you know, get into the lab, or  
46 get out into the field, and do some more mechanistic studies, but  
47 I'm more concerned about these temporal autocorrelation structures  
48 and why they're able to account for 30 to 80 percent of the

1 variability in some of these Stock Synthesis outputs.

2  
3 **CHAIRMAN NANCE:** Thank you. Will, did you have a question?

4  
5 **DR. PATTERSON:** Actually, you know, I think Josh got to it there  
6 at the end, about, you know, in the end, we're concerned about  
7 process, and so, even though this is more of a data exploration,  
8 once you see a signal, then how do we actually describe the process  
9 that's driving this.

10  
11 Then, you know, Mandy's comment about incorporating environmental  
12 covariates into assessment models, I think that's, you know, a  
13 really important consideration. I wonder, and this, I guess, is  
14 more of a question for Mandy than Josh, if -- What if you just  
15 took your time series, and so the environmental covariates help  
16 explain some of the variability with productivity in the  
17 assessment, or it's moving through the population and population  
18 dynamics over time, but what if you just truncated your time series  
19 of environmental covariates so that you don't have this issue, in  
20 the last few years, that the recruitment deviations are being  
21 driven by an environmental signal and not, you know, age comps or  
22 catch rates, et cetera. You know, is that a possibility?

23  
24 **DR. KARNAUSKAS:** Yes, that's a good thought, and you could  
25 certainly just truncate it and cut the data out, if you didn't  
26 want the environment to have an impact on your catch advice.  
27 That's true, but I still -- I guess, to kind of your point and  
28 Josh's point, still your understanding of what's causing the  
29 periodicity -- I mean, I think this gets into our questions of  
30 like do we consider this a regime shift or not, and those types of  
31 decisions, and, you know, are we going to assume low recruitment  
32 into the future, or is recruitment going to be up to average.  
33 Whether or not you assume that that's an environmental signal --  
34 I mean, that has major implications on the catch advice, too.

35  
36 **CHAIRMAN NANCE:** Thank you. Steve, please.

37  
38 **DR. SAUL:** Thank you, Mr. Chair, and thanks, Josh, for this talk.  
39 This is super interesting and thought provoking. What Will and  
40 David and Mandy have said I full agree with, and I think, also,  
41 the index, the CPUE indices, also mess with, or drive, some of  
42 those deviations as well, when the model is trying to reconcile  
43 the fit between, you know, the size, or the demographics of the  
44 population, and the CPUE.

45  
46 You know, some of that CPUE seems to also dictate how those  
47 deviations are estimated, or when, and I think looking at a lag is  
48 really good, for some of these processes, right, because the

1 environment may change, but it may take a couple of years for that  
2 change to show up in the assessment, and then I'm wondering if a  
3 way forward, for your research, might be -- Not that you want to  
4 abandon the Gulf, but maybe to look at assessments that are done  
5 in other regions, like Alaska, the North Pacific, where they have  
6 long time series of environmental data that are in the assessment.

7  
8 You could potentially -- You could get the SS model files from  
9 those and run the assessment with and without those long time  
10 series of environmental data, and then perhaps compare, you know,  
11 the rec devs with and without that in the model, and then how they  
12 align with some of the indicators that you're looking at, and that  
13 might be a way to sort of proof-of-concept try to better tease out  
14 some of these questions you're asking.

15  
16 I think you're walking on solid theory, right, and recruitment  
17 deviations are supposed to be reflective of environmental  
18 processes, but I think, in practicality, they're largely driven by  
19 a lot of the data structure, things that we're talking about now,  
20 and so that's one idea that I had for you.

21  
22 **DR. KILBORN:** Thank you. I'm going to follow-up with you on that  
23 later.

24  
25 **CHAIRMAN NANCE:** David, please.

26  
27 **DR. GRIFFITH:** I'm just -- I am quite ignorant of a lot of this  
28 stuff that you're talking about, and my question has been slightly  
29 asked, or answered, by something Steven just said, and Will just  
30 said, but I need to ask Mandy, and why do you think that adding  
31 these environmental factors would automatically affect this, you  
32 know, recruitment variability? Why would that occur? Just because  
33 they're new variables?

34  
35 **DR. KARNAUSKAS:** So you're asking why adding environmental  
36 covariates would change the catch advice or the fits to the stock  
37 assessment?

38  
39 **DR. GRIFFITH:** The stock assessment, or the variability, I think,  
40 is what you had said, and that's the way I read it.

41  
42 **DR. KARNAUSKAS:** So, anytime you add new data into an integrated  
43 assessment, it's going to change fits, and I think we saw that  
44 yesterday with scamp, when Skyler added, you know, a couple of  
45 years of recruitment, and then suddenly the model didn't converge,  
46 and so, anytime you add -- Especially with -- If you're trying to  
47 -- If you're linking something recruitment deviations, again, as  
48 others have mentioned, the recruitment deviations are soaking up

1 a lot of the unexplained variability that's in growth, recruitment  
2 itself, and, I mean, it could really be -- Selectivity, if you  
3 have selectivity incorrectly parameterized, and it could also be  
4 soaking up some of the variability from that, and so it's kind of  
5 a catch-all.

6  
7 It's taking all the noise that's not explained by the way you have  
8 the model parameterized, and it's just dumping it in a bucket and  
9 saying this is what it is, and so, anytime you add new information,  
10 saying, hey, I'm going to explain some of this unexplained stuff  
11 that's in this bucket, then it's going to change the fits to  
12 everything else, and so, anytime you add new data into an  
13 assessment, it's going to change the fits, and I think, because  
14 recruitment deviations are encompassing so much, they're  
15 particularly prone to that issue, in my experience.

16  
17 **DR. GRIFFITH:** Well, if that's the case, then incorporating, you  
18 know, social science data would all of a sudden make it seem as  
19 though that was driving the variability, and is that what you're  
20 saying?

21  
22 **DR. KARNAUSKAS:** I'm not sure I understood that question.  
23 Incorporating social science data into --

24  
25 **DR. GRIFFITH:** Well, you had said that incorporating any data into  
26 these models would all of a sudden change the direction of things,  
27 and so I'm just saying incorporating any kind of -- You had  
28 mentioned oil platforms, and, I mean, oil platforms, or any kind  
29 of human anthropogenic change in the environment, is going to  
30 affect -- You know, it's going to affect the fish stocks and stuff  
31 like that, and so I'm just wondering about this from a kind of  
32 thinking about the whole ecosystem and, you know, how it interacts  
33 with its different components.

34  
35 I just don't understand how say, for example, if you add oil  
36 platforms, that, all of a sudden, oil platforms are responsible  
37 for all of the fish variability that you're seeing, or the  
38 recruitment variability.

39  
40 **DR. KARNAUSKAS:** Okay. I see what you're asking. Yes, it comes  
41 down to the -- So the recruitment deviations, in the last years of  
42 the assessment, are driving a lot of the catch advice, because, if  
43 you're saying, for example -- Let's say the red snapper assessment,  
44 that's being done right now, if you said that, this year, we're  
45 going to have a huge recruitment event, and it hasn't been seen  
46 yet, but we're going to have it, because the environment says we're  
47 going to have a huge recruitment event, we're going to have much  
48 larger catches next year, or, well, it takes like two or three

1 years for those recruits to actually get in the fishery, and so,  
2 two years from now, we're going to be able to have huge fishing  
3 pressure on red snapper, because I'm saying, right now, we're going  
4 to have a huge recruitment event, versus what if I said the  
5 environment was going to be really bad this year for red snapper  
6 recruitment, and we're expecting really low recruitment, and then  
7 your catch advice, two years from now, is very different, because  
8 you're projecting forward that assumed year class strength.

9  
10 Because those last years of data are informed by basically nothing,  
11 because we have no information, or very little information, for  
12 most of our species, on the strength of recruitment, this year,  
13 last year, or the year before, but that's driving the catch advice  
14 -- I mean, it's just basic math. Like the amount of new recruits  
15 coming into the population next year is going to drive the catch  
16 two or three years down the road, and so that's the issue. That's  
17 why it's particularly informative.

18  
19 **DR. KILBORN:** But aren't we doing that already?

20  
21 **DR. KARNAUSKAS:** Sorry. Doing what?

22  
23 **DR. KILBORN:** Aren't we using the last few years of data to make  
24 those projections?

25  
26 **DR. KARNAUSKAS:** We are, yes, and we're assuming mostly, by  
27 default, that they're average, because, when you have no data, it  
28 reverts to the stock assessment curve, and it assumes average  
29 recruitment.

30  
31 **CHAIRMAN NANCE:** Luiz.

32  
33 **DR. BARBIERI:** Thank you, Mr. Chairman, and thank you for the  
34 presentation, Josh. You know, not to rehash, and a lot of people  
35 brought up a lot of good concerns here, but I applaud your effort  
36 to come and present, because, obviously, this has generated a lot  
37 of good discussion, and there is a lot of interest, right, in  
38 general, in understanding some of this unexplained, right, causes  
39 for recruitment variations and stock dynamics and all of that, and  
40 so, you know, thank you for that.

41  
42 My question is really more of -- You know, it could be for Mandy  
43 as well, and, I mean, really -- Well, first of all, I think that  
44 the committee would benefit from having an overview presentation,  
45 and it has been quite a while since we've received, as a committee,  
46 an overview presentation of our integrated ecosystem assessment  
47 program, you know, just an update for all of us, and it's great  
48 that Josh included those ecosystem indicator reports in his

1 presentation, but, you know, this highlights another dimension of  
2 what we're trying to integrate, right, into fisheries assessment  
3 and management that is new, and is attractive, in a way, because  
4 it allows us to start accounting for things that we have not been  
5 able to explicitly account for in our assessment and management  
6 processes, at least not as fully as we would like to, right.

7  
8 First of all, it's a request to you to, you know, Mr. Chairman,  
9 working with staff, and, I mean, I think this would be beneficial  
10 for all of us to get, and, you know, we have a lot of new committee  
11 members, and the program, I believe, has evolved over time, and so  
12 it would be nice for us to get an overview of where you are, or we  
13 are, regionally, with EIA.

14  
15 Then the second is, you know, related to that, is how can we  
16 integrate this type of effort into a broad regional effort, right,  
17 going on to look at some of these parameters, you know, attributes  
18 and factors, that we have not been able to look at, right, and, I  
19 mean, is there a space within our regional thinking, right, in  
20 understanding ecological processes, and, I mean, of course, we do  
21 have ecosystem assessment processes in place, and all of this, but  
22 we need first to get like a consolidated overview, and we see, you  
23 know, Dave's presentations from time to time, and we see the  
24 progress.

25  
26 You know, you and some of your colleagues there came and gave good  
27 presentations and looking at other issues, but I think an overview  
28 would be helpful for us for us to better understand how efforts of  
29 this nature, you know, could fit within that framework. I don't  
30 think it's a question, and it's a request and a comment.

31  
32 **CHAIRMAN NANCE:** Thank you, Luiz. Tom, please.

33  
34 **DR. FRAZER:** All right, Josh, and so, I mean, I sat and I listened  
35 to this, and, you know, I was thinking about it more  
36 philosophically, right, and this discussion kind of got me to  
37 ponder a few things, and I think, you know, as scientists, I mean,  
38 one of the things that we do is we explore patterns, and we're  
39 really good at it, right, and, as many people have commented, you  
40 know, we use those patterns to make some inferences about processes  
41 that shed some light on the way that the world works, right, and  
42 the real trick there is to figure out -- When you look at it that  
43 way, right, the patterns, whether they're temporal or spatial,  
44 they're generally linked to some empirical data, right, and then  
45 you use that to kind of identify appropriate questions, or  
46 hypotheses, that are going to get you to that understanding as  
47 expeditiously, I guess, as possible.

1 Where I struggled, at the beginning of this talk, was like, you  
2 know, what is the process, because, in this case, the pattern tool,  
3 right, isn't linked to empirical data, and it's linked,  
4 essentially, to these recruitment deviations that are modeled,  
5 right, and they're not real, and so, really, what you're doing is  
6 using that pattern approach, you know, seeking approach, to  
7 investigate a process, but the process, in this case, is why does  
8 the model generate the output that it does, right, and so we're  
9 just looking at it in two different ways.

10  
11 I would agree with almost every comment that was made here, and we  
12 have to realize what the tool is being used for and then ask  
13 ourselves what are the most important types of questions to explore  
14 in the modeling effort, right, moving forward, and so I thought it  
15 was helpful, right, and it just took me a while to wrap my head  
16 around it, and I think people need to understand, you know, that  
17 we're working in two separate worlds here. Thanks, Josh.

18  
19 **CHAIRMAN NANCE:** Thank you, Tom.

20  
21 **DR. KILBORN:** I just wanted to say thanks. He's my boss.

22  
23 **DR. SIEGFRIED:** That's very polite, and so I just have maybe a  
24 couple of questions and comments. I suppose I haven't thought  
25 about -- You know, after an assessment is done, I'm not sure we  
26 need to, for the catch advice, understand, you know, every  
27 component of the variability in recruitment, and I think that's  
28 something we should probably try to do more at the beginning of  
29 the assessment process, you know, at the conceptual model point,  
30 where we're figuring out what we're actually trying to model in  
31 the dynamics of the stock.

32  
33 However, what I did think about, during your presentation, is some  
34 of the discussions that I've had in the past couple of years about  
35 sargassum, relating to greater amberjack and gray triggerfish, in  
36 particular, and so I know we talked about it quite a bit at the  
37 amberjack visioning workshop, about the use of juveniles, or young-  
38 of-the-year, of sargassum and the types of indices that might  
39 actually help us get an index of recruitment, which is something  
40 we rarely have, and so that would be very useful, and I'm kind of  
41 surprised, but not, that the sargassum here wasn't more  
42 explanatory, because I think it's just too short for gray  
43 triggerfish, or I'm sorry, for greater amberjack here, but that's  
44 something I would have thought would be, you know, more  
45 interesting, coming out of this, looking at what types of time  
46 series we actually should investigate for key things like  
47 recruitment.

1 When I've talked with Nathan Putman at LGL, and others, about what  
2 we can do with sargassum, it is difficult to actually get empirical  
3 data about the association of these species and sargassum, and  
4 it's sort of an idea that they all are associated, and we don't  
5 know when they settle, and we don't know how long they stay in the  
6 sargassum, and so the time lags that people have brought up is  
7 actually quite key to understanding, you know, how much of that  
8 recruitment would be explained by an index of sargassum.

10 There is also a spatial component, especially for something like  
11 greater amberjack that moves so much. Which part of the sargassum  
12 beds are they using, and so I'm not saying that I don't want to  
13 understand recruitment, but I'm saying that we don't do this after  
14 the fact, but this would be helpful as a conceptual model, for  
15 things like sargassum in particular.

17 **DR. KILBORN:** Thank you. I agree with a lot of that, and, when I  
18 was trying to pull together the sargassum data, it became  
19 immediately clear that it's really hard to get information about  
20 what's happening in the sargassum beds, because I had requested  
21 all sorts of information about like the thickness of the mats, and  
22 the shape, and, you know, whether they were windrows or clumps,  
23 and things like that, and it's just -- Nobody is really collecting  
24 that information.

26 Well, that's not true. Somebody was collecting that information,  
27 in Alabama I think, but they -- It was a relatively small-scale  
28 study.

30 The other thing that I ran into was, and I think somebody else, I  
31 think maybe Ryan, had mentioned it earlier, was the sargassum data  
32 -- They are big, areal coverage values, and so I think that could  
33 have been treated a little bit more spatially explicitly, because  
34 I was really just kind of lumping them into those big, experimental  
35 areas, and some of them were related to the management zones, but  
36 others were just like the central Gulf of Mexico, you know, and so  
37 I think that's maybe one of the other reasons why there weren't as  
38 good of results as I was hoping for, because I really thought there  
39 was going to be a better relationship as well, and so I think some  
40 of this had to do with the quality of the data on the sargassum  
41 side as well.

43 **DR. SIEGFRIED:** Yes, and thank you for addressing some of that. I  
44 do think the length of the time series relationship to the  
45 generation time of the species matters too, and, you know,  
46 something that Nathan Putman was bringing up is how expensive it  
47 would be to do the fieldwork to gather, you know, juvenile  
48 associations with these beds and what that would be like, and

1 that's difficult, and, also, interpreting the satellite data is  
2 quite difficult, and a lot better minds than me are doing that,  
3 but we were even looking at like the predictive power, and that's  
4 something that would be interesting for you work, is, you know,  
5 using a shorter time series of the recruitment and trying to see  
6 if your associations -- If your results actually allow you to  
7 predict the deviations that are in the model, but we weren't even  
8 sure how much of a lag and what level of predictive power we would  
9 have with a recruitment index that was based on sargassum, because  
10 of the data quality, and it's good to hear that you're thinking  
11 about those things.

12  
13 **DR. KILBORN:** Thank you.

14  
15 **CHAIRMAN NANCE:** Thank you, Katie. Mike, please.

16  
17 **DR. ALLEN:** Thank you, Mr. Chair, and thank you, Josh, for the  
18 presentation. You know, given the uncertainty coming out of SS 3  
19 about whether these recruitment residuals are really signaling the  
20 recruitment deviations, I wonder if an approach might be to take  
21 some species that have juvenile survey indices and run this kind  
22 of paired analysis just on the recruitment data, like the field  
23 data, and see how those patterns might match up to what's coming  
24 out of SS 3, because I agree with Mandy that those recruitment  
25 deviations are really just a bucket of additional variation that  
26 may or may not be actual recruitment deviations, and it would be  
27 nice -- It would be interesting to do this analysis paired with  
28 some actual recruitment time series that are field collected and  
29 see how well they match up, and so that's just a thought. There's  
30 a few species you could probably do that for, some of the reef  
31 fish species that have estuarine juvenile phases, and, you know,  
32 there are some data, and so just a thought.

33  
34 **DR. KILBORN:** Thank you.

35  
36 **CHAIRMAN NANCE:** Good point. Any other questions for Josh? Jack,  
37 please.

38  
39 **DR. ISAACS:** I think I should point out that the ibis was the  
40 sacred animal who taught the Egyptian god of writing, and maybe  
41 the council needs to consider the appropriate ritual sacrifices.

42  
43 **CHAIRMAN NANCE:** Thank you. We appreciate that.

44  
45 **DR. ISAACS:** You're welcome.

46  
47 **CHAIRMAN NANCE:** Josh, thank you for that presentation.

1 DR. KILBORN: I still have more.

2  
3 CHAIRMAN NANCE: You have more?

4  
5 DR. KILBORN: I do. I told you, and we've only got the first hour  
6 done. It's actually not another hour, but I think the rest of --

7  
8 CHAIRMAN NANCE: You've got fifteen more minutes, young man.

9  
10 DR. KILBORN: I think it's the interesting part, and I appreciate  
11 you all directing all your questions to Mandy, by the way. That  
12 was very helpful. Remember that we're going to talk about  
13 ecosystem trajectories as well, right, and so this, I think, will  
14 be a little bit more pleasing, because this is based off of real  
15 data that Mandy collected and not the deviation values.

16  
17 Remember I said that I wanted to try to conceptualize the complex  
18 adaptive fishery ecosystem of the Gulf of Mexico, and, to do that,  
19 I pulled together twenty-three different response variables that  
20 capture the upper and lower trophic level status of various  
21 population members, the multispecies stock structure, things like,  
22 you know, pelagic to demersal catch ratios and that sort of stuff,  
23 and there's fishing revenues for commercial fishers in there, as  
24 well as the Ryther index of ecosystem overfishing, and so that's  
25 how I'm just kind of conceptualizing the living marine resources  
26 and their structure and function in the Gulf of Mexico.

27  
28 I also have fifteen different environmental and climate and  
29 anthropogenic factors that went into this model. Again, this is  
30 not the punchline, and so don't focus too much on this stuff, but  
31 these were included in the model, and so, again, these were the  
32 sort of things that were sort of hypothesized to affect the  
33 outcomes in that response matrix, right, and so utilization of the  
34 fishery, climatological and environmental variables, as well as  
35 some basal resources and habitat.

36  
37 Okay, and so this time series was decomposed, and there were  
38 actually six eigenvectors that were selected to account for the  
39 variability in the response system, and these are the scales that  
40 were ultimately selected, and there's a twenty-seven-year, a  
41 thirteen-and-a-half-year, nine, 6.75, 5.4, and 4.5-year frequency,  
42 and those were all deemed to be appropriate at accounting for this  
43 response.

44  
45 This is the redundancy analysis triplot here, and, again, a large  
46 proportion of the variability is explained with this model, and  
47 what we can also see is a nice kind of temporal march through time  
48 here, right, and so the bottom-right of the image is the early

1 time period, and, as you kind of arch up and around, to the left,  
2 we end up in the latter part of the time series, right, and so  
3 it's actually a fairly continuous movement through this  
4 multivariate ordination space.

5  
6 We can see that the primary axis of variability, which accounts  
7 for 45 percent of the variability, is best explained by that  
8 twenty-seven-year AEM, and the secondary axis is best explained by  
9 the thirteen-and-a-half-year trend. The other trends, you can see  
10 their correlation biplot vectors are more towards the origin of  
11 the diagram, and so they're not as influential as the other two,  
12 although they did, you know, get picked in the variable selection  
13 method, and so they are statistically significantly accounting for  
14 some of the variability in this response state that we see here.

15  
16 One of the things that we can do with these is look at changes  
17 over time, right, and so remember that first axis is the kind of  
18 twenty-seven-year period, and what we generally see is that, over  
19 the time of the time series, several of the responses increased  
20 over time, and several decreased over time, and so some of that is  
21 good, and some of that is bad, right, and, you know, the point  
22 though is that we can do this exercise, and we can see how the  
23 resources shift in their magnitude and abundance and composition  
24 over the time series, and we can start to put some limits on that  
25 timing, right, and so we think it takes about thirty years for  
26 this kind of change to happen with these resources.

27  
28 Now, what drove that, I can't tell you, and we can make some, you  
29 know, guesses, based on the environmental factors, but the point  
30 is there is a consistent, long-term trend change in some of these  
31 variables.

32  
33 The same thing with this kind of up-down model here, with that  
34 thirteen-and-a-half-year trend. Cobia had that sort of up-down  
35 action over time, whereas all the other species had more of a down  
36 than up kind of framework, right, and so, even though that temporal  
37 structure kind of represents the down to up to down pattern, you  
38 know, something could be negatively related to that, right, and it  
39 could have an opposite manifestation, but, again, the point being  
40 that we can start to kind of nail down differences, over time,  
41 from say 1997 to 2013, and, you know, those sorts of changes would  
42 be affected more on a thirteen-and-a-half-year time scale than the  
43 larger time scale.

44  
45 All right, and so those ordination diagrams -- If you take out the  
46 coordinates for the first two axes and plot them independently  
47 against time, this is what you get, right, and so the first axis  
48 is the blue line, and the second axis is that orange line, right,

1 and so this is basically just another way to kind of represent  
2 these ordination diagrams, but you can go through that stepwise  
3 variable selection process for each of those, like we did before,  
4 and kind of start nailing down some potential covariates that  
5 appear to be operating on similar time scales, right, and so,  
6 again, don't get too lost in the details here.

7  
8 We're not talking about mechanism of these things affecting the  
9 system, and what we're seeing though is these predictors are  
10 changing in the similar ways as the response in our complex  
11 adaptive fisheries ecosystem.

12  
13 This slide is really just to point out that we can identify  
14 temporal autocorrelation scales at the Gulf-wide level, and we can  
15 start to tease out, you know, some of the changes that happened  
16 over those time periods, but the thing I want to talk about is  
17 that trajectory idea, right, and so, if we use these two canonical  
18 axes, which are derived from the temporal model itself, how do we  
19 -- How can we understand them, you know, with respect to the  
20 composition and abundance of the different variables that went  
21 into our response matrix, and what we see here is, in the first  
22 part of that time series, before the two axes kind of cross, it  
23 appears as though there is a set of controlling dynamics in the  
24 Gulf of Mexico that are, you know, configured in whatever way they  
25 are, right, and I don't know how to name that configuration, but,  
26 you know, the two lines -- The blue line is above the orange line,  
27 and they are separated quite a bit, and they seem to be converging  
28 somewhere around 1994.

29  
30 On the right-hand side, you've got the canonical, you know, axes,  
31 and the ordination, but the colors are related to a resemblance  
32 profile clustering analysis, and so those colors are related to  
33 groups of years that are numerically distinct with respect to the  
34 underlying resources in the fishery ecosystem, and so what we see  
35 is that that first time period, with one set of controlling  
36 dynamics, encompasses three little kind of sub-clusters that, you  
37 know, kind of show this system changing through time, and  
38 potentially operating under one set of controlling dynamics, and  
39 then, after 1995, when, you know, those two axes cross, we see a  
40 whole different pattern in the system state movement, right, and  
41 we've got that weird little wiggle right there, and it kind of  
42 seems to be more of just a constant trend, or a constant slow-  
43 burn, of change.

44  
45 Relating this back to the concept of, you know, the shapes of these  
46 trajectories, and what that might mean for our ecosystem, the  
47 question is what do we have in the Gulf of Mexico, right, and it  
48 appears to be some kind of system that changes over time, right,

1 and we're not displaying hysteresis, and we're not displaying a  
2 directional change that goes back to, you know, an original state,  
3 the way it was in the 1980s, and we're seeing, you know, a period  
4 of controlling dynamics that changed in the mid-1990s, possibly  
5 related to management uptake, and now we're seeing just a constant  
6 change of the resources in our fishery.

7  
8 They're moving off in the kind of downward and to the left  
9 direction in this ordination diagram, but we're not apparently  
10 going back to any previously-known state that we've ever seen with  
11 respect to our resources, and so, you know, what do we have going  
12 on here? I don't know. Is this a gradual directional change, or  
13 that kind of Humpty Dumpty pattern, and I'm not really sure, but,  
14 to me, it shows that, you know, we are affecting change in the  
15 resources in our system, and we are, you know, moving our system  
16 state around.

17  
18 Whether that's by environmental changes, anthropogenic changes,  
19 management changes, I don't really know for sure, but something is  
20 going on in our system that is organizing our resources and  
21 changing the structure and function and the way that they are  
22 composed in the state, in this system.

23  
24 Again, some discussion points around this idea are, you know, is  
25 this useful, right, and like we can identify some tradeoffs, over  
26 time, to how the system states change, and I think we can see the  
27 effect of management in this living marine resource, but, you know,  
28 I want to know what you think about that. Is this kind of thing  
29 more useful for a multispecies modeling exercise, as opposed to  
30 like the deviation-type stuff that we were just talking about, and  
31 could we do something -- I have done stuff like this with, you  
32 know, different multispecies abundance values and, you know,  
33 relating things back to that, but, again, the same questions.

34  
35 You know, can this be operationalized, and is this something that  
36 could be used to maybe update our risk probabilities for  
37 management, right, and, if we make this decision, is this going to  
38 move our system in that direction or that direction, and how is  
39 that going to affect outcomes, and so, again, this is another  
40 discussion point, and we've got ten minutes for Mandy to answer  
41 questions.

42  
43 **CHAIRMAN NANCE:** Thank you, Josh, and I know we have -- Dr. Gallaway  
44 has a question.

45  
46 **DR. GALLAWAY:** I should have put my hand up sooner, and I was just  
47 encouraging anybody that's interested to touch base with Dr. Putman  
48 on his sargassum studies, but be advised that he's focused more on

1 the resolution of sargassum dynamics, rather than the broader  
2 implications relative to the role they play in recruitment, and so  
3 I strongly concur that that's an area that should be investigated,  
4 but I'm sure that Nathan would be pleased to address any questions  
5 that you might have for him. Thank you.

6  
7 **CHAIRMAN NANCE:** Thank you, Benny. Is there discussion? David,  
8 please.

9  
10 **DR. CHAGARIS:** So, I mean, I think this is really interesting, and  
11 it doesn't suffer from the same flaws as the previous analysis you  
12 presented, and, you know, looking at the figure you had on Slide,  
13 I guess it's 94, you know, showing the trajectory of the ecosystem,  
14 what's missing here is like where is the starting point, you know,  
15 and so we don't really know whether it's a Humpty Dumpty or a  
16 returning back, or maybe we're actually going back to where we  
17 want to be, and so I agree that what it does show is that the  
18 system is changing.

19  
20 We don't really have an idea of what the baseline is, because we  
21 couldn't do the analysis with the data prior to 1986, but I think  
22 that this is something worth tracking over time, and, you know, I  
23 don't know how it might plug into single-species management, but,  
24 as far as, you know, ecosystem management, you know, some way to  
25 like just quantify, you know, what are we doing as a whole in the  
26 ecosystem, how is it changing over time, and I think it could be  
27 really useful. Operationally, I don't really know how to formalize  
28 that, but, just for informational purposes, I think it's --

29  
30 **CHAIRMAN NANCE:** I do think it has utility in single species also,  
31 but what you're saying is where are we on the true curve.

32  
33 **DR. KILBORN:** Also, with the single species, you know, you can  
34 pull together a number of different things that characterize, you  
35 know, the structure and function of a single-species stock, and  
36 perform a similar analysis in the same way.

37  
38 **CHAIRMAN NANCE:** Any other discussion from the SSC? Harry.

39  
40 **MR. BLANCHET:** One of the things that struck me was that, over the  
41 time period we're talking about here, one of the factors that was  
42 going into this was commercial revenues. If you go back to 1986,  
43 I think the species du jour was red drum and purse seine harvest  
44 in the Gulf of Mexico, but what was really driving commercial  
45 revenues, at that point, was a robust shrimp fishery that did not  
46 have a whole lot of import competition, like what we do today, and  
47 so we're probably talking about extrinsic factors, and things like  
48 shrimp revenue could make a big influence on that particular

1 factor, and so, you know, in terms of how that relates to things  
2 that are going on inside the Gulf of Mexico, and within its  
3 fisheries stock, maybe some kind of review, or evaluation, of  
4 whether some of these types of parameters are even appropriate for  
5 inclusion might be useful, because, to me, that -- You may be  
6 adding confounding influences that shape what your outcomes are  
7 that really are not influencing the system, but are truly  
8 extrinsic, but I agree that this has got a lot of interest.

9  
10 The other question I had, and I'm not quite sure -- In that last  
11 graphic, maybe 1996, there's a legend that says, "dots named 1 to  
12 10", and what are those? Now I'll shut up. Thank you.

13  
14 **DR. KILBORN:** Thank you for the questions, and so the dots are the  
15 clusters, and so each color corresponds to a group of years that  
16 clustered together, based on the twenty-three different response  
17 indicators.

18  
19 Then, to your first question, I agree with what you're saying, and  
20 I actually have had it in mind, for a while, to try to create  
21 basically binary variables that capture management decisions and  
22 try to use those as predictors, to maybe test the hypothesis that  
23 different management actions had, you know, specific effects on  
24 different resources.

25  
26 The other thing, kind of related to that, is, depending on the  
27 question of interest, you could parameterize these models any way  
28 you want, right, and, if you're focused on just a certain subset  
29 of resources, or a specific region, you can capture data specific  
30 to that, and then perform an exercise like this and see what's  
31 going on in that subset, or sub-region, and so I think this is a  
32 super flexible method to get at a lot of different questions, and  
33 it really just boils down to what data do you have and how do you  
34 hypothesize your various systems to be configured.

35  
36 **CHAIRMAN NANCE:** Thank you. Harry, thank you. Mandy, please.

37  
38 **DR. KARNAUSKAS:** Just to add to that, I think Harry made a good  
39 point, and, Josh, thanks. This was very interesting. Looking at  
40 this plot of gradual directional change, I think it's a function  
41 of two things. As Harry pointed out, there's indicators,  
42 processes, that just cannot change quickly, like human population  
43 growth and number of oil rigs, and those things, just by default,  
44 are not going to, you know, fluctuate wildly, and so --

45  
46 **DR. KILBORN:** Mandy, real quick, I just want to point out to  
47 everybody that this directional change, and these patterns, are  
48 from the responses only, and they don't account for the predictor

1 variables, and so this is just the description of the system state  
2 related to the fish resources, the structure of catches related  
3 to, you know, like demersal and pelagic, that kind of stuff, and  
4 it's not accounting for any of the -- Any of the other predictors.

5  
6 **DR. KARNAUSKAS:** Okay. So I'm not sure what the twenty-three  
7 indicators were, but I think the point is still relevant that it's  
8 going to be a function of two things, things that just cannot  
9 change very quickly, because of their nature, and then the sort of  
10 low frequency fluctuations that we have in the Gulf of Mexico, and  
11 we don't have El Nino's like they have on the west coast, and what  
12 we tend to see is like AMO being sort of the dominant mode of  
13 variability in the Gulf, and so we see just long, or low, frequency  
14 temperature changes, and so I think that's probably what's behind  
15 the way this looks, but those would need to be kind of parsed  
16 apart.

17  
18 Then, going to your next slide, to try and answer the question of  
19 how to operationalize these results for management, I think this  
20 is really interesting, and it has some potential. I think, of the  
21 three possibilities, I would say maybe updating risk  
22 probabilities, or trying to incorporate this information somehow  
23 into the amount of risk that we recommend be taken in any sort of  
24 catch advice.

25  
26 I think, you know, we talk about the dangers of putting covariates  
27 in assessment models, and, in terms of sort of baking these into  
28 control rules, based on system state, there was a recent paper,  
29 and I think Bill mentioned it yesterday, Free et al., which showed  
30 that hardwiring environmental variables into control rules often  
31 doesn't work very well, and so -- Or it doesn't get you any  
32 increased performance, beyond just ignoring them, and so, of those  
33 three possibilities, I think that looking at how -- The potential  
34 for change could impact catch advice and trying to convert that  
35 into the amount of risk that should be taken in management probably  
36 shows the most promise.

37  
38 **DR. KILBORN:** Thank you.

39  
40 **CHAIRMAN NANCE:** Thank you. John.

41  
42 **MR. MARESKA:** Thank you, Josh. Very interesting, and so I don't  
43 know who came up with the names of these trajectories, but, to  
44 paraphrase the nursery rhyme, you know, Humpty Dumpty had a great  
45 fall, and so I don't know if you realize it or not, but that  
46 crossover in the trajectories also coincides with the recent  
47 increase in sea-level rise.

1 **DR. KILBORN:** Thank you.

2  
3 **CHAIRMAN NANCE:** Thank you. Josh, we appreciate the presentation.  
4 I think it stimulated a great amount of thought and discussion,  
5 and so thank you for being here, and it's good to be able to see  
6 you.

7  
8 **DR. KILBORN:** Thank you very much. I appreciate it.

9  
10 **CHAIRMAN NANCE:** We'll go ahead and take a ten-minute break, or a  
11 fifteen-minute break, and so we'll come back at 10:45, and we're  
12 going to go into the great, greater, and greatest amberjack  
13 presentations.

14  
15 (Whereupon, a brief recess was taken.)

16  
17 **CHAIRMAN NANCE:** Okay. So we can stay on track, it's time to  
18 gather back for our next presentation, and let's see. Dr. Powers  
19 -- Where is Ryan? Is Kelly on, Jessica?

20  
21 **MS. MATOS:** Kelly, do you want to test your sound?

22  
23 **DR. KELLY BOYLE:** This is Kelly here. Can you all hear me?

24  
25 **CHAIRMAN NANCE:** Yes, we can.

26  
27 **DR. BOYLE:** Okay. Great.

28  
29 **DISCUSSION: GREATER AMBERJACK DISCARD MORTALITY**

30  
31 **CHAIRMAN NANCE:** Let me do, real quick -- This is Item XX. For  
32 the scope of work, Dr. Sean Powers and Dr. Kelly Boyle will  
33 summarize the findings of several recent studies focusing on  
34 discard mortality rates for the Gulf greater amberjack.

35  
36 Findings include that swimming depth and swimming activity of  
37 greater amberjack are influenced by multiple factors, and  
38 recreational fishing discards may impart sub-lethal stress that  
39 results in elevated swimming activity. As far as we hear this  
40 presentation, we need to be able to think about that from the SSC,  
41 and certainly ask questions, and we can move forward with this,  
42 and so Dr. Boyle is going to give the presentation. Sean.

43  
44 **DR. POWERS:** Yes, but I was just going to give a little background.  
45 My group got interested in amberjack movement, residence time,  
46 site fidelity, and, obviously, discard mortality. A few years  
47 ago, I had a student, Laura Stone-Jackson, who did her master's  
48 work on that, with some funding from the State of Alabama.

1  
2 We then expanded that project, with some MARFIN funding, and Kelly  
3 Boyle, who joined my group as a post-doc, oversaw the project, and  
4 he is now an assistant professor at the University of New Orleans,  
5 and so a great city to go to, by the way, and so but we hear talk  
6 about specific references to what we need for stock assessments,  
7 and hopefully -- It's almost become a standard way to look at  
8 discard mortality here, using acoustic telemetry, and so that will  
9 be good to inform the SSC.

10  
11 He will also go into the movement dynamics, and that's going to  
12 have important implications when we talk about the Greater  
13 Amberjack Count study, because these data help us to learn things  
14 about residence time, site fidelity, and depth use that's going to  
15 be important in the design of that study, and so, Kelly, are you  
16 ready?

17  
18 **DR. BOYLE:** Yes, Sean, I'm ready. Thank you for the introduction.  
19 A little bit of background, and, from the SEDAR 2020 report,  
20 greater amberjack are considered overfished and experiencing  
21 overfishing, and some of the management practices in place to  
22 address this are size restrictions and seasonal closures, and those  
23 things have the potential to increase the likelihood releasing  
24 short, sub-adult fish during the open season, because they're too  
25 short to keep, and, during closed seasons, for both adults and  
26 sub-adult sized fish to be released.

27  
28 Released fish could face a number of potential risks that might  
29 increase their likelihood of mortality, and so injury from the  
30 fishing tackle used, exhaustion from fighting before being landed,  
31 and, also, the potential for barotrauma from swim bladder  
32 overexpansion, if they're making a rapid ascent that they can't  
33 compensate their swim bladder, reduce the pressure in the swim  
34 bladder in time, as they come up to shallower depths and that  
35 pressure is released. These fish also could experience depredation  
36 before being landed, and also after being released.

37  
38 As Sean mentioned, Laura Jackson, who was a master's student in  
39 his lab, studied post-release mortality using sensor tags and  
40 satellite tags of fish that were caught using recreational gear at  
41 two sites, one at fifty meters depth and one at seventy meters  
42 depth, and this study took place in September of 2014, and they  
43 tagged thirty-six amberjack with these acoustic depth sensor tags.

44  
45 The fish in the study were released at the surface and vented with  
46 a venting tool, and the post-release mortality estimate from the  
47 study was about 18.8 percent, and Laura, and colleagues, used Cox  
48 proportional hazards models to examine various predictors

1 associated with post-release mortality, like fight time and other  
2 things, and one of the things that they took data on was a release  
3 condition, and so an assessment of how quickly the fish was able  
4 to descend on its own, or if it was floating at the surface for a  
5 while, with kind of the highest score if it was dead at the surface,  
6 and release condition was the kind of sole significant predictor  
7 of post-release mortality in that study.

8  
9 In addition to post-release mortality, I'll be talking a little  
10 bit this morning about the potential for sub-lethal impacts  
11 assessed by changes in activity level in the fish and changes in  
12 their depth use and position in the water column over the course  
13 of a day, over a diel cycle.

14  
15 In the current study that we're talking about today, we were  
16 interested in examining the potential of barotrauma to impact post-  
17 release mortality in these fish, and so, in part, following up on  
18 results from Curtis et al., studying post-release mortality and  
19 delayed mortality in red snapper, where they found that fish that  
20 were non-vented were three-times more likely to die than fish that  
21 were released with a descending device, to help the fish obtain  
22 depth and repressurize the swim bladder, and, also, that fish  
23 released at the surface that weren't vented were 1.9-times more  
24 likely to die than vented fish, and so that was part of the  
25 motivation of this study.

26  
27 We, like Laura, used sensor tags, although, in this case, we had  
28 dual sensor tags from INOVASI that looked at the depth that the  
29 tag and fish was at and the swimming activity, using a tail beat  
30 accelerometer in the tag, and we used recreational fishing methods  
31 to obtain fish, working with a commercial guide and deckhands to  
32 help catch the fish, and we used live bait with circle hooks and  
33 jigging in the study.

34  
35 During the study, we took data on site depth, water temperature at  
36 the surface and mid-depth, along with dissolved oxygen and salinity  
37 and at the bottom of sites, and so that was taken on the day of  
38 tagging and fishing, and we also had water temperature data  
39 available at depth from acoustic receivers that were in place at  
40 these sites, and we recorded fight time with a stopwatch on the  
41 deck of the boat while fishing. Fish size, handling time, also  
42 with a stopwatch, and fish were measured and tagged and ventilated  
43 with a saltwater hose during handling.

44  
45 Then we randomly determined a starting release treatment on each  
46 day of fishing, as either the first fish would be released as the  
47 surface or released using a descender device from Seaqualizer, and  
48 then we alternated for each fish, in the order of the fish being

1 landed on that day of fishing, so that we would have an equal  
2 sample size of fish released at the surface and fish released with  
3 a descender device.

4  
5 The descender device, we had a camera, a GoPro camera, attached to  
6 a foil, to see if we could determine what happened as the fish was  
7 released and if there was any depredation on the way down. One  
8 challenge we had with this was that the leader between the foil  
9 and the weight that was attached to the descender device had to be  
10 pretty long for greater amberjack, and so, often, the fish was out  
11 of view upon release, and so we didn't often -- We weren't able to  
12 see the actual release event for most fish, but no depredation was  
13 observed, and so we didn't really incorporate those data, just  
14 because those video events weren't really showing the fish.

15  
16 For this study, we had three field outings, and so the first  
17 beginning in August of 2018, and the second in the spring of 2019,  
18 and the third, again, in August in 2020, and, initially, we used  
19 an external stainless steel dart tag that we epoxied the acoustic  
20 transmitter to, so that we could be sure that we wouldn't  
21 inadvertently vent the swim bladder, because none of the fish were  
22 vented in our study, but I will talk about this in a moment.

23  
24 We had issues with tag shedding, and so we switched our tagging  
25 procedures up for the following two seasons and placed transmitters  
26 internally. We didn't vent the swim bladder, and we had no  
27 evidence of inadvertently venting the swim bladder, but we still  
28 had to implant these in the body cavities on the caudal portion of  
29 the peritoneal cavity. In both field seasons, we had a secondary  
30 tag, a nylon dart tag, that had phone numbers and information for  
31 recapturing from anglers.

32  
33 Our field sites are shown here, and we had some common field sites  
34 between the second and third field seasons, and we picked sites  
35 based on trying to have both a depth range throughout the study,  
36 and so our sites ranged from thirty to sixty-five meters depth,  
37 our artificial reef sites, but we also did some fishing trips ahead  
38 of time, so that we could improve our chances of being able to  
39 catch amberjack where we put receivers down, and so that's why the  
40 sites varied a little bit over the course of the study.

41  
42 We looked at post-release fate, and we considered mortality that  
43 could occur pre-landing, and so from depredation before being  
44 landed or severe fishing injury, where it was clear that the fish  
45 was dead before being landed, and, in one case, a fish was hit by  
46 the propellor of the vessel, for example. Capture and handling  
47 mortality we considered for any fish that was dead before being  
48 released or was not able to -- Was floating at the surface,

1 essentially, and then post-release mortality was determined from  
2 the sensor tags, and so from looking at the data from the sensor  
3 tags.

4  
5 These three things we refer to, for the study, as AVM, at vessel  
6 mortality, for things that occur pre-landing. Capture handling  
7 mortality for fish dead on the vessel, or dead at the surface, and  
8 post-release mortality is fish were considered to be alive when  
9 released, or believed to be alive.

10  
11 I'm going to show some examples of the sensor tag data that we  
12 obtained in order to determine fish fate, and so each row of these  
13 is the same fish. On the left is the accelerometry data that is  
14 showing swimming activity, and on the right is depth, and so, for  
15 Fish 22, you can see there is only briefly -- Sorry. Let me say  
16 that the X-axis is hours post-release, and so there's only a few  
17 kind of brief data points of any movement activity from the  
18 accelerometer, and the fish is sort of quickly at a depth close to  
19 the bottom, and then, after twenty hours, it's at the bottom.

20  
21 The second example, Fish 23, is showing kind of more vigorous  
22 swimming activity, and changes in depth, but then, after somewhere  
23 around thirty hours, the activity is kind of noticeably changing,  
24 and there is one last foray, after like sixty-five hours or so,  
25 where the fish goes into shallow water, and then the tag is at the  
26 bottom for all the time after that. Fish 31 is showing an example  
27 of a fish that appears dead very quickly after release.

28  
29 In contrast, we also had cases where we had indicator where the  
30 tag was shed, where we had swimming activity just immediately  
31 stopping, and the depth of the fish immediately changing, and,  
32 fortunately, in about half of these cases, I think we had  
33 recaptured fish, and so we had confirmation that they were shed  
34 tags, from anglers that had caught the fish later, and it appears  
35 that the tag wasn't -- The stainless steel attachment to the  
36 stainless steel leader broke inside the fish, and we determined,  
37 on one fish, where the angler had the carcass, and we could see  
38 that the attachment point of the tag was still present in the fish.  
39 After 2018, as mentioned earlier, we switched to internal tagging.

40  
41 Here is some examples of fish that were determined to have survived  
42 up until at least the last observation, and so, in some of these  
43 cases, it appears that the fish either emigrated away from the  
44 acoustic array, and, in other cases, the battery of the tag had  
45 finished, and so it reached probably the end of tag life.

46  
47 In these cases, you can see that the swimming activity is variable,  
48 but it's occurring at a relatively steady rate over these kind of

1 broad time periods at the end of observation for each of these  
2 fish, and, in Fish 27, for example, you can see periods where there  
3 is -- This graph has connected the data points, but the fish was  
4 out of range of the receiver, and so for larger periods of time,  
5 but then came back in detection range.

6  
7 We also had a number of fish that we considered to be alive, but  
8 emigrations, where were only briefly observed at the array, for  
9 several hours in some cases, and, in some of these events, fish  
10 were recaptured later, away from where they were caught, and, in  
11 other cases, they weren't determined again, but we had no  
12 indication that there was post-release mortality, from the brief  
13 observation.

14  
15 Overall, among the three field seasons, survivorship was about 85  
16 percent of fish, and so that's counting mortality before landing  
17 and after post-release mortality. Survivorship after mortality,  
18 pre-landing and from capture and handling mortality, was about 95  
19 percent survivorship, and, of the fish that were successfully  
20 released, the survivorship of those fish was about 89 percent.

21  
22 Throughout the three study periods, the recapture rate from anglers  
23 was about 12 percent, and, again, that was useful in determining  
24 the fate of some fish that had either emigrated earlier, so we  
25 could determine that they had survived for a longer period, in  
26 hazards models, and it also let us know when there was tag  
27 shedding, for a couple of cases.

28  
29 We ran a separate Cox hazards model for the internally-tagged fish,  
30 because the procedure might have impacted post-release mortality,  
31 and, in our larger dataset of two seasons, where we had internally-  
32 tagged fish, it allowed us to do this, and we found a much -- So  
33 none of the factors that we examined, other than fish size, were  
34 associated with survival probability, and so legal-sized fish were  
35 at a much greater rate of risk of post-release mortality, although  
36 there's a lot of variability, because the total number of post-  
37 release mortalities is relatively low.

38  
39 On the left side, it's looking across a sixty-day period, and, on  
40 the right side, we're zoomed into the first thirty hours post-  
41 release, which is where most mortality is taking place, within the  
42 first day, and so you can see, within about ten hours, the most  
43 mortality is taking place. As mentioned before, post-release  
44 mortality is much higher for legal fish, about 44 percent, and 2  
45 percent for sub-legal fish.

46  
47 We did not observe factors that we predicted would be associated  
48 with barotrauma within the depth range of our study, and so our

1 deepest site was about sixty-five meters. Site depth wasn't  
2 associated with increased mortality risk, and release treatment  
3 was also not associated, but, notably, use of a descender also did  
4 not increase the risk of post-release mortality, and so there was  
5 no -- It was roughly an equal -- I think it was three and four  
6 post-release mortalities with and without the descender device.

7  
8 I don't know if there are any questions before discussing some of  
9 the post-release behavior of fishes that were determined to have  
10 survived throughout the study period, and perhaps this might be a  
11 good time to stop for a second.

12  
13 **CHAIRMAN NANCE:** Any questions? Jim Tolan, please.

14  
15 **DR. TOLAN:** Thank you, Mr. Chairman. I am going to give this a  
16 try. You said that an increase in post-release mortality was  
17 higher in the legal-sized fish, and did you attribute that to  
18 increased fight time and exhaustion?

19  
20 **DR. BOYLE:** Yes, that's a great point, and we didn't see increased  
21 fight time associated with that, and so it's possible that maybe  
22 the noise that's just the difficulty in determining fight time  
23 with a stopwatch, and, you know, maybe it is related to fight time,  
24 but we didn't directly observe that, based on our fight time data,  
25 and so maybe it's still related to fighting and exhaustion, because  
26 of the size of the fish, but we did not determine a difference in  
27 time. Also, handling a bigger fish might be harder, but there was  
28 no evidence of handling time being associated with increased risk  
29 as well.

30  
31 **CHAIRMAN NANCE:** Thank you. Will Patterson, please.

32  
33 **DR. PATTERSON:** Thanks, Jim. Kelly, I didn't hear, or maybe I  
34 missed it, about the depth of fish when you caught them, and so  
35 had variable depths of the sites where you tagged fish, but  
36 amberjack are often caught up in the water column, and did you  
37 guys measure, or attempt to estimate, what the depth of fish were  
38 when they were actually captured, or hooked?

39  
40 **DR. BOYLE:** That's a great point. We did not have a systematic  
41 way where we were able to estimate that, but, like you said,  
42 they're up in the water column, and so the actual amount of depth  
43 that they're traversing is, in many cases, going to be much less  
44 than the site depth, and that might be one reason why we didn't  
45 observe a big impact, in this case, because, at most of the sites,  
46 the fish were hooked somewhere mid-depth, is my qualitative  
47 impression.

1 **CHAIRMAN NANCE:** Thank you. Trevor.

2  
3 **MR. MONCRIEF:** I was going down the same road as Jim, but not  
4 necessarily on the fight side, but going onto handling on the deck,  
5 with those larger fish and stuff like that. I mean, they can be  
6 somewhat problematic, when you get them down and try to do stuff  
7 with them. Do you have any insight on that?

8  
9 Then the other one that I was going to mention is your recapture  
10 rate of 12 percent. I mean, that's fair, and I was wondering, and  
11 were those recaptures by the general angling public, or was it  
12 done by the same group that you went out and tagged with?

13  
14 **DR. BOYLE:** The first question, we didn't see a difference in time,  
15 in terms of handling time with the bigger fish, but I could  
16 imagine, even if there's no difference in time, maybe it's tougher  
17 on the fish, because you have to hold the bigger fish down more,  
18 you know, to keep it from moving, and so, even if it's occurring  
19 in the same time, maybe it's more stress, or more trauma, on the  
20 fish or something. Also, with this -- You know, maybe with a  
21 bigger sample size, you would see differences related directly to  
22 handling time, or fight time, that's just hard to see with this  
23 kind of sample size.

24  
25 On the second question, all the recaptures were from other anglers,  
26 either commercial anglers, in some cases, and recreational anglers  
27 in some cases, and it's mostly -- It's mostly off of Alabama  
28 waters, and the furthest away was off Cancun, one or two I think  
29 in Louisiana, and one in Florida, if I'm remembering correctly.

30  
31 **MR. MONCRIEF:** Awesome. Thanks.

32  
33 **CHAIRMAN NANCE:** Thank you. It looks like no more questions,  
34 Kelly, and so -- Jack, do you have one?

35  
36 **DR. ISAACS:** Actually, it's more an observation, and kind of human  
37 dimensions illustrate the importance of these survivability  
38 studies that you're doing. In kind of an unrelated species, but,  
39 in spotted seatrout, you know, we're trying to push for tighter  
40 regulations over there, to help, you know, rebuild the stock, and  
41 anglers' perceptions of survivability of that species, after  
42 release, turns out to be kind of significant, in whether they're  
43 willing to accept higher minimum size regulations, and that was  
44 something that we came across, and, depending on how you define  
45 it, two or four different surveys, over two different years, and,  
46 even though there we found that the majority of folks perceived  
47 mortality to be about what the research signifies that it is,  
48 there's a significant portion who think that it's a lot higher,

1 and I think it was 10 percent for that species, is what most  
2 studies tend to come up with, and a lot of folks think it's higher,  
3 and they just think that throwing back the smaller fish is just  
4 waste, that they're going to die anyway.

5  
6 We just had an unusual situation, in Louisiana, where a legislative  
7 oversight committee exercised its legal right to throw out a  
8 commission's decision to tighten regulations on the spotted  
9 seatrout, and one of the factors that they explained in their  
10 decision to throw it out, the publicly-stated factor, was the issue  
11 of post-release mortality, which they kept hearing, from their  
12 constituents, that it was fairly high, and so really getting some  
13 good studies on species like this, and it's just important, and I  
14 just thought that would be a good thing to share with you.

15  
16 **CHAIRMAN NANCE:** Jack, thank you for that.

17  
18 **DR. BOYLE:** Thank you.

19  
20 **CHAIRMAN NANCE:** Kelly, let's go ahead and go on, please.

21  
22 **DR. BOYLE:** Let's continue, and so, with these tags, we have the  
23 opportunity to examine some of the data of depth and swimming  
24 activity of fish that remained in the array for a sufficient  
25 periods and were determined to have survived, so that we could  
26 look at some of the kind of just general patterns that the fish  
27 were doing at these three sampling periods and then also examine  
28 if there were kind of any differences associated with the first  
29 couple of days post-release relative to the overall period.

30  
31 To do this, because the tags emit depth and swimming activity at  
32 variable rates, and a lot of this -- There's a lot of kind of data  
33 to sort of simplify, to be able to look at, we binned the average  
34 activity of each fish by hour, and so like the average depth for  
35 each fish for each hour of each day, while it was within detection  
36 of receivers, and we looked at diel patterns of these depth and  
37 swimming data across the study period.

38  
39 To do this, we constructed these diel matrices for each fish, so  
40 we would have the average depth per hour, at each hour of the day,  
41 and the average activity value, or accelerometry value, associated  
42 with swimming for each hour, and we calculated a -- So we had hours  
43 of all depths, and let me rephrase that. We had depth values for  
44 all depths observed for each hour, and averaged across the study  
45 period.

46  
47 For each of these fish, there would be a matrix of how many  
48 observations were at each depth across each hour of the day, and

1 we could calculate a similarity value between each pair of fish,  
2 to see if the fish were kind of similar in their use of depth over  
3 the study period, and the same for swimming.

4  
5 This slide is showing the kind of diel patterns, visualized as a  
6 heat map, and so on the X-axis of each one of these plots is the  
7 hour of the day, and the Y-axis is the depth in meters, and so  
8 warmer colors, redder colors, are where there is more observations  
9 at a particular depth, and the brown-shaded areas represent depths  
10 that weren't available at particular sites, and so, in the top  
11 row, for example, these are all relatively shallower sites, and so  
12 they don't go to sixty-five meters, and these fish show kind of a  
13 similar pattern with most of their -- With most of their depth  
14 observations occurring within a narrow range, a little bit below  
15 mid-depth, around twenty meters or so.

16  
17 There were other -- The second row shows kind of another pattern,  
18 where there was a mix of observations between both shallower and  
19 deeper depths, and the row below shows some examples of fish that  
20 showed more variation in depth use over the course of the study,  
21 and the bottom row, like Fish 13 and Fish 3, you see some patterns  
22 where fish were at slightly shallower depths during some of the  
23 observations during daytime hours, and like they would be a little  
24 bit shallower than they were at evening hours.

25  
26 To look at the patterns of individual fish like this, we visualized  
27 how similar the depth use of individual fish was using a  
28 multidimensional scaling of the similarity values between these  
29 depth use matrices, and so this MDS plot -- The data points are  
30 individual fish, and the data that are close together represent  
31 fish that have more -- The similarity patterns are more similar to  
32 each other, relative to the other fishes, and presumably a sort of  
33 similar shape and diel depth use, and we -- To kind of quantify  
34 these patterns, how different they are among each other, we used  
35 some PERMANOVA analyses to look at how the patterns of similarity,  
36 or dissimilarity, are associated with various factors.

37  
38 The main factor that explained most of the variation among these  
39 data points was the sampling year, the field effort, and so, on  
40 the left, the data are colorized and outlined by the three field  
41 efforts, and so the kind of higher scores on Axis 1 were all three  
42 years overlapped, and there's a lot of kind of similarity among  
43 the depth use patterns among those fish, but, particularly in Field  
44 Effort 1 and 2, some of the fish showed patterns that weren't seen  
45 in other years, and, notably, Field Effort 2 took place during the  
46 spring, and so the particularly big difference is in more surface  
47 waters relative to the summer months in Field Effort 1 and Field  
48 Effort 3.

1  
2 Also, in Field Effort 2, there were more cases where fish were  
3 present at shallower reefs, at thirty meters, and the sort of other  
4 feature that explained these patterns a lot was the depth of the  
5 reef where the fish was spending its time.

6  
7 We did the kind of same analyses, looking at the swimming activity  
8 of fishes, and so these plots are showing swimming activity across  
9 the period of observation for some individual fish here over a  
10 diel cycle, and the Y-axis -- It's a relative scale, and so the  
11 maximum observed swimming value would be 100 percent, and so, most  
12 of the time, their swimming activity is much lower than the maximum  
13 value, for kind of all cases, but there's a lot of variability  
14 among fish and how much -- How much variation there is in terms of  
15 high swimming values observed relative to the kind of typical  
16 pattern, over the course of the study.

17  
18 Swimming activity was a lot more variable than the depth use  
19 patterns among fish, and there was an effect observed from field  
20 effort year, but you can see there's a lot of overlap among many  
21 of the fish in all three years, and there's no real pattern  
22 associated with depth, other than some depths showed more variation  
23 in swimming activity.

24  
25 Those patterns were kind of -- We're including the whole period  
26 where the fish was observed after release of these fish that  
27 survived, but we also examined patterns of each day for fish,  
28 looking at fish immediately after they were released, for the first  
29 week of data, and then periods after that, and so the prediction  
30 that perhaps fish would show variation, or altered depth or  
31 swimming use activity, immediately after release, just from the  
32 potential stress of being caught and released.

33  
34 To do this, we restricted this analysis to fish where we had depth  
35 and swimming activity available for all hours of every day for  
36 Days 1 through 7, post-release, and at least fourteen days of  
37 complete data, and so that could be fish where you had at least  
38 two weeks of complete data that were consecutive, or, in some  
39 cases, it was fish where it might have been observed for the first  
40 twelve days, and then two subsequent days later on, and so we did  
41 have to work with data from fish that sometimes would be away from  
42 a reef or switched reefs.

43  
44 For this analysis, we -- For each fish, we had essentially a column  
45 of data, where we would have depth values for each hour, and so  
46 twenty-four hours for each day, and we calculated the correlation,  
47 a cross-correlation coefficient, of similarity of day-one with all  
48 subsequent days, and so on, and so all days of the dataset for

1 each fish were examined, and so this is looking at patterns of  
2 similarity within each fish.

3  
4 Then we graphed this, to look at it visually, but we also did a  
5 resampling procedure, to see, if we randomized the -- If we random  
6 determined which day we selected, if the pattern that we observed  
7 in days-one through seven would differ greater than expected by  
8 chance, and so I can explain this a little bit better with a  
9 visual, I think.

10  
11 This is looking at these pairs of plots for five fish here, and  
12 it's looking at depth use over days post-release, and so beginning  
13 at day-zero, immediately after release, and so depth is on the Y-  
14 axis, and days post-release is on the X-axis, and so, for Fish 28,  
15 you can see there's sort of greater diel kind of oscillation  
16 occurring as the days increased over the study period, and so like,  
17 by around day-fifteen, you start to see this kind of vertical  
18 migration that's a little more repeatable, and it becomes more  
19 pronounced later on.

20  
21 The plot, just to the right of each of these plots, is looking at  
22 the median, or it's looking at the correlation values of each day  
23 relative to the entire dataset, and so the median correlation value  
24 of that day among all other days, and so a value that is high would  
25 be indicative of a day that was more similar to the overall  
26 pattern, and a value that is low would be more atypical, and so,  
27 for example, in Fish 38, the first couple of observations are a  
28 little more atypical, and they have lower values relative to the  
29 kind of repeated pattern that begins to occur around day-ten and  
30 continues almost to day-forty.

31  
32 For depth, we see some cases, like Fish 38, for example, and Fish  
33 12, where the depth use is pretty different in the first couple of  
34 days, but this was not the case for all fishes, and some fish were  
35 actually more different later on in the study period, like in Fish  
36 25.

37  
38 This is showing the same kind of analysis, but for swimming  
39 activity, and so, for Fish 42, you can see that there's sort of  
40 greater accelerometry values, or acceleration values, in the first  
41 couple of days post-release, relative to about day-five, and then  
42 things become kind of more stereotyped for the rest of the study  
43 period, and that's reflected by the low values, the kind of lower  
44 values, that approach that kind of asymptote of around 0.4 as a  
45 correlation throughout the rest of the period.

46  
47 Among these fish that were observed with swimming activity  
48 immediately after the release, the ones that were different tended

1 to have higher swimming activity for the first couple of days, and  
2 so it's evident in Fish 42, and it's especially evident in Fish 25  
3 as well, and you can see those kind of higher values that are  
4 sustained, and the zero is a little bit shifted on the X-axis  
5 there, but, between days, about post-release day-one and two, there  
6 is much more elevated swimming activity and then more pronounced  
7 diel oscillations at around day-ten.

8  
9 These fish, in general, the resampling procedure indicated that we  
10 tended to see cross-correlation values that were lower than  
11 expected by chance in the resampling procedure for the first five  
12 days post-release, and so they were lower than expected, if you  
13 sampled at random and shuffled the days, essentially, and that was  
14 the case whether you were looking at the mean value observed, the  
15 mean cross-correlation coefficient or the median, and it was kind  
16 of the same effect.

17  
18 Another thing that we observed, among fish after tagging in this  
19 study, was emigrations associated with cyclonic storms that had  
20 moved through the area, and so, particularly in 2020, and that was  
21 a busy hurricane and tropical storm year in the northern Gulf, and  
22 Hurricane Sally passed pretty close to the study sites, and eight  
23 fish were found to have emigrated as Hurricane Sally passed over,  
24 and five of those fish were detected on other reefs where we happen  
25 to have receivers, and so we could hear from those fish later on,  
26 and so the fish highlighted here are fish that left either on the  
27 fourteenth or fifteenth from various reefs, and some of these fish  
28 had actually already emigrated and moved to a third reef.

29  
30 We took a look at the depth profiles and swimming activity of some  
31 of the fish that were -- That did not emigrate and still had  
32 twenty-four hours of data during storm passing relative to their  
33 patterns of swimming activity and depth use when there were no  
34 storms present, for example, and so, in these two fish, for  
35 example, Fish 108 and 111, their depth profiles, in a resampling  
36 test, appeared different than what we would have expected, just by  
37 change, relative to non-storm days, and the big difference seems  
38 to be associated with avoiding these kind of avoiding these kind  
39 of shallower depths on the day when Hurricane Laura was nearby.

40  
41 Similarly, we had a couple of fish, during Hurricane Sally, that  
42 we had twenty-four hours of data from, from some of the days when  
43 the storm had likely affected sea conditions in the area, and those  
44 days were observed to have differences in swimming patterns that  
45 were kind of aberrant, based on the results of the resampling  
46 procedure, and the differences seem to be associated with kind of  
47 higher than typical observed swimming activity as the fish were  
48 passing, or as the storms were passing. Sorry.

1  
2 Just to summarize, for all of this, we observed that legal fish,  
3 legal-sized fish, appeared to be at a higher risk of post-release  
4 mortality, and we didn't observe evidence of barotrauma at sites  
5 less than sixty-five meters depth, from about thirty meters to  
6 sixty-five meters of depth, and part of that, as mentioned earlier  
7 in the discussion, is maybe because the fish are hooked at a  
8 shallower depth, and so they're not necessarily caught at site  
9 depth, and we did observe some evidence, mainly associated with  
10 swimming activity in the first five days of release, that indicate  
11 that the fish might be swimming with a little more effort than  
12 they do throughout the rest of the observation period, and these  
13 are questions that I suggest could be points of further study, to  
14 see how these sort of -- How these sub-lethal impacts, considering  
15 what potential impacts they might have on growth or reproductive  
16 investment and energy budgets of the fish.

17  
18 Other consideration, from the study, is that the cyclonic storms  
19 seem to be associated with emigration events from artificial reefs,  
20 and this has been reported from others, like Will Patterson,  
21 looking at these fish and other fish, that these things might lead  
22 to fish moving off of reefs, and that's also a consideration for  
23 these kinds of studies, if you need a long observation period,  
24 because the likelihood of fish leaving seems to be associated with  
25 when these storms are happening, and so that's one challenge of  
26 doing this kind of work in late summer, if you're trying to observe  
27 these fish for a longer period, though the main focus of our study  
28 was looking at kind of the first hours post-release. That is it  
29 for me, other than the acknowledgements, but I'm happy to discuss  
30 this more.

31  
32 **CHAIRMAN NANCE:** Thank you very much.

33  
34 **DR. BOYLE:** Thank you.

35  
36 **CHAIRMAN NANCE:** Sean, please.

37  
38 **DR. POWERS:** Kelly, just to add, and so how do these estimates  
39 compare to the stock assessment?

40  
41 **DR. BOYLE:** That's a good point, and so, in the stock assessment,  
42 the stock assessment used a couple of scenarios, and so the --

43  
44 **DR. POWERS:** Are you looking for the --

45  
46 **DR. BOYLE:** I am looking for the actual numbers.

47  
48 **DR. POWERS:** It was 10 percent for recreational and 20 percent for

1 commercial, the different discard rates, with the assumption that  
2 commercial was from deeper depths, and so --

3  
4 **DR. BOYLE:** Yes, and so the overall -- The mortality, the post-  
5 release mortality, is -- It's similar to those scenarios used in  
6 the stock assessment. However, the higher observation of mortality  
7 for legal-sized fish I think would be an area where that might  
8 need to be considered, just because we observed much higher  
9 estimated post-release mortality of legal-sized fish, of about 44  
10 percent.

11  
12 **DR. POWERS:** That's interesting, because I don't know of any  
13 assessments that adjust it for size, offhand, but, you know, that  
14 -- I mean, discards in-season, you would think, is because of size,  
15 and out-of-season would be the average, I guess, because it would  
16 be small and big ones, but thanks, Kelly.

17  
18 **CHAIRMAN NANCE:** It is harder though with the depth component,  
19 because you've got a depth that you know what the bottom is, but  
20 yet the fish is so variable of where it's taken, and you can't  
21 really account for that.

22  
23 **DR. POWERS:** You know, I was following that question, and they  
24 were absolutely right, Will and everyone, to bring that point up,  
25 but the only depth information that we're going to have from  
26 logbooks is depth that they're fishing, and we would never -- I  
27 mean, I don't think anybody would ever report the depth of the  
28 fish caught.

29  
30 **CHAIRMAN NANCE:** I think that's the issue, because, like you're  
31 saying, that is all we have. Will, please.

32  
33 **DR. PATTERSON:** Thanks, Jim. Kelly, you mentioned that, early on,  
34 you guys were doing external tags, and then you switched, because  
35 you -- It seemed like you were having too high tag loss, but I'm  
36 wondering if you looked at the data and if you had enough  
37 information for the first few days after you tagged.

38  
39 You know, sometimes you don't see tag loss showing up until a week  
40 or two after the fish have been tagged, and so I'm wondering if  
41 you have any data for those first few days for the fish that were  
42 just tagged with external tags versus fish that you did surgery on  
43 to implant the tags, and one of the concerns, obviously, about  
44 doing the surgery is that, you know, you can't parse the surgery  
45 effect versus the release mortality effect, and you showed this  
46 pattern of, for the first five days after, tagging and fish  
47 activity appears to be different.

1 I'm wondering if you have data from those, from the early fish  
2 that you used the external tags, and if that activity pattern  
3 looked any different, or if it really is just an effect of being  
4 caught and released that's impacting their activity, and it's not  
5 really a surgery effect, and I think where this comes in is, you  
6 know, if the bigger fish are the ones that are showing the highest  
7 release mortality, then the question becomes is that because  
8 they're more stressed by catch-and-release, or are they are more  
9 stressed by the surgery than the smaller ones.

10  
11 **DR. BOYLE:** That's a good point. I didn't specifically look at -  
12 - So we included the behavior, post-release, of both fish that  
13 were externally tagged and internally tagged in this, but I didn't  
14 make that comparison. We didn't have that many -- Let me correct  
15 myself, and so there are only a couple of fish in which, if I  
16 remember correctly from the first externally-tagged effort, that  
17 had fourteen days of data for that specific comparison, but maybe  
18 there would be another way to look at that, on even sort of  
19 qualitatively, just in terms of the first couple of hours of  
20 externally-tagged versus internally-tagged fish, to see if the --  
21 If the swimming seems more elevated, and I didn't do that, and  
22 that's an interesting point.

23  
24 **DR. PATTERSON:** Even if you don't have a full two weeks, it might  
25 be interesting to look at it, if you just have those, you know,  
26 first few days, to see if you perceive a recovery quicker, and,  
27 again, I don't know what your sample sizes are for those early  
28 tags, but it might be worth just taking a peek, to see if the  
29 recovery is different for that group of fish versus the fish that  
30 were implanted.

31  
32 **CHAIRMAN NANCE:** Thank you. Paul, please.

33  
34 **DR. MICKLE:** Thank you, Mr. Chair, and so I may have missed it,  
35 but I saw your sampling dates were -- It looks like early fall, or  
36 late summer, and then springtime, and did you bring temperature  
37 in? Did I miss that in the presentation? If I did, I apologize,  
38 but it seems like it's a covariate that you could easily  
39 investigate. Thank you.

40  
41 **DR. BOYLE:** Yes, and that's a -- We did bring temperature in, and  
42 there were differences during those periods, and I would suspect  
43 that might explain some of the differences in the depth patterns,  
44 in particular, that we observed, and the post-release behavior.  
45 It was not a factor for post-release mortality, as far as we could  
46 tell, but there are big differences, in terms of the surface  
47 temperatures being much warmer in the August and September sampling  
48 dates, relative to the spring dates.

1  
2 Even between the two summer and fall sampling, 2018 and 2020, there  
3 were differences in salinity and things, just between the years,  
4 even though the periods of fish were around the same time of years,  
5 but different years, but they weren't found to be factors in post-  
6 release survivorship.

7  
8 **CHAIRMAN NANCE:** Thank you. Any further questions? That was a  
9 great study though, and it has a lot of great information in there.  
10 Thank you. Kelly, thank you for that presentation.

11  
12 **DR. BOYLE:** Thank you very much for letting me present to you.

13  
14 **CHAIRMAN NANCE:** You're welcome. We'll go ahead and break for  
15 lunch, and we're going to come back at 12:30. We've got a full  
16 afternoon of stuff to be able to cover, and so let's be prompt and  
17 come back at 12:30. Thank you.

18  
19 (Whereupon, the meeting recessed for lunch on March 9, 2023.)

20  
21 - - -

22  
23 March 9, 2023

24  
25 THURSDAY AFTERNOON SESSION

26  
27 - - -

28  
29 The Meeting of the Gulf of Mexico Fishery Management Council  
30 Standing and Special Reef Fish, Special Socioeconomic, Special  
31 Ecosystem, and Special Shrimp Scientific and Statistical  
32 Committees reconvened on Thursday, March 9, 2023, and was called  
33 to order by Chairman Jim Nance.

34  
35 **CHAIRMAN NANCE:** Okay. It's time to start, and we appreciate all  
36 of you taking a little shorter lunch today to be able to move  
37 forward with this. Our next item of business is Item Number XXI,  
38 and it's an update of the Gulf of Mexico Greater Amberjack Count,  
39 and, Ryan, would you please give us our scope of work, and then  
40 we'll turn the time over to Dr. Sean Powers.

41  
42 **UPDATE: GULF OF MEXICO GREAT AMBERJACK COUNT**

43  
44 **MR. RINDONE:** Sure. Sean is here to summarize the ongoing work in  
45 the Gulf to estimate the absolute abundance of greater amberjack.  
46 This collaboratively-funded research includes state, federal, and  
47 academic partners conducting a variety of coordinated projects to  
48 generate regionally-specific estimates of absolute abundance for

1 amberjack, and so you guys should review the information presented  
2 and discuss and provide any recommendations to Sean and his team,  
3 as appropriate.

4  
5 **CHAIRMAN NANCE:** Dr. Powers.

6  
7 **DR. POWERS:** I'm going to start and then turn it over, and so thank  
8 you, and I know most of you have heard about the Great Amberjack  
9 Count, and we're calling it just the Great Amberjack Count and not  
10 the Greater or Marginally Greater or any of those things, and so  
11 it's just the Great Amberjack Count, is what we're calling it, and  
12 here you see the list of PIs. This isn't all-inclusive, and we've  
13 had several people join the band, so to speak, along the way, and  
14 Josh Kilborn is helping us now, and Sue Barbieri is also helping  
15 us with some things, but you can see it is a large cross-section  
16 of folks around the Gulf and the southeast Atlantic.

17  
18 What's the rationale? Well, I will try to be quick, to save more  
19 time for Mark, because he's going to go over some of our initial  
20 results, but, obviously, reef fish management, in our neck of the  
21 woods, is contentious, and so there's disagreement regarding stock  
22 status and catch levels, mainly disagreement between recreational  
23 anglers and the federal assessments, and that causes -- It causes  
24 the public to question the scientific basis for many of the  
25 management decisions, and so, like all good tax payers, when there  
26 is conflict, they go to their congressman, or senators, and,  
27 essentially, because stakeholder buy-in is critical to effective  
28 management, and congressmen, and senators, don't know who is right,  
29 when they talk about these conflicts, or whether a real conflict  
30 actually exists, and their solution is to study it and put money  
31 in that direction.

32  
33 Essentially, Congress, in this case, largely driven by Senator  
34 Shelby, focused on two species, and so red snapper originally,  
35 which you heard the results of the Great Red Snapper Count, which  
36 is completed, and Dr. Stunz led that effort, with much of the same  
37 team that we have, and now the Greater Amberjack Count, which was  
38 included to be Gulf of Mexico and South Atlantic. The funding for  
39 this passes through both Sea Grant and National Marine Fisheries  
40 Service.

41  
42 One of the things is we build on successes and lessons learned  
43 from the Great Red Snapper Count, and one of the reasons we're  
44 here today is because one of the lessons we learned was engaging  
45 the SSCs and National Marine Fisheries Service more along the way,  
46 so you all didn't hear about it just at the very end.

47  
48 A lot of that has to do with the Greater Amberjack Count allowed

1 more flexibility for us to do that, and the Great Red Snapper Count  
2 really focused on it being an independent estimate, independent of  
3 National Marine Fisheries Service, and that language was relaxed,  
4 a fair amount, in the Great Amberjack Count, realizing that that  
5 was counterproductive, not to have a partner in National Marine  
6 Fisheries Service.

7  
8 One of the things that we've developed a project for was to realize  
9 that, in some ways, we have an easier task on amberjack than red  
10 snapper, and, basically, it's less controversial, and people have  
11 -- I think stakeholders, from our surveys, have less of a  
12 preconceived notion on what the direction should be, and there's  
13 a lot of uncertainty amongst everybody with greater amberjack, and  
14 so that's a positive.

15  
16 The negative is that we don't know nearly as much about greater  
17 amberjack movement, spatial dynamics, than we do about red snapper,  
18 and it's just not as studied of a species, and so a lot of our  
19 work here is also to fill the void of our knowledge of amberjack,  
20 and so not only to produce the absolute abundance estimates, but,  
21 to do that, we need to know a lot more about the ecology of the  
22 species.

23  
24 We're in Phase 1 and 2 and 3, and so we have a series of steps,  
25 and I will show you that, quickly, through the objectives, but,  
26 essentially, we had a stakeholder input group, and we also got  
27 some information from Kai's amberjack focus group that he ran.  
28 One of the key things that we're trying to do is synthesize all  
29 the fisheries and habitat data. This RFP, like the Great Red  
30 Snapper Count, had the stipulation that we could not use any of  
31 this money for habitat mapping.

32  
33 The reason for that is they were worried that we would suck up all  
34 \$9 million just getting better habitat maps, which we could easily  
35 do, and so we really can't -- We have to synthesize existing  
36 habitat information, just like the Red Snapper Count did, and  
37 that's going to lead to some uncertainty, in the end, when we  
38 extrapolate to the amount of those habitats, but that was a  
39 stipulation of the RFP, and we can't do anything about that.

40  
41 That fits in -- The synthesis of both habitat data and fisheries  
42 data flows into our sampling design, and the regional surveys --  
43 We have divided -- The RFP said we had to have regional-specific  
44 estimates, and they have to be able to be divided by habitat type,  
45 and so artificial, natural hardbottom, and uncharacterized bottom,  
46 at least.

47  
48 We have the same thing, and we're developing -- But we learned a

1 couple of lessons with the Great Red Snapper Count, and one is to  
2 make sure the estimates by region are truly additive, and, in order  
3 to do that, we have to do a lot of calibration studies amongst  
4 gears, because no one gear can be used across all the regions, for  
5 a variety of reasons, but differences in environment, mainly, and  
6 so we're focusing a lot on calibration studies.

7  
8 We need to know more about connectivity and movement, and eDNA  
9 holds some promise, because we have a lot of -- Well, we have four  
10 *Seriola* species that often are difficult to differentiate on video,  
11 and we're going to update the biological parameters, and all of  
12 these feed into the absolute abundance, and so where we are now is  
13 we've finished a subset of the calibration experiments, and we've  
14 done a lot of the synthesis, and now we have, essentially, the  
15 sampling designs by each region, and so that's what Mark is going  
16 to produce, but we still have time to adapt and make it more  
17 efficient.

18  
19 I am going to go through these quickly, and we have seven  
20 objectives. The first is to synthesize habitat data, and, again,  
21 we're dealing with the South Atlantic as well as the Gulf of  
22 Mexico. It turns out that there is a lot more surveys of habitat  
23 type in the Gulf of Mexico than there is in the South Atlantic.  
24 The South Atlantic relies heavily on modeling of habitat type,  
25 where habitat should be, whereas the Gulf of Mexico has a lot more  
26 observational data, and so even though we're not mapping, but we're  
27 actually going to augment and test some of those habitat models,  
28 particularly on the South Atlantic, to make sure that they're  
29 estimating the coverage of those strata correctly.

30  
31 To optimize the sampling design, particularly in the Bayesian  
32 estimation we're going to use, we're going to synthesize the  
33 abundance data, both from traditional knowledge, fisheries-  
34 independent data, and fisheries-dependent data, and these are  
35 things that Josh and Steve are doing out of the south Florida  
36 group.

37  
38 Obviously, the key is to estimate absolute abundance, and that's  
39 going to depend a lot on our sampling design and framework, and  
40 one of the things that we learned, from the review, was to make  
41 sure that the estimates were additive, and the other thing we  
42 learned was that we were probably, or we were, underestimating the  
43 variability, and so making sure that we get a lot more sources of  
44 variability and habitat types, not only counts of the data, but  
45 also in the amount of habitat and other sources of variability  
46 that we knew were underestimated, and so we paid a lot of attention  
47 to that, and we paid a lot of attention to calibration of gears,  
48 and I'm going to let Mark really get into this more, but, again,

1 here is our regions, and then at least by those three habitat  
2 types.

3  
4 The core approach is every region is going to have some type of  
5 video gear and have active acoustics in the system. The type of  
6 video gear will differ between the systems, and our reliance on  
7 the acoustics will also differ. Basically, in the western Gulf of  
8 Mexico, where we deal with that nepheloid layer, we need a higher  
9 reliance on acoustics.

10  
11 We also are inheriting a lot of video gear. You know, we're going  
12 to leverage the National Marine Fisheries Service's G-FISHER, as  
13 well as Nate Bachelor's studies, and they really can't change their  
14 video gear, because they would have -- They would disrupt their  
15 long-term series, and so we're going to calibrate our gears to  
16 theirs and also augment the sampling with more acoustics.

17  
18 We're looking the efficiency of eDNA technologies, helping us with  
19 the species presence question at first, although our PIs hope that  
20 they can get into a quantification with the eDNA, and so these are  
21 just some of the different types of video gears, and different  
22 video gears are used in different regions, like I said, because of  
23 environmental conditions, and there's also differences amongst the  
24 habitat types, the taller vertical relief habitats of oil and gas  
25 platforms and artificial reefs, compared to the wide expanses of  
26 uncharacterized bottom or natural hardbottom.

27  
28 This just shows you three species of *Seriola* that we're concerned  
29 with here, and this gives you a typical -- This is ROV here, and  
30 so we've had a lot of good luck so far with eDNA, but Mark is going  
31 to talk you a little more about that.

32  
33 Active acoustics, Kevin Boswell and Ben Binder are leading this  
34 group, and we focus a lot on what the track patterns should be  
35 around structures, and we've looked into a lot -- Believe it or  
36 now, we've talked to Children's and Women's Hospital at USA into  
37 taking recently-dead fish and sticking it in their CT scan, to get  
38 better ideas on the swim bladder morphology to predict return and  
39 separate greater amberjack from the other jacks, as well as the  
40 other species, and so we had to do this late at night, when there  
41 was no children around, but it's been very, very promising, and so  
42 Kevin Boswell has done a lot of this type of work before, but,  
43 here, we're, obviously, focusing on amberjack. We're also looking  
44 at the use of dual-frequency, instead of single-frequency.

45  
46 We're going to do a lot of comparison of camera gears. In our  
47 calibration, we have discrete experiments, where do all the  
48 calibration, and then, in each regional study, we're pairing the

1 different types of camera systems as well, and Ted, for example,  
2 at FWC, is using a lot of baited versus unbaited at the same time,  
3 so we can correct those things, and so a lot more calibration  
4 efforts are going into the study, again making the point that we  
5 need our estimates to be additive at the end, additive by region  
6 and additive by habitat type.

7  
8 Movement connectivity and mortality, we have a high-dollar reward  
9 tag program in this, and we also put a lot of acoustic tags in  
10 there, to rely on the network of acoustic receivers throughout the  
11 Gulf and South Atlantic, and here is just an example of some of  
12 the acoustic arrays that were actually planned or actually in  
13 place, and that's the high-dollar reward tags.

14  
15 Environmental -- eDNA we think is important, because it's going to  
16 allow us to separate the different *Seriola* species, and we're  
17 working on tools to be able to minimize the amount of water they  
18 have to take, and actually taking samples at-depth, with  
19 submersible pumps and filters, and so, right now, we're just  
20 planning on using eDNA during calibration studies, and so work off  
21 of Mississippi and Alabama. If we can simplify the water  
22 collection procedures, then we can expand it to most of the other  
23 regions as well. I should say this objective came out of Kai's  
24 visioning, where a lot of the stakeholders wanted us to explore  
25 the use of eDNA.

26  
27 Recent stock assessments update the biological information, and,  
28 again, our absolute abundance estimation has to be divided by age,  
29 but it also has to -- So we need age-length information, since  
30 we're not catching a lot of samples, since it's based on acoustics  
31 and video, for the most part. We're also archiving samples to be  
32 used later, if somebody wants to fund a mark-and-recapture, genetic  
33 mark-and-recapture.

34  
35 Stakeholder engagement is planned throughout, and it's been very,  
36 very popular on our high-dollar reward tags, and we've got lots of  
37 engagement, and lots of engagement from commercial and  
38 recreational fishermen on some work that Steven Scyphers has been  
39 doing to try to find out where the fishermen think all the  
40 amberjack are in the study.

41  
42 The impacts and applications, obviously, it's a large-scale  
43 survey, using novel sampling approaches. Here, more than the red  
44 snapper count, we want to also make sure that we learn things about  
45 the camera systems in the fisheries-independent surveys that are  
46 already being conducted by calibrating all of our gear to the  
47 existing NMFS surveys, and we think we can have more of a long-  
48 term impact in the fisheries-independent business.

1  
2 Leveraging existing datasets, and so we hope to produce an  
3 independent, robust estimate of absolute abundance of one-plus-  
4 year-olds, and the question we get mostly is when will it be  
5 available, and so 2023 is our primary field season. We've done  
6 some earlier work, and some calibration studies before, but this  
7 season will be our primary field season. We are going to do just  
8 a little more calibration work in spring of 2024.

9  
10 Given how long it takes to work up the acoustic data and the video  
11 reads, both from FWC as well as the other groups, our no-cost  
12 extension will bring us into August 2024. Our hope is that all of  
13 the data will be available by August of 2024, and we can finish  
14 our project report by December of 2024, and that means we would  
15 hand it over to the council and Sea Grant at about the end of the  
16 year in 2024.

17  
18 My understanding, and Ryan can correct me if I'm wrong, is the  
19 steering committee wants a similar type of peer review on the whole  
20 report, and we'll go back and forth, and the SSC will be involved,  
21 and so I'm guessing the final, final will be done by April or May  
22 of 2025.

23  
24 Now I'm going to turn it over to Mark, and Mark Albins is another  
25 researcher at the University of South Alabama. Mark coordinates  
26 the whole project, the day-to-day coordination, and Mark is also  
27 in charge of linking the fisheries ecologists with the  
28 statisticians and serving as an interpreter, when we don't  
29 understand the language that each other uses. The other one on  
30 the phone right now joining us is John Hoenig, and John Hoenig and  
31 Lynn Stokes are our primary survey statisticians, and they've been  
32 working with us throughout this process.

33  
34 **CHAIRMAN NANCE:** Perfect, and, Sean, I just want to say how  
35 appreciative the SSC is to have this, and I think it's nice to be  
36 able to see this and to have this interaction throughout the  
37 process, and I think that will be very good.

38  
39 **DR. POWERS:** We are giving these updates to the South Atlantic SSC  
40 as well.

41  
42 **CHAIRMAN NANCE:** Perfect, and I also want to recognize Bob Gill  
43 here, and he's a council member, just to make sure we're aware  
44 that he's here. Mark, go ahead, and we'll turn the time over to  
45 you, and we appreciate you being here.

46  
47 **MR. MARK ALBINS:** All right. Thank you very much for the  
48 opportunity. I'm going to start off with a little bit of a caveat,

1 just because this stuff that I'm about to present -- Most of it is  
2 very, very hot off the presses, and I've only had a few days to  
3 throw this together, and so I apologize, in advance, for any lack  
4 of polish that you might notice. Essentially, what I'm going to  
5 do is walk you through our preliminary results to-date and some  
6 more detail about our sample design, moving into the 2023 field  
7 season.

8  
9 This is just an outline of what we're going to be talking about,  
10 and so I'm going to talk about -- These are basically some of our  
11 preliminary results for conventional tagging, acoustic tagging,  
12 population genetics, eDNA, and the active acoustics part of the  
13 project, and then I will go into our calibration studies, the two  
14 that we've conducted so far in Florida and Mississippi/Alabama.

15  
16 Then I will talk about our habitat data synthesis, which, as Sean  
17 said, Josh Kilborn has been working on, very hard, for us, and  
18 then we'll talk about the abundance data synthesis, which is also  
19 something that Josh has worked on a bit, and we'll end with our  
20 sample design, moving forward into the upcoming field season.

21  
22 Starting with conventional tagging, on the right is just a close-  
23 up of one of our tags that we're using specifically for this  
24 project, and a lot of the fish are double-tagged, as you can see  
25 in the picture here, and we've been promoting this, using social  
26 media, the internet, as well as physical signs that have been  
27 posted throughout the region, at places like boat docks and bait  
28 shops and stuff.

29  
30 The objectives of the conventional tagging portion of the project  
31 are to estimate the regional and sector-specific fishing mortality  
32 rates of greater amberjack in the Atlantic and the Gulf, to assess  
33 length-based vulnerability to capture, harvest, and discard, and  
34 to evaluate rates of movement of greater amberjack among regions.  
35 This is a map showing all the places that we have tagged fish to-  
36 date, and there have been 695 out of a planned 1,200 conventional  
37 tags put out. 318 out of 330 planned acoustic tags are out, and  
38 this is a high-dollar reward tag system, and so you can get \$250  
39 if you catch one of these fish and report it to our hotline.

40  
41 So far, we've had a total number of tag returns of thirty-nine,  
42 and that's nine in the Atlantic, seventeen in the eastern Gulf,  
43 and thirteen in the western Gulf. Of those thirty-nine returns,  
44 twenty of them were double-tagged fish, and only one of those  
45 twenty was missing a tag, and so we've at least got an initial  
46 estimate of tag shedding rates. The remaining tags will be put  
47 out over the summer of 2023, and so we expect all of our tags to  
48 be out over the next several months.

1  
2 At the end of the day, the plan is to build a Bayesian multistate  
3 mark-recapture model and to incorporate the acoustic tag returns  
4 into a full analysis, to try and answer some of these questions.  
5 As far as acoustic tagging, again, as I said, the objectives will  
6 be to look at residency period and site fidelity, both between  
7 regions and within regions, for different structure types and for  
8 different fish sizes, to estimate movement and exchange within and  
9 between regions, and these are kind of like the larger-scale  
10 regions, the South Atlantic, eastern Gulf, and western Gulf, and  
11 to estimate both fishing and natural mortality rates, post-release  
12 mortality estimates, and depth use across habitat types and  
13 regions, and so a subset of our acoustic tags are pressure tags,  
14 and so we'll be getting depth data as well.

15  
16 This is a map of -- All the little, yellow dots show where we have  
17 deployed acoustic tags thus far, and the numbers show you about  
18 how many are out, and that's close to the total. You can see that  
19 there's very few in South Carolina and eastern Florida, and those  
20 are the numbers where we still need to get some more acoustic tags  
21 out, and so 318 out of 330 tags are out.

22  
23 We are collaborating, and this should say "collaborating" and not  
24 "coordinating", and we're collaborating with both iTAG and FACT,  
25 so that we have, in addition to the PIs that are on the project,  
26 which have a pretty extensive network of receivers, we're also  
27 going to be getting data from all of the iTAG and FACT receivers  
28 across the region.

29  
30 We expect receiver downloads, at least for our PI receivers, to  
31 begin in the spring and summer of 2023, and the FACT and iTAG  
32 receiver returns should be rolling in around -- Starting to roll  
33 in around the same time, but there will probably be some  
34 periodicity to that.

35  
36 What we have yet to do is deploy those few remaining tags, and  
37 this map just shows -- It's the same map that Sean showed you, and  
38 it basically just shows the existing networks that we're  
39 collaborating with, and the planned -- Actually, now they're out,  
40 and the PI receivers that are out, mostly in the western Gulf.

41  
42 As far as population genetics goes, the main objectives here, first  
43 of all, are to develop genomic resources to interpret genome scans  
44 in greater amberjack, and that requires us to first draft a genome  
45 assembly and then to develop a linkage map, in order to interpret  
46 that, and then, obviously, survey the population genetic structure  
47 in both the Gulf of Mexico and the South Atlantic. For this, we're  
48 sampling geographic populations and assaying samples at 2,000 and

1 10,000 single nucleotide polymorphisms. That will allow us to  
2 analyze the genetic stock structure and connectivity to identify  
3 sub-units, and for migrants and migration patterns, and analyze  
4 variation under selection.

5  
6 So far, population genetics -- We have made a lot of progress on  
7 the reference genome, and we have sampled the population, in pretty  
8 considerable numbers, through our tagging project, but also  
9 through some fishery-dependent collections, and so the numbers in  
10 red, on the map, give you an idea of where we're at right now with  
11 our sample numbers across the Gulf and South Atlantic. We still  
12 need to complete our reference genome, to complete our linkage map  
13 and assay the population sample, using dd-RAD sequencing, and,  
14 from that, be able to analyze the genetic stock structure and  
15 connectivity of the species.

16  
17 I just wanted to make a note, and just, as Sean mentioned earlier,  
18 we are archiving all of these samples, and so, when we do our  
19 analysis, we're only using a very small portion of the tissue  
20 samples, and the remaining samples are being archived for potential  
21 future use. If a parentage analysis gets funded, they would be  
22 available for that.

23  
24 Again, eDNA, like Sean said, has a lot of potential, and the  
25 objectives, so far here, are, first of all, to evaluate the  
26 capacity for these tools to detect, discriminate, and quantify  
27 target DNA, and so we may be able to, at the end of the day, get  
28 some relative abundance estimates out of the eDNA analysis. First  
29 though, you have to develop the ddPCR assay, which has -- I will  
30 talk about that in a second, but we've accomplished that part of  
31 it, and then work out what kind of sampling tools and techniques  
32 work for the system.

33  
34 In the past, eDNA has been used in a lot of freshwater systems, a  
35 lot of rivers, estuaries, lakes, things like that, but there  
36 haven't been -- You know, you can count on them, on one or two  
37 hands, how many studies there have been in the ocean, and so that's  
38 -- Having to work out those details is really important. We are  
39 collecting eDNA field data, in concert with our other gears, during  
40 both our calibration studies and during our abundance sampling  
41 efforts.

42  
43 This is just some graphics of the eDNA assay and how it works.  
44 Essentially, we're using four different probes, which use primers  
45 that kind of get at those probes from both ends with a PCR reaction,  
46 and this happens -- The ddPCR stands for "digital droplet PCR",  
47 and so what happens is you take your sample and fraction it into  
48 like 10,000 droplets and then do a separate PCR reaction on each

1 of those droplets, and that's what gives you the capacity to  
2 measure the quantity of DNA in the environment, and we hope that  
3 we're going to be able to infer at least relative abundance from  
4 those quantities.

5  
6 We've also tested these probes against a whole bunch of potentially  
7 confusing samples, and so we've thrown -- We've cross-tested on  
8 twenty-four different non-target species, including some of the  
9 baits that we use for our cameras and traps, and also other  
10 closely-related *Seriola* species, and what you see, on the right-  
11 hand side there, is that our four-probe assay is able to  
12 differentiate between non-targets and between the four *Seriola*  
13 species that we have in the system, and so lesser amberjack,  
14 greater amberjack, banded rudderfish, and almaco.

15  
16 The sampling, the eDNA sampling, has been a bit challenging thus  
17 far, and it's pretty equipment intensive, because so far what we've  
18 been using is triplicate Niskin drop samplers to collect these  
19 huge ten-liter samples and then bring the samples up to the surface  
20 and then filter them, and so what we're doing now is working on  
21 ideas for increasing sampling efficiency, by basically deploying  
22 a pumping system that can push water through a filter at-depth and  
23 then bring just the filter back up to the boat, so you don't have  
24 to move as much water, and you get a lot more efficient that way,  
25 and we could even mount these pumps on our ROVs, or stationary  
26 cameras, and so we're working on some details there.

27  
28 Moving on to active acoustics, basically, so far in the project,  
29 the main objectives of the active acoustics team have been, first  
30 of all, to work through these calibrations that we've conducted,  
31 to test their methods for abundance estimation, to characterize  
32 the wideband response for amberjack, and to optimize survey design  
33 patterns, like whether it's better to do kind of an always-on  
34 approach or whether it's better to do flower patterns over certain  
35 isolated habitat points or whether it's better to do parallel-  
36 line-type surveys,

37  
38 They're also, as Sean mentioned, processing CT scans of amberjack,  
39 and I will talk a little bit more about that part of it, and I  
40 will save the calibration part for my calibration section, and so  
41 the CT scans -- Essentially, we go out and collect greater  
42 amberjack, and we try and keep alive in aerated containers and get  
43 them to the CT scanner in as good condition as possible, so that  
44 there's no deflation of the swim bladder and stuff like that, and  
45 we've been pretty successful with that, but, essentially, we bring  
46 them into the CT scan, and then, if you've never seen a CT scan  
47 before, this is a video of what an amberjack looks like in a CT  
48 scan, and so, basically, it takes little cross-section slices

1 through the whole body of the fish, and we're able to use those  
2 slices to then build a three-dimensional model of the different  
3 tissues in the fish, and so we can build a model that contains  
4 skeleton, swim bladder, skin, whatever we think is important for  
5 the acoustic signature of the fish. Here you see basically the  
6 swim bladder in red and the skeleton in gray.

7  
8 That three-dimensional model, particularly of the swim bladder  
9 primarily, but also of the other tissues, if we deem it necessary,  
10 is then basically translated into a three-dimensional backscatter  
11 model, and this is where it gets a little bit computing intensive,  
12 and so we have to use like high-performance computer clusters to  
13 do this step, to go from this swim bladder model to this, and what  
14 you're seeing here is essentially the acoustic fingerprint of  
15 different fish species, and so we've got nine different fish  
16 species plotted on these graphs.

17  
18 On the left, you've got the normalized backscatter, and on the  
19 right you've got the target strength, across the X-axis, which is  
20 different frequencies, and so the idea is that, if you're hitting  
21 these fish with a wide enough band of frequencies, and you have  
22 this model for your species, you can potentially differentiate  
23 that species from other species, just based on the active acoustics  
24 data themselves, and so we have a lot of high hopes for this, and  
25 we're also seeing this as a proving ground, and a development  
26 ground, for this kind of technology, but we're also not necessarily  
27 relying on just the hydroacoustics, and that's why we're coupling  
28 that with cameras across the whole project.

29  
30 Okay, and so our calibrations, and, as Sean said, we've conducted  
31 two dedicated calibration studies so far, and we're planning to do  
32 at least a third, as well as integrating some calibration with our  
33 regular sampling, by deploying the same gears at the same times in  
34 the same places, but I'm going to share with you the preliminary  
35 results from the two calibration studies that we've done so far.

36  
37 The first calibration study we did in Florida, in early May in  
38 2022, and, essentially, what -- I will give you the end of the  
39 story first, and what came out of this calibration, I think, was  
40 that we got to ground-test all of our gears, and we got to work  
41 out some of the bugs, and we learned a lot about what we wanted to  
42 do in our next calibration, but I'm going to go through a little  
43 bit more detail here.

44  
45 The objectives, obviously, is to test out our gears, to deploy  
46 multiple gears at the same time in the same place, to compare the  
47 results among those gears, and then hopefully to estimate  
48 calibration factors from those comparisons.

1  
2 For the Florida calibration, we went to these three sites, the  
3 Pinellas 2 Artificial Reef, the Gulf Stream Gas Pipeline, and the  
4 Elbow, and I'm just going to show you a map, and, actually, we'll  
5 talk about the sampling protocol for all three sites, and so each  
6 gear was sampled each day, and the order of gears was randomized  
7 at these sites.

8  
9 We had our echosounder. For this calibration, the echosounder was  
10 running continuously, and so, essentially, wherever the boat went,  
11 whether it was dropping an ROV or whether it was towing the C-  
12 BASS, the echosounder was running. The C-BASS was not deployed on  
13 one of the sites, because there was too much relief in the  
14 structure, and that's one of the limitations of the C-BASS gear,  
15 and so, basically, if you looked at what we did during this  
16 calibration, it looks something like this.

17  
18 We had kind of sub-sites within each of the three sites, an  
19 artificial reef site, a pipeline site, and the Elbow site, and we  
20 deployed two gears, the S-BRUV cameras and the ROV cameras, at the  
21 artificial reef site, and then all three of the camera gears at  
22 the pipeline and Elbow site, and, again, the echosounder was  
23 running continuously during the whole cruise.

24  
25 This is what the Elbow site looked like, and so what you have is  
26 a green and red flag showing the beginning and ending of each of  
27 the C-BASS transects, and then the dots represent the locations  
28 where we dropped an ROV and an S-BRUV camera along that transect,  
29 and so, theoretically, at the end of the day, we'll be able to  
30 compare the three different camera gears together, as well as  
31 compare them to the echosounder data.

32  
33 Preliminary results are three different *Seriola* species were seen,  
34 greater amberjack, almaco jack, and banded rudderfish. All the  
35 gear systems functioned, more or less, as designed and expected,  
36 and the water visibility was generally good to excellent, and so  
37 we got pretty good camera data out of this calibration. The ROV  
38 and C-BASS video reads are completely done. The C-BASS, we still  
39 have 25 percent of the C-BASS samples to look at habitat on, and  
40 then the S-BRUV are in progress, and so I don't have any comparison  
41 with S-BRUV, and the EK analyses are done.

42  
43 Preliminary results look something like this, and the ROV basically  
44 saw more fish than the other gears, ninety-nine individual *Seriola*  
45 *dumerili* and three unidentified *Seriola*, and there are many mixed  
46 schools of *Seriola* present during the calibration, and the highest  
47 counts of *dumerili* were on artificial reefs. Counts were much  
48 lower on the pipeline and the Elbow sites.

1  
2 The C-BASS only saw four *S. dumerili* and seven unidentified  
3 *Seriola*, and we're currently, as I said, finishing up the habitat  
4 data for the C-BASS transects.

5  
6 The echosounder, basically, that's what you're seeing in the image  
7 here, is some of the echosounder data at five different frequencies  
8 of the same part of the transect for those five frequencies. A  
9 lot of fish were observed on the echosounder data, but what we --  
10 One of the things that we learned was that it's really hard to  
11 apply any kind of abundance models to an always on echosounder  
12 track, and so that's a little bit problematic mathematically, and  
13 I think we came up with a solution for the second calibration for  
14 that. The S-BRUV video reads, as I said before, are not yet  
15 finished, and so we don't have a complete comparison of those.

16  
17 The next steps for processing the data from this first calibration  
18 are first to finish those S-BRUV video reads, to compare the S-  
19 BRUV to the ROV counts, and to parse the C-BASS data -- Right now,  
20 we're parsing the C-BASS data for those points in which it overlaps  
21 with the other camera gears, so that we can compare it with the  
22 other camera gears, and we also need to test alternative  
23 echosounder survey patterns, which I will talk about here in a  
24 second, at the next calibration.

25  
26 The main take-aways here was that we learned a lot about how our  
27 gears functioned, and the water clarity was good. We think that,  
28 once those video reads are completed, we'll have some data to  
29 inform a calibration factor estimate, at least among those three  
30 camera gears that I talked about, but probably not with the  
31 echosounder, for this particular set of efforts, because the  
32 always-on echosounder was of limited value for calculating areal  
33 abundance. This led us to conclude that we need to use patterned  
34 parallel lines, or flower surveys, for spatial models of abundance  
35 with the echosounder.

36  
37 Moving into our second calibration effort, where we brought lessons  
38 learned from the first calibration to bear, hopefully, we conducted  
39 this calibration off of Mississippi and Alabama, where the system  
40 is, in some ways, more tractable, but, in some ways, a little bit  
41 less representative of the diversity that's out there, and so what  
42 we wanted to do, for this calibration, was, first of all, establish  
43 two virtual positioning system arrays with acoustically-tagged *S.*  
44 *dumerili* and then conduct our calibrations within those VPS arrays,  
45 so that we have better data on how many fish are present and what  
46 they're doing while the gears are deployed.

47  
48 We then deployed multiple camera gears near concurrently in those

1 arrays, and we ran two different echosounder survey patterns, a  
2 parallel pattern and a flower pattern, near concurrently with the  
3 camera gears in those arrays, and then we used those VPS  
4 triangulated positions, in combination with camera observations of  
5 tagged and untagged *S. dumerili* from the camera gears to calculate  
6 a Lincoln-Peterson abundance estimator, as kind of an independent  
7 groundtruth of amberjack abundance within the array.

8  
9 We also used, or are using, I should say, those VPS triangulated  
10 positions to quantify behavioral changes in response to gear  
11 deployments. We also trialed eDNA sample collections and assay  
12 efficacy at sites with known *S. dumerili* during this calibration  
13 effort.

14  
15 This is a map of those two sites, and they're both in the Alabama  
16 Artificial Reef Permit Zone, and you can see them in the kind of  
17 blow-up map here on the right, and it's kind of hard to see the  
18 lines in the map to the bottom-right, but that's essentially what  
19 each site looked like, right, and there's a big, twenty-five-foot-  
20 tall pyramid in the center, and then the dots around that that you  
21 see are our acoustic receivers, and we spaced them so that we could  
22 get optimal coverage, with an estimated range of about 250 meters,  
23 which is probably a pretty significant underestimate.

24  
25 VPS arrays were deployed at both sites, and they were both super  
26 pyramids. They are twenty-five-foot-tall-by-fifteen-foot-wide  
27 artificial structures, and we have eight receivers per site. Like  
28 I said, the minimum range, we believe, is about 250 meters on  
29 these, and that's on a bad day, with a minimum coverage area of  
30 about twenty hectares, and so, essentially, any fish, within the  
31 four outside receivers, we should have been able to get a pretty  
32 good triangulation on, based on this information.

33  
34 We put out both fish that had both acoustic tags and external dart  
35 tags, eighteen on one side and twenty on the other, and then we  
36 also had some fish that did not have acoustic tags, that just had  
37 dart tags in those, but the numbers were fairly small, five and  
38 three fish at the two sites.

39  
40 These are the two vessels that we used, and, because of vessel  
41 size and crew limitations, we basically were limited to three  
42 different gears per vessel, and so, off the *Escape*, we deployed  
43 the ROV, which is the typical gear that will be used in Alabama  
44 and Mississippi, and we deployed a drop camera, which is something  
45 that's been developed by the LSU folks, and it's going to be used  
46 as the primary camera gear in the western Gulf of Mexico, and then  
47 we used, as I said, active acoustics, which will be used across  
48 all of the regions for the abundance estimate.

1  
2 Off the second vessel, the Wilson, we deployed trap cameras, and  
3 these are basically the same cameras that they use in the SERFS  
4 survey, and so these are baited chevron traps with GoPro cameras  
5 attached to the tops of them, and we also deployed the S-BRUV  
6 cameras, which is the typical gear that will be used in the South  
7 Atlantic and in Florida, and this is the G-FISHER camera,  
8 essentially, and then we also took DNA samples off of the Wilson,  
9 and eDNA samples will be -- We'll continue to collect those in the  
10 Alabama-Mississippi region.

11  
12 I don't want to go into this too much, but suffice it to say that  
13 we wanted to randomize the order of gears, so there wasn't any  
14 bias, and we also randomized the order of boats, and whether they  
15 visited a site first, so that we didn't have any biases there, and  
16 so, essentially, for each day, we designated one of the sites as  
17 a primary site, and alternated days for that, and then we deployed  
18 all gears at the primary site, with opportunistic deployment of  
19 the Wilson gears at the secondary site, because the hydroacoustics  
20 calibration took up a good portion of the day on the Escape.

21  
22 The vessel order and the gear order was randomized each day, except  
23 for the eDNA. The eDNA samples were taken before the other gears  
24 were deployed, in the middle of the two other gears, and then at  
25 the end of the time at that site, and so three different eDNA  
26 samples per site per day.

27  
28 Okay, and preliminary results from the camera gears, and we do  
29 have video reads for all of these, which is nice, and half of the  
30 S-BRUV drops were baited, and the other half were unbaited, and  
31 there was no obvious difference in counts between baited and  
32 unbaited cameras, which was surprising, but that was the result,  
33 and so this may change with increased sample size, and we do plan  
34 to have a large sample of S-BRUV off of the west coast of Florida  
35 that will be tested basically both with and without bait, to try  
36 and get a better handle on what the effect of bait is on these  
37 counts.

38  
39 We did find that there was a significant effect of proximity to  
40 reef, and so half of the S-BRUV drops, and half of the trap camera  
41 drops, were really close to the reef, within about twenty meters,  
42 and half of them were dropped about a hundred meters away from the  
43 reef, and the near counts were substantially higher than the far  
44 counts. The far counts, a hundred meters away from the reef, were  
45 mostly zeroes, almost entirely zeros.

46  
47 Time period, essentially, for some of the gears, we wanted to  
48 compare the drop, the actual deployment of the gear, and that's

1 the camera falls from the surface to the bottom, to the time that  
2 it sits on the bottom to the time that it's being recovered to the  
3 boat, because other -- Anecdotal, we've heard about following  
4 behaviors, and aggregated behaviors of this species, and so we  
5 wanted to know if it mattered what time during the video you take  
6 your max N count from.

7  
8 For some gears, the drop cam, the trap cam, and the S-BRUV, we  
9 separated our max N counts for different periods over the  
10 deployment, and the descent period had the highest, but the most  
11 variable, counts, much higher and more variable than the bottom  
12 and ascent periods, and the ascent period had the most counts, and  
13 they were mostly zeroes, and so I think, moving forward -- Why  
14 this is important is because, as Sean said, we are piggybacking on  
15 projects that already have certain methods set, and so it's  
16 important to understand how the different groups -- How they choose  
17 to analyze their videos can have an effect on their max N counts.

18  
19 We may be able to augment some of the video processing as well,  
20 to, for example, add descent counts to a gear that doesn't  
21 typically -- That isn't typically analyzed that way.

22  
23 Preliminary results, comparing the camera gears to each other,  
24 here is some actual hard data for you guys, and, essentially, the  
25 one thing that came out of this -- I don't know what we really  
26 expected from these, because we're only looking at two sites, and  
27 so a correlation between two points is either there or not there,  
28 right, and what we found was that, if you compare the two sites,  
29 all the gears had higher counts on one pyramid, 28, than on Pyramid  
30 26, but, if you look at the individual sets of deployments of gears  
31 on the individual days, and try and correlate them together, what  
32 you see is there aren't a lot of strong correlations among camera  
33 gears, although ROV counts were generally higher than counts from  
34 other camera gears, and, other than a general trend of higher  
35 counts on Pyramid 28, there didn't appear to be really strong  
36 correlations among camera gears, and so we think that we can  
37 resolve this issue with a lot more concurrent samples of gears, at  
38 a larger number of sites, with a wider range of natural abundance  
39 at those sites, and so, essentially, if you're just -- Like I said,  
40 if you're just looking at two points in time, it's maybe not the  
41 best way to look for a correlation, or especially not to measure  
42 the slope of one.

43  
44 We know that we need more calibration work, and we're going to do  
45 that by some dedicated -- Another dedicated calibration cruise,  
46 but we're also going to do that by deploying some of these gears  
47 together across a wide range of sites during the abundance  
48 estimation.

1  
2 The VPS array gave us some interesting results, and I just want to  
3 go through those, really quick. These numbers aren't that  
4 important to go through individually, but, essentially, we had a  
5 number of fish that were dart tagged and a number of fish that  
6 were both acoustic tagged and dart tagged on each of the two sites,  
7 and, of those fish, you know, there was only a subset that were  
8 detected. Of that subset, there was only another subset, a further  
9 subset, that we got good triangulation positions on, and then some  
10 of the fish were either mortality events, and so the tag was  
11 stationary on the bottom, or stationary just outside of the array,  
12 and you can see those numbers there, 4 and 6, at the two different  
13 sites.

14  
15 Then, for the tags that were acting like fish should act, we had  
16 only one that had low persistence, and so the other eighteen fish  
17 that we tagged, where the tag actually behaved like a fish should  
18 behave, they stayed on the reefs and had fairly high persistence  
19 over the about a month that we had our receivers out.

20  
21 I am going to kind of drill down in this Pyramid 28 for a second,  
22 real quick, and this is one fish tracked from Pyramid 28, and I'm  
23 showing you this one because it's fairly representative of the  
24 eleven fish that had high residency around the reef, and what you  
25 maybe can't see, because the time is going by so quick, is that  
26 this fish seems to be very tightly associated with the reef  
27 structure during the nighttime hours, and then, during the daytime  
28 hours, its range increases, but it stays within about a hundred  
29 meters of the reef or so, and so that whole twenty-four-hour  
30 period.

31  
32 What's cool about these data, and I'll talk a little bit more about  
33 it later, is that we can correlate these movement patterns with  
34 the actual timing of gear deployments and see if deployment of say  
35 an S-BRUV causes the step length, and/or direction, to change from  
36 before, during and after the gear deployments.

37  
38 If you look at those data just and kind of freeze them, or if you  
39 look at all those points, all the triangulations, for fish during  
40 the week in which we deployed our gears, this is what those clouds  
41 look like, and so the point of this slide is to show you that, for  
42 all eight of these fish, if you filter to that week, they spent  
43 most of their time within about a hundred meters of the reef, and  
44 so these should be -- You know, we would hope that any kind of  
45 gears that are measuring fish around a reef would count most of  
46 these fish, or at least have an opportunity to count most of these  
47 fish, when they're in the water.

1 These data were useful in another way, and we basically used them  
2 to create a Lincoln-Peterson density estimate of amberjack  
3 abundance within the array during the gear deployments, and,  
4 essentially, Lincoln-Peterson is just a standard mark-recapture  
5 density estimator, right, and it calculates the number of fish in  
6 the system as the number of fish tagged times the number of fish  
7 recaptured divided by the number of recaptures that were tagged.

8  
9 This estimator, obviously, assumes that a system is closed, and so  
10 it assumes that no tagged fish die or leave the system between the  
11 time that you tagged them and the time that your recapture occurs,  
12 and so it doesn't work very well in the open ocean, but what the  
13 VPS array allows us to do is it allows us to basically use the  
14 acoustically-tagged fish to estimate the loss factor, to estimate  
15 the combined effect of emigration and mortality for all tagged  
16 fish between the tagging event and recapture event, and so,  
17 essentially, what you do is calculate your number tagged at the  
18 recapture event is equal to the number of acoustically-tagged fish  
19 present at the recapture event plus the number of, if you have any  
20 non-acoustically-tagged, but externally-tagged fish, plus those  
21 times the number of acoustically-tagged fish at the recapture event  
22 divided by the number of acoustically-tagged fish that you started  
23 off with.

24  
25 You just apply that same ratio to the fish that don't have acoustic  
26 tags, and you get the number of external tags present during the  
27 recapture event, and then you use that estimate of tagged fish in  
28 your Lincoln-Peterson density estimator.

29  
30 Essentially, what our Lincoln-Peterson density estimates look like  
31 is we had very few samples where tagged fish were observed. The  
32 highest number of tagged fish in a single sample was one, and the  
33 ROV had five of these samples, out of thirteen, and so five videos,  
34 out of thirteen videos, had a tagged fish observed. The LSU drop  
35 camera had zero, out of their fourteen drops, with a tagged fish,  
36 and the trap cam had two, and the S-BRUV had two.

37  
38 Where we could, we used those tagged to untagged ratios to estimate  
39 the Lincoln-Peterson density estimates, and, essentially, we were  
40 able to get four estimates, or at least we were able to get Lincoln-  
41 Peterson density estimates on Pyramid 26 for four of the days and  
42 Pyramid 28 for two of the days. Now, you will notice that, in  
43 some of these cases, you've got different numbers, right, and  
44 that's because, during a different drop, or a different dive, you  
45 may have seen a different number of untagged fish, and so that  
46 changes the ratio, but we think that these numbers are, you know,  
47 fairly representative of the number of fish that were in the array  
48 at the time of the other camera surveys.

1  
2 If we compare those to our camera gears, again, we're comparing -  
3 - We're trying to look for a correlation between, you know, what  
4 are essentially two points, and I've broken them up here by day,  
5 but essentially between two sites, and what you see is that, on  
6 the far right is the ROV, on the Y-axis, and the VPS estimate on  
7 the X-axis, and that's the only one that had a really strong  
8 correlation, but, again, what we've learned from this is basically  
9 how to move forward with a better calibration study, and, in the  
10 future, I think the idea would be to try and choose sites with a  
11 higher variability in natural abundance of amberjack, to get a  
12 better handle on these calibration factors.

13  
14 Again, using these kinds of data, we can also analyze changes in  
15 behavior during gear deployments. Changes in step length and  
16 direction before, during, and after deployment of different gears  
17 will help to inform how our gears are counting fish, and it will  
18 also allow us to estimate gear-induced changes in density, and  
19 this is more relevant for continuous versus discrete habitat  
20 patches, because we think that, on a discrete habitat patch, if a  
21 gear attracts fish, it just essentially takes the number of fish  
22 that are there and kind of compresses them into a smaller space,  
23 whereas, in a continuous habitat, you may be pulling in fish from  
24 a distance, and so we need to make sure that we're not doing that,  
25 or, if we're doing it, we're accounting for it in our analyses.

26  
27 Okay. Active acoustics, and how did those compare within the  
28 calibration, and, essentially, as I said, the objectives for active  
29 acoustics during the calibration study were to test the abundance  
30 estimators, to characterize the wideband response to greater  
31 amberjack, and to optimize the survey design.

32  
33 For active acoustics, we basically completed one of each of the  
34 two survey spatial patterns, the flower and the parallel lines  
35 transects, on each day, three on Pyramid 28 and two on Pyramid 26,  
36 and we did this for four different frequencies, and each of these  
37 frequencies has a different capacity to detect fish, but it also  
38 has a different angle, and so it covers a different amount of area  
39 at the bottom.

40  
41 Essentially, beam angle interacts with depth to determine the beam  
42 width at the bottom, and also along the whole depth gradient, and  
43 it can also affect interference related to structures. In other  
44 words, if you're trying to run active acoustics around a shipwreck,  
45 or a large artificial reef, your beam width basically determines  
46 how much that structure interferes with your ability to count fish  
47 in the water column.

1 The frequency also is important, because, depending on the acoustic  
2 signature of your targets, it determines the ability to observe  
3 targets, and so certain target types, with a certain acoustic  
4 fingerprint, will not be visible with certain frequencies, and so  
5 we're trying to kind of dial all of this in and come up with the  
6 optimum frequency and beam angle to use with the surveys.

7  
8 Higher frequencies have higher bandwidth, so they can detect a  
9 wider range of target types, but then you have -- You cost is that  
10 you have reduced operational depth, and so it's important to  
11 optimize all of these tools.

12  
13 We also think that the results of the CT scans, and those  
14 backscatter models that I talked about earlier, combined with these  
15 calibration results, will help us to optimize exactly what  
16 hydroacoustic frequencies and beam angles are the best for counting  
17 amberjack, and so this is what the different patterns look like  
18 for the active acoustics, and you can see the flower patterns,  
19 and, again, these are maps of those sites that I showed you  
20 earlier, and so the dot in the middle is the reef, and then the  
21 red dots are our passive acoustic receivers.

22  
23 The blue dots that show up are the fish that were counted in the  
24 acoustics, the echosounder, data, and so you can see they're pretty  
25 tight around the structure, just as we would expect based on our  
26 VPS data, and the question is how to turn that into a density  
27 estimate, and so fish track counts were variable, but within a  
28 reasonable range, and they counted between eighteen and sixty-four  
29 fish per survey, but you have to have some kind of spatial model  
30 to interpolate between these lines for your density estimate.

31  
32 Essentially, we've gone through this exercise in a couple of  
33 different ways, and we've considered kriging models, exponential  
34 decay models, and GAM models. The GAMs have been shown, in past  
35 studies, to perform really well, especially for modeling abundance  
36 around isolated structures, and also on continuous reefs, but we  
37 evaluated GAM models with a Tweedie and gamma distribution of the  
38 data across all four transducers independently at both of the  
39 sites, over the five days, and we came up with estimates of  
40 density, and this would be volumetric density, and so fish per  
41 cubic meter, and we scaled them to the survey volume to get  
42 abundance, or overall counts of fish, around the reef.

43  
44 These are the results, and so, on the Y-axis, you've got the  
45 estimated abundance, and, on the X-axis, you've got the different  
46 frequency bands that we tested and used, and, on the left-hand  
47 side, you've got the flower pattern. On the right-hand side,  
48 you've got the parallel lines pattern, and then the top is Reef

1 26, and bottom is Reef 28.

2  
3 Essentially, what this tells us is that there's very high  
4 variability in predicted density among and between the  
5 frequencies, and we think this is due to an interplay between fish  
6 detectability and beam angle, and so the estimate of the volume  
7 that's sampled by the beam in any given point in time, and there  
8 were fairly weak correlations between the predicted density and  
9 counts from the ROV, except for the 120 kilohertz frequency, where  
10 we got a pretty strong positive correlation between these estimates  
11 and the ROV counts.

12  
13 Preliminary results from the seventy kilohertz echosounder are  
14 very similar to those from the Lincoln-Peterson abundance  
15 estimate, and so we're starting to zone-in, right, and we're  
16 starting to think that maybe between 120 and seventy, or maybe  
17 running both the 120 and seventy at the same time is the answer.

18  
19 Parallel lines gave very similar results to the flower surveys,  
20 but with a substantially lower variance, but the total area covered  
21 for the parallel line survey was higher than -- Excuse me. The  
22 total area covered was higher for the parallel lines survey than  
23 for the flower survey, and so we're still kind of debating what we  
24 need to do, as far as that goes. We're leaning towards using a  
25 parallel lines survey, with fairly tight tracks, for both point  
26 structures, like artificial reefs, and for structures that have  
27 some area as well.

28  
29 The next steps for active acoustics are to standardize beam angle  
30 across different frequencies, to try and isolate the beam-volume-  
31 dependent detectability that we think is coming from this analysis  
32 to evaluate alternative spatial models, to kind of fill in the  
33 gaps between tracks, and also to calibrate these estimates against  
34 camera gears, again, like I said before, across a wider range of  
35 naturally-occurring fish densities.

36  
37 Moving on to eDNA, at the top is the same plot that I showed you  
38 earlier, that basically just shows the results of our assays that  
39 we're able to differentiate between the four species of *Seriola* in  
40 the region, and what you're seeing at the bottom are the results  
41 from the calibration study, and so you see some samples that were  
42 identified as having *S. dumerili* and some samples that were  
43 identified as having *S. rivoliana*.

44  
45 In fact, of the six samples that they've processed -- They took  
46 more samples than this, but they've only processed six of them,  
47 from one day at each site, and there were four out of six positive  
48 for *S. dumerili* and three out of six positive for *rivoliana*, and

1 so it seems like we're probably not detecting fish when they are  
2 there, and plans to increase detectability is, first of all, to  
3 reduce filter pore size, to sample down-current of the sites, to  
4 sort of make that standard, and I don't know why we didn't think  
5 of that sooner, but sampling down-current of the site might be  
6 very important.

7  
8 Increasing replicate samples at a given site, and, to do that, you  
9 have to increase efficiency, if your money doesn't change, right,  
10 and so we're, again, working on ways to improve cost efficiency of  
11 collecting these samples. I guess maybe now would be a good time  
12 to stop and take questions, before I move on to the synthesis and  
13 sample design.

14  
15 **CHAIRMAN NANCE:** I think that's a great idea. For the eDNA, how  
16 far away from the site -- Have you determined a distance away that  
17 is --

18  
19 **MR. ALBINS:** Not yet. I mean, that's something that we're working  
20 on. Obviously, we're having detectability problems, by dropping  
21 Niskin bottles within -- You know, probably they were all dropped  
22 within thirty to fifty meters of the reef, and most of the fish  
23 were concentrated within a hundred meters of the reef, and we're  
24 missing them sometimes, and so that tells us that something that  
25 we're doing -- You know, we need to improve our detectability, and  
26 we need to make sure that we don't do that at the expense of saying  
27 that they're there when they're not.

28  
29 **CHAIRMAN NANCE:** Sure. Luiz.

30  
31 **DR. BARBIERI:** Thank you, Mr. Chairman. Mark, thank you for coming  
32 over and giving the presentation. It's great for us to have the  
33 opportunity, right, to see this early in the process and have this  
34 opportunity to --

35  
36 **MR. ALBINS:** Yes, and it's a bit rough, but you guys asked for it,  
37 and so you're seeing the sausage right here. We're making sausage.

38  
39 **DR. BARBIERI:** Yes, and so I think I know the answer to this  
40 question, but I feel like I should ask it anyway, and it looks  
41 like you guys are looking into a lot of issues, right, and trying  
42 to face a lot of the challenges. I mean, this project is just a  
43 huge challenge, right, and you face a number of issues that you're  
44 going to have to address.

45  
46 You've made a lot of progress in testing a lot of these gears, and  
47 calibrating between gears, and trying to see detectability and all  
48 the other factors, right, that will allow you to pursue the

1 project, but it looks like you would benefit from having additional  
2 time to continue this preliminary work, and I'm thinking about  
3 this in regard to the timeline that Sean talked about, right, and  
4 usually these projects have a hard, right, end time that hardly  
5 can be extended, and so is it possible, right, to get an extension  
6 to continue some of this preliminary work, because it looks like  
7 this issue of lessons learned, right, from the Great Red Snapper  
8 Count, trying to optimize sampling for this next project, is going  
9 to be very helpful, but, but there's so much to do and so much to  
10 be handled. Any thoughts on that?

11  
12 **MR. ALBINS:** More time would be great, but I will have to kick  
13 that to Sean, right, because that's not something we really have  
14 control over.

15  
16 **DR. POWERS:** So, unfortunately, no. I mean, the project was  
17 supposed to be two years, and we're assuming a one-year no-cost  
18 extension, which is similar to what happened, and my PIs are  
19 planning for that, all the co-PIs, on it, but, no, and, I mean, we  
20 would love to be able to a whole other field season of calibration  
21 and VPS, but I guess one of the things you will hear, when John  
22 Hoenig talks, is the big question is, okay, what happens if you do  
23 that and there's just simply no correlation amongst the years, and  
24 so we have a plan for that, a back-up, to make sure that the  
25 regional estimates are as absolute as possible and, hence,  
26 standalone, and by that way go additive, but, in addition to our  
27 traditional kind of randomized sampling universe, we have a  
28 Bayesian model being developed that could also deal with relative  
29 abundance estimates, and so you will -- Because we've asked this  
30 all along the way.

31  
32 Okay, and what if the hydroacoustics can't tell a species, and how  
33 do we then get proportion, and what happens if an S-BRUV and a  
34 chevron trap will never correlate to each other, and what do we do  
35 in that situation, and it would be -- We would benefit, definitely,  
36 from a whole other year of calibration, and then pushing the field  
37 season into 2024, but that's not an option with the funders.

38  
39 **CHAIRMAN NANCE:** Thank you. Will Patterson, please.

40  
41 **MR. ALBINS:** That's a great answer, Sean. Thanks.

42  
43 **DR. PATTERSON:** Thanks, Jim. Mark, when you were presenting the  
44 calibration results, looking at the estimates from the sonar versus  
45 the various camera gears, you know, you had counts that were an  
46 order of magnitude higher with the sonar, and your estimates were  
47 much higher than the number of tagged fish there, which makes  
48 sense, because you have this large population of untagged fish,

1 but that lack of correspondence -- You know, it's tough to figure  
2 out what's causing that, and it seems, to me, that detectability  
3 is something that's going to be a real concern here.

4  
5 You know, Kelly gave a talk, Kelly Boyle gave a talk, earlier  
6 today, looking at the depth distribution of acoustically-tagged  
7 amberjack, and they spent most of their time above, you know, the  
8 seabed, by at least a few meters, and so why would we ever expect  
9 a chevron trap, or a BRUV, or even an ROV that's flying a couple  
10 of meters off the seabed, to accurately count the number of  
11 amberjack present on a site?

12  
13 **MR. ALBINS:** Those are great questions, Will, and I will start  
14 with the last one first, I think. Our max Ns that we used for the  
15 calibration were the highest of the max Ns from a particular video  
16 deployment, and so that's surface to surface, and so we are getting  
17 counts, sometimes from the descent, and sometimes our maximum  
18 counts are happening on the bottom, and so we're trying to  
19 incorporate that into the calibration, as kind of a cofactor, that,  
20 while the camera is descending from the surface to the bottom, it  
21 could be the time when you get the best view of amberjack, because  
22 they are potentially distributed up in the water column.

23  
24 They're also very curious fish, and so we believe that sometimes,  
25 when the ROV goes down to the bottom, or when the S-BRUV hits the  
26 bottom, those fish will come down from that middle water column,  
27 swim around and investigate, and then go back up and do their  
28 thing, and so, either way, you're getting a relative -- You know,  
29 a relative abundance estimate of those fish, and, to the question  
30 about -- First of all, the Lincoln-Peterson estimate didn't give  
31 us an estimate of how many tagged fish were there, and it gave us  
32 an estimate of the total number of fish that were there, because  
33 we know how many tagged fish were there, and we know the ratio of  
34 tagged fish to untagged fish from the camera gear, and so we use  
35 that to estimate the total number of fish present, just like your  
36 classic Lincoln-Peterson density estimator.

37  
38 Those numbers actually agreed really well with the active acoustic  
39 numbers at the seventy-kilohertz frequency, and so they gave us  
40 about the same numbers. They were on the order of fifty or sixty  
41 fish per site.

42  
43 One of the Lincoln-Peterson estimates was way high, and it was  
44 like 147 or something, and we all find that kind of hard to believe,  
45 and so there's, you know, some sources of noise here, and there's  
46 multiplication factors that mean, when you have something go a  
47 little bit off, it goes way off, and so we're trying to figure out  
48 how to deal with that, but I do think that the camera gears are

1 measuring relative abundance, and so, whether there's a hundred  
2 fish there, if your camera gear consistently measures 10 percent  
3 of that hundred, that's a good relative abundance measure, even  
4 though they're an order of magnitude different, and so I think  
5 that's --

6  
7 **DR. PATTERSON:** I agree that the cameras might do a good job of  
8 getting you relative abundance, but the project calls for absolute  
9 abundance, and, to do that, you've got to be able to estimate  
10 accurately the number of fish that are on a given site, and you  
11 also have to be able to estimate the effective sample area of the  
12 gear, so you can convert that to a density, and then multiply that  
13 through by the areas that you haven't sampled.

14  
15 **MR. ALBINS:** Yes, exactly, and that's where the active acoustic  
16 comes in, right, and so your active acoustics, whether it's a  
17 parallel pattern or a flower pattern, will give you an areal  
18 density estimate, the number of fish per meter squared, or per  
19 hectare, whatever you want, and then, because there is some  
20 ambiguity there about what species you're actually getting,  
21 potentially, and they're working on that, but our backup plan is  
22 to use the camera gears to give us species ratios for those species  
23 that could be counted in the hydroacoustics, and so any species  
24 that spends time up off the bottom, like, for example, a red  
25 snapper, and, for example, the other *Seriola* species, and so we  
26 can use our video data to come up with *Seriola dumerili* to anything  
27 that could be also counted in the hydroacoustics, and then the  
28 hydroacoustics is our unifying absolute abundance gear, in that it  
29 gives us that number of fish per unit area that can be scaled up  
30 the amount of habitat in the region.

31  
32 **DR. PATTERSON:** So that assumption relies on the four *Seriola*  
33 species behaving similarly with the camera gear, and that's a big  
34 assumption, because of the size differences in the fish, and Sarah  
35 Grassley published, you know, parts of her dissertation work that  
36 showed greater amberjack were the most gregarious fish, when it  
37 came to the C-BASS, you know, being towed through the system.

38  
39 The early C-BASS results that you showed here, the counts were  
40 much lower, but, you know, anyway, there's a lot to unpack there,  
41 but, really, what this gets to is you guys are working on the  
42 uncertainty, and, obviously, you appreciate that that has to be  
43 accomplished, so that you can incorporate this into whatever  
44 approach that you use to actually perform the estimate, but, when  
45 Sean gave his early comment, at the beginning, he indicated that  
46 the sample design didn't exist, and that you guys were working  
47 toward that, and so, I mean, it's confusing, to me, that a project  
48 of this scope, and expense, could even get funded without having

1 a sample design, but you guys are, you know, well into the second  
2 year without a sample design, and when do you think that you're  
3 going to have that ready to go?

4  
5 **MR. ALBINS:** About five minutes from now. I'm joking, but that's  
6 the next part of my presentation, and I'm going to talk about our  
7 synthesis of existing habitat and abundance data, which then feeds  
8 into our sample design, and the reason that it's taken a long time  
9 to come up with our sample design is because we're being really  
10 mindful, and careful, of specifically what you're talking about,  
11 being able to propagate any uncertainties through to that final  
12 estimate of abundance.

13  
14 We acknowledge, recognize, the importance of that, and we're being  
15 really careful to try and not let logistical limitations handcuff  
16 us, in terms of coming up with reasonable, realistic estimates, at  
17 the end of the day, that are honest about our uncertainty, and it  
18 could very well be that that is a big uncertainty, right, but we're  
19 doing everything that we can to make sure it's as tight as we can  
20 possibly make it with the tools that we have available.

21  
22 **CHAIRMAN NANCE:** John, did you want to respond to that?

23  
24 **DR. JOHN HOENIG:** Yes, and the first thing is that different  
25 regions have different databases that could be built on, and so  
26 you have to have different designs, especially when you have  
27 piggybacking on existing programs. Then that can't be changed,  
28 and so you have to build a design that takes that into  
29 consideration, and that's the necessity of coming up with a  
30 different design for each region. It had caused us to tread slowly  
31 and carefully, to make sure that we're using all the information  
32 and doing it in a reasonable way.

33  
34 I did want to make a comment that was said, that you need to figure  
35 out what the camera sees, in terms of density, number per area,  
36 and then the area that's being looked at, and that's not quite  
37 true. There are two kinds of sites, and you can think of it as  
38 there are point sites, like a small -- Like a chicken coop that's  
39 an artificial reef, and all you need to know there is how many  
40 fish are there per artificial reef, and then you multiply that  
41 count per reef by the number of reefs, whereas, if you have a  
42 natural reef, that could cover a large amount of area or a small  
43 amount of area, or, if you have a big reef, like a sunken ship  
44 that you can't see, then you do need to look at the area of  
45 attraction and the density, but those are two separate situations,  
46 and we were aware of that in designing, trying to design, it to  
47 deal with both of those.

1 **CHAIRMAN NANCE:** Thank you. Sean.

2  
3 **DR. POWERS:** I might have misspoke, if that was your meaning, Will,  
4 and we proposed a sampling design, and I shared the proposal with  
5 the SSC, and the sampling design is in there, which defines minimum  
6 sample sizes for each region and each habitat type, along with  
7 general surveys we were going to, for lack of a better word,  
8 inherit and then supplement.

9  
10 The proposal allowed us to optimize those survey designs, and so  
11 I guess that's the word I should be using, is that we're going to  
12 further refine and optimize our design, which we acknowledge fully,  
13 in the proposal, has to do with what we learn with gear and habitat  
14 synthesis.

15  
16 **CHAIRMAN NANCE:** Thank you.

17  
18 **DR. PATTERSON:** Jim, can I respond to that?

19  
20 **CHAIRMAN NANCE:** You bet, Will. Go ahead.

21  
22 **DR. PATTERSON:** Sorry, Sean, and I didn't actually see the proposal  
23 in there, and I would have taken a look at it, but, yes, that makes  
24 sense, if that was what you had proposed as part of your plan.  
25 Maybe it's going to come up here in this next piece about synthesis  
26 of existing habitat and abundance data, but, in that work, and I  
27 assume that you guys did some simulations to figure out what kind  
28 of sample sizes you would need, given the variance in the data  
29 that exists, you know, among these various surveys, including the  
30 red snapper population estimation study that just finished in the  
31 Gulf, and, if so -- You know, one of the sort of constraints, it  
32 seemed to me, when the RFP was issued for this, was that you had  
33 the same amount of funding, or actually a little bit less than  
34 what was available for the snapper study in the Gulf, yet you had  
35 50 percent more area, for an animal that was more patchily  
36 distributed, and, when it did occur, could occur at high numbers,  
37 and so your variance estimates were going to probably be much  
38 higher.

39  
40 Therefore, you would need more samples, and not fewer, using a  
41 camera-based, or a sonar-based, approach, and, with the early  
42 calibration stuff, it looks like there's, you know, considerable  
43 uncertainty in those estimates, which would, again, blow up your  
44 variance, and so I'm just curious what you guys have looked at,  
45 through simulation, that would suggest that you have enough funding  
46 to do it this way or whether, you know, you're going to be able to  
47 meet your CV of 0.3.

1 **MR. ALBINS:** We haven't done any simulations, and I think, you  
2 know, that's a place where we could definitely improve things.  
3 That being said, I think we all kind of acknowledge that we can't  
4 sample enough to do the kind of job that we would really like to  
5 do with this. We're going to do the best job that we can with the  
6 funding that we have, and we're also leveraging some other big  
7 projects, like G-FISHER and SRFS, to get those sample sizes up as  
8 high as possible, and that's why, you know, the calibrations and  
9 everything are so important, is trying to figure out how to  
10 integrate information from those different gear types, and, again,  
11 our best answer is that we're using, you know, hydroacoustics, or  
12 active acoustics, as the unifying gear and trying to use the  
13 cameras to make sure that that's seeing what we think it's seeing.

14  
15 **CHAIRMAN NANCE:** Thank you. Trevor.

16  
17 **MR. MONCRIEF:** Thanks. My question is a little more simple, and,  
18 since we've got everybody in the room, as far as Steve and Sean,  
19 and even Benny, I figure this is a good time to ask it, and was  
20 there any consideration given -- I saw where the sampling was based  
21 -- Was there any consideration given to including those rigs and  
22 petroleum platforms that are within ten miles of the shelf, and  
23 did any anglers speak to observing fish out there in any large  
24 numbers or anything else like that?

25  
26 **MR. ALBINS:** We definitely are sampling platforms, and that's  
27 definitely part of our sampling universe, and we're sampling from  
28 twenty meters to 150 meters, or at least that's what we proposed  
29 in our response to the RFP. That being said, we are trying to be  
30 responsive to new information, right, and, if there's information  
31 out there that tells us that you better look shallower, or you  
32 better look deeper, that's, you know, something that we're open  
33 to, and actively looking for that kind of information, to help us  
34 kind of zero-in on where these fish are.

35  
36 **DR. POWERS:** I will add that the feedback that we got was not to  
37 go shallower, and it was that we should go deeper than 150, and so  
38 we're trying to work on that suggestion.

39  
40 **MR. MONCRIEF:** I think definitely, with the rigs offshore, and not  
41 just Mississippi and Alabama, but also that Louisiana area, and it  
42 seems like there are -- There is a fair amount of fish that sit  
43 off on those rigs that might be sitting in a thousand feet of  
44 water, but that structure goes all the way up to the surface, and  
45 there's a large amount of -- there as well, and so I just wanted  
46 to mention that one.

47  
48 **CHAIRMAN NANCE:** Thank you, Trevor. Steven, please. Steven Saul.

1  
2 **DR. SAUL:** Thank you, Mr. Chair. I just had a question about you  
3 all's sampling on artificial structures, to one of the points that  
4 John Hoenig had made, and I was curious, and are you treating all  
5 sort of artificial structures as kind of uniform, in the sense  
6 that -- Because I assume there is quite a bit of diversity in  
7 artificial reef type, or structure, and is there any sort of sub-  
8 stratification, or classification, being done as you sample those  
9 locations?

10  
11 **MR. ALBINS:** I'll talk about that a little bit more in the next  
12 section, but just a quick answer is that we are, when we're able  
13 to use relief as at least a categorical means of both stratifying  
14 our sampling and for the extrapolation later, and I think we'll be  
15 using that as a factor. Sometimes those data aren't available,  
16 and there are some databases that say there is an artificial reef  
17 at this lat and long, and that's it. Like that's all we know about  
18 that reef, and so we've got to either find alternative sources of  
19 information about that reef, or hopefully it gets covered with one  
20 of our mapping efforts, but, yes, we're trying to incorporate that,  
21 to the extent that we can.

22  
23 **CHAIRMAN NANCE:** Will, please.

24  
25 **DR. PATTERSON:** Thanks, Jim. Mark, you mentioned, a minute ago,  
26 that you guys hadn't had a chance to do any simulations yet, to  
27 try to estimate the number of samples that you would need, given  
28 the variance, and I guess that will come later, once you have the  
29 calibration stuff done, and you can get a better sense of what  
30 those gears are telling you, but I'm wondering, you know, given -  
31 - You know, Sean mentioned, early on, about lessons learned from  
32 the snapper population estimation study that, obviously, preceded  
33 this, and I'm wondering -- You know, the amberjack data that came  
34 out of those samples, if you guys have taken a look at those, and,  
35 just based on the sampling that was optimized for red snapper, you  
36 know, using those, because a lot of habitats, obviously, are going  
37 to overlap, and you're going to see amberjack and red snapper in  
38 similar places, and what those population estimates, at least for  
39 the Gulf, are telling you, about not only what you can expect  
40 population-wise, but maybe what the gear, you know, limitations  
41 might be for amberjack.

42  
43 **MR. ALBINS:** As far as gear limitations, I don't know how much  
44 we're using those data, but we are using all the data that we've  
45 been able to collect, both from the Great Red Snapper Count and  
46 from other surveys, historical surveys, to basically try and get  
47 a prior, right, and that prior is informative for some of our  
48 sample design, which I will talk about in a moment, but it's also

1 going to be part of the prior, one of the priors, that goes into  
2 the Bayesian modeling part of the estimator, which Sean alluded to  
3 earlier.

4  
5 We are trying to take account historical habitat data, as well as  
6 historical catch data, to the extent that it's available and to  
7 the extent that we think it may inform our sampling design and our  
8 final estimates.

9  
10 **CHAIRMAN NANCE:** Benny.

11  
12 **DR. GALLAWAY:** Thank you. Great presentation, especially given  
13 the lack of time that you had to get ready for this meeting, and  
14 I really appreciate it. Thank you. One of your early slides  
15 struck me, in that it had to do with the number of fish that were  
16 tagged in each region, and I quickly took down the numbers, and I  
17 think you tagged 159 fish in the western Gulf, and a total of  
18 eighty-two in the eastern Gulf, and I was curious, and was that  
19 just a function of the number of sites that were visited, or can  
20 you explain the differences in the number of fish tagged by region?  
21 Thanks.

22  
23 **MR. ALBINS:** Yes, and so our goal is just to get fairly even  
24 dispersion of representation for the tagging across the entire  
25 region, and so we have a total of 1,200 conventional tags and 320  
26 acoustic tags planned, and each region gets a fairly even  
27 allocation of those tags. Those aren't all out yet, and so the  
28 numbers that I gave you earlier are partial, and especially for  
29 the conventional tags. Most of the acoustic tags are already out,  
30 but the conventional tags -- The guys in the western Gulf have  
31 gotten most of theirs out earlier than some of the other regions,  
32 and so that probably explains most of the disparity in numbers  
33 that you may have noticed.

34  
35 **DR. GALLAWAY:** So more to come.

36  
37 **MR. ALBINS:** More to come, yes.

38  
39 **DR. GALLAWAY:** Thank you.

40  
41 **MR. ALBINS:** I think we're about half, or two-thirds, of the way  
42 there for our conventional tags getting out.

43  
44 **CHAIRMAN NANCE:** Thank you. Mark, let's go ahead and -- I think  
45 some of these questions are going to be discussed later, and so  
46 let's go ahead and go through the presentation and then take any  
47 additional questions at the end.

1 **MR. ALBINS:** Sounds very good. Thank you. As I mentioned, we've  
2 done -- We've put a lot of effort into, or I should say Josh  
3 Kilborn has put a lot of effort into pulling together a whole lot  
4 of disparate and difficult-to-handle datasets, both on existing  
5 habitat and existing abundance data, and make some sense of those,  
6 right, and so what I'm going to present to you now is kind of what  
7 we, as a group, have arrived at as being the best available data  
8 to use both for sampling and for our ultimate extrapolation up to  
9 the absolute abundance estimates.

10  
11 As Sean mentioned, the region -- We've divided it into these six  
12 sub-regions, and each of these regions has different pre-existing  
13 historical data, both on habitat and catch, and so we have to deal  
14 with them differently in terms of that, and we also, as you will  
15 see later, when I talk about sampling design, have some projects  
16 that we're leveraging that have pre-existing sample designs that  
17 we have to integrate into the sampling design for this project.

18  
19 Habitat synthesis for the eastern Gulf of Mexico region --  
20 Essentially, we started with the easiest part, which is just  
21 compiling all these different lists of -- I say the easiest, but  
22 it wasn't by any means easy, but all these different lists of  
23 artificial reef locations, types, and sizes, and we got them from  
24 state sources, from federal sources, from BOEM, from the NOAA  
25 wrecks and obstructions database, and we basically looked at them  
26 all and put them all into, you know, a GIS software package and  
27 looked at overlap between them, where they agreed, where they  
28 disagreed, and tried to pick out the layers, and the sets, of these  
29 points that we had the most confidence in for being a good  
30 representation of what's out there now.

31  
32 That being said, that's not all we have, right, and, especially  
33 for the eastern Gulf of Mexico regions, both the Florida shelf and  
34 for the Alabama-Mississippi region, we have scalable habitat data,  
35 and, in other words, we have two different projects that have both,  
36 over the course of the last several years, collected manually-  
37 digitized side-scan sonar habitat data for randomly-selected grid  
38 cells across the region.

39  
40 Now, this is, as you can imagine, extremely useful, because it  
41 gives us a list -- Beyond the list of published sites that we might  
42 get from any particular state agency, this gives us an estimate  
43 of, on the ground, what's actually out there, and so we can select  
44 from these contacts both for sampling and also use that to estimate  
45 the number of reefs that are out there that are not documented.

46  
47 We'll use these lists, along with the scalable habitat data, to  
48 select sampling sites, to estimate the areal extent of natural

1 habitats, to estimate the number and types of artificial habitats,  
2 and to extrapolate the habitat-specific amberjack abundance  
3 estimates.

4  
5 Western Florida, I just wanted to give you a little bit more detail  
6 on this what I'm calling scalable habitat data, and so the western  
7 Florida dataset -- Essentially, every little dash that you see in  
8 the map on the right-hand side is a randomly-selected -- For the  
9 most part, it's a randomly-selected point where FWC has done side-  
10 scan imaging of the bottom and then manually digitized different  
11 habitat types.

12  
13 As you can imagine, this not only identifies polygons that are  
14 made up of different natural reef types, but it is also able to  
15 identify artificial structures on the bottom, and so, even though  
16 there's a lot of white space in that map, there's also a random  
17 selection of sites at which we have really good knowledge of the  
18 habitats there, and so we can use those to scale up to the entire  
19 region.

20  
21 Similarly, Alabama -- This is a grid off of Alabama, and these are  
22 one-nautical-mile grid cells, and all the ones that are in gray  
23 have been side-scan sonared over the years, and so this is an  
24 example of one of those grid cells, and, essentially, each of these  
25 grid cells, again side-scan sonared and then manually, and a reader  
26 goes in and reads those side-scan sonar data for contacts, and  
27 they will identify both areal regions of natural pavement, or  
28 natural hardbottom, as well as point data for reefs, and that  
29 includes an estimate of relief and an estimate of footprint as  
30 well.

31  
32 Again, these side-scan sonar data are capable of identifying  
33 natural reefs as well as artificial structures, and so, for those  
34 two regions, we have this really nice random sampling of the  
35 bottom, and we can use those, again, to both choose our sampling  
36 sites and to scale-up, at the end of the day.

37  
38 We're less fortunate, in some respects, for the western Gulf of  
39 Mexico, in that we don't have that type of side-scan sonar, but we  
40 do have, again, lists of artificial reef locations, types and  
41 sizes, from a variety of sources, that we can compare to each other  
42 and come up with kind of a consensus list of sites, and we also  
43 have scalable maps, in this case, from -- The best maps that we  
44 feel are available come from the Louisiana and Texas state  
45 agencies, as well as Gardner et al. 2022.

46  
47 We've looked at these shapefiles, and we've talked about them  
48 extensively, and I think that what we agree on is that the Gardner

1 et al. polygons for natural reefs, in this western Gulf region,  
2 are probably our best bet for high probability of artificial  
3 structures, and I think that's what we're going to be moving  
4 forward with, although we are considering using -- There are some  
5 places where the state shapefiles show artificial reefs that  
6 Gardner does not show, and we're trying to figure out exactly how  
7 to deal with sampling those.

8  
9 I believe the consensus, at this point, is to subsume those within  
10 the uncharacterized stratum and to potentially stratify by  
11 uncharacterized, but suspected, hardbottom, for the  
12 uncharacterized stratum, but that's something that we're working  
13 on currently.

14  
15 The South Atlantic, we're in kind of even worse shape, I guess, so  
16 to speak, for natural reef, and I'll talk a little bit about what  
17 we have for the South Atlantic. The South Atlantic, we, again,  
18 have a list of artificial reef location, types, and sizes, from a  
19 couple of different sources that we can cross-check against each  
20 other and use those for choosing sites and for extrapolation.

21  
22 We also have a list of known natural reef point locations, and so  
23 the NOAA SERFS survey has an extensive list, and I believe there's  
24 about 5,000 points of known natural reef points. They don't have  
25 any data on how large those reefs are, but they know that there  
26 are points that are natural reef points, and so we can sample from  
27 those as well, and, of course, that's what SERFS is going to do.  
28 They randomly select about half of those 5,000 sites each year to  
29 survey, and so we'll be incorporating those data into this project  
30 for 2023.

31  
32 The natural reef is a little bit more problematic. There is  
33 location and extent info for natural reefs, but it comes from the  
34 NCCOS model, which is essentially a probability of encounter model,  
35 and after, again, extensive discussion, and bouncing this back and  
36 forth among the PIs, we don't have a high enough confidence in  
37 this to use it like we're planning to use the Gardner et al.  
38 natural reef polygons for the Gulf, but what we are going to do,  
39 and I will talk about it in the sampling design section, is use  
40 that to stratify our unconsolidated bottom surveys.

41  
42 There are, at this time, no scalable habitat map products for this  
43 region, and, again, I'm going to talk about how we're going to  
44 solve that problem in the next section of my talk.

45  
46 This is -- I am not going to spend a lot of time on the abundance  
47 synthesis, because this is something that we're still basically  
48 working on making sure that we have all the data, and it's been

1 hard to get all the data that we think is important, and so we're  
2 trying to make sure that we get all the data sources that we can  
3 to gather into this, but, right now, what you're looking at is a  
4 combination of the SERFS database, the G-FISHER database, all of  
5 the project PI's various databases on greater amberjack, as well  
6 as some observer data from Florida.

7  
8 We think there are other sources of data, especially fishery-  
9 dependent data, that are out there that we would like to try and  
10 incorporate into -- Eventually formulate the priors for the  
11 Bayesian modeling of greater amberjack abundance, which will  
12 essentially take the, you know, historical data as a prior and  
13 then inform that with our survey results to come out with a post-  
14 year distribution, or abundance estimate, of amberjack.

15  
16 Moving on into sample design, and so we're taking all of this  
17 mostly habitat data that we've assembled and using that to come up  
18 with sample designs that are necessarily region-specific, because  
19 our knowledge about each region is different, and the information  
20 available in each region is different.

21  
22 Sample design, first, I'm going to talk about the eastern Gulf of  
23 Mexico, where, arguably, we have kind of the best situation,  
24 because of that randomized sampling of habitat from the side-scan  
25 sonar projects, and then I will talk a little bit about the western  
26 Gulf of Mexico, where we're using the Gardner et al. natural reef  
27 polygons to fill that part of our knowledge, and then I will talk  
28 about the South Atlantic, where it's arguably the most difficult  
29 of these situations.

30  
31 I want to remind you, before I jump into this, that, throughout  
32 all of this, our unifying gear is the EK80 echosounder, which we  
33 believe will give us areal density, at the end of the day, but we  
34 are hedging our bets against its ability to identify species, and  
35 so we're hoping that we can identify species using active  
36 acoustics, but, if we can't, then the camera gears become even  
37 more important, because they become a correction factor for that.

38  
39 We're also deploying camera gears, which, depending on the gear,  
40 can give us relative, and, in the case of C-BASS, absolute  
41 abundance estimates, and, more importantly, give us species  
42 identification and size distribution, that we can then apply to  
43 the hydroacoustics counts.

44  
45 West Florida, this is actually the sample design going into 2023  
46 for west Florida artificial and natural reefs, and so what you're  
47 seeing are the two maps, and the one on the top is natural reef,  
48 and the one on the bottom is artificial reefs, and these are all

1 selected, randomly-selected, sites from the different strata that  
2 I will talk about in a moment.

3  
4 The blue dots are where we're going to deploy S-BRUV cameras, and  
5 the red dots are where we'll deploy both active acoustics and S-  
6 BRUV cameras, and so the sample size for the hydroacoustics is a  
7 bit smaller than for the S-BRUV, but we'll have S-BRUV at both the  
8 blue and red dots.

9  
10 Essentially, what's going on in west Florida is that, to get a  
11 higher sample size, we are leveraging the existing G-FISHER survey,  
12 which already has its own sampling design, and, basically, G-  
13 FISHER uses these baited stationary 360-degree view cameras to  
14 sample known natural and artificial reefs.

15  
16 Their existing design is essentially a two-stage cluster sampling  
17 design that's stratified by region, in three different levels,  
18 depth in three levels, habitat type, in at least two levels,  
19 although they do stratify by -- Within habitat type, they stratify  
20 by size and relief, and so it's actually a nine-level sub-habitat,  
21 and these are across, and they're factorial, and so you've got  
22 size, relief, habitat type, depth, and region.

23  
24 The funding for the greater amberjack project is essentially going  
25 to supplement the already planned G-FISHER survey by increasing S-  
26 BRUV sampling to increase both overall coverage and to add  
27 echosounder surveys to a very large subset of those G-FISHER sites.

28  
29 We are also providing funding for adding repeated baited and  
30 unbaited drops, where, essentially, they will drop their S-BRUV  
31 one day, and randomize whether that S-BRUV is baited or unbaited,  
32 and then, the following day, or even that same day, they will re-  
33 drop it on the same site with the other bait treatment, either  
34 unbaited or baited, and look at comparisons of how bait may be  
35 affecting the S-BRUV cameras.

36  
37 As far as uncharacterized habitat in west Florida, this is  
38 essentially -- The sample design is to use the C-BASS, which is a  
39 towed camera that also -- Basically, you run the echosounder from  
40 the vessel, and then you tow the camera behind the vessel, and so  
41 you get a strip of echosounder data to go with your camera data,  
42 and, essentially, this will be deployed over unconsolidated and  
43 unknown habitat in Florida, as well as some other regions, and  
44 we'll talk about that in a minute, and this is going to be  
45 stratified by existing abundance data, and so, in this case, we  
46 used the historical G-FISHER data, from their drop cameras, to  
47 assign, and these are five-nautical-mile grid cells, to assign one  
48 of our values to each of those grid cells.

1  
2 The tan grid cells have not been sampled by G-FISHER, and so those  
3 have zero effort. The white cells have effort, but zero catches,  
4 and the blue have moderate catch, and the red have high catch, and  
5 so, in order to optimize efficiency, we want to sample more where  
6 we know less, or where the variance is expected to be highest, and  
7 so, essentially, we're going to -- The idea is that, if you don't  
8 know anything about an area, you want to sample it a lot.

9  
10 If you know something about the area, but your variance about that  
11 knowledge is really high, you want to sample that a lot, but, if  
12 what you know about that area has a low variance already, you don't  
13 maybe need to sample it as much, although we're not going to not  
14 sample it, and we're just going to spend a little bit less effort  
15 there, and so the largest allocations for these C-BASS transects  
16 will be on zero effort and high-catch grid cells, which is where  
17 you have the highest variance.

18  
19 There will also be incidental multibeam mapping. As Sean said,  
20 we're not funded to map, but part of the C-BASS -- Kind of the  
21 necessity of running the C-BASS is you have to know what the  
22 topography of the bottom is that you're running it over, so that  
23 you can avoid entanglement and running into things and stuff like  
24 that, and so, incidental to all the C-BASS transects, we will also  
25 have multibeam mapping of each of those five-kilometer-long  
26 transects, and that will augment and provide an independent  
27 estimate of unknown natural and artificial reefs that we can  
28 include in our analysis.

29  
30 Moving on to Mississippi-Alabama, again, this is an area where we  
31 have that randomized habitat, randomly selected grid cells, where  
32 we have side-scan sonar, and we have habitat data, and so it's  
33 pretty tractable. We are, in this case, leveraging the existing  
34 USA Fishery-Independent Sampling, which is a state-funded sampling  
35 series that's been going on for many years, and this uses ROV-  
36 mounted cameras to sample from known natural artificial and  
37 unstructured habitats.

38  
39 The existing design is essentially a two-stage cluster sampling  
40 design stratified, by region, to levels inside and outside the  
41 artificial reef permit zone. For depth, we have three different  
42 depth levels. Habitat type, natural versus artificial, and relief  
43 is high versus low, and, actually, that's something that we're  
44 adding in specifically for this project, and I should have moved  
45 that to the next bullet point, but, essentially, that project is  
46 being supplemented by adding additional ROV sampling, to both  
47 increase overall sample size, but also to increase spatial coverage  
48 to include Mississippi and also to intentionally oversample high-

1 relief habitats.

2  
3 We think that greater amberjack are probably going to have the  
4 highest abundance on high-relief habitats, and we're pretty sure  
5 of that, based on data that, you know, we've looked at, and so we  
6 want to make sure that we're not under sampling those fairly rare  
7 habitat types in this particular system, and so we'll be  
8 intentionally increasing the sample size in the deep natural reef  
9 areas and the high-relief habitats.

10  
11 We're also using funding to add echosounder surveys to the majority  
12 of the sites and to add S-BRUV camera drops to a subset of the  
13 sites, in order to help further inform our calibrations between  
14 the ROV camera gears and the S-BRUV camera gears.

15  
16 We're also adding the eDNA to a subset of these sites, and, again,  
17 we are pretty confident that the eDNA will get to a point where it  
18 can give us presence and absence of the four different species,  
19 but we're also hopeful that they will be able to work out the  
20 methods, so that we can get at least an alternate estimate of  
21 relative abundance of amberjack and the three related species.

22  
23 Moving on to the Mississippi-Alabama uncharacterized bottom, I  
24 could have presented this along with the Florida uncharacterized  
25 bottom, because we're using exactly the same sampling design. C-  
26 BASS and echosounders will be deployed to sample this habitat type.  
27 It will be stratified by region, two levels, and, again, existing  
28 abundance data based on the G-FISHER surveys, where we essentially  
29 put our largest allocations of effort to those areas that have had  
30 no effort and to those areas that have historically had high catch,  
31 or highly-variable catch.

32  
33 Again, incidental multibeam mapping will provide an independent  
34 estimate of unknown natural and artificial reefs, to kind of add  
35 together with the existing side-scan data. This will be especially  
36 important in Mississippi, the Mississippi part of this region,  
37 where we do not have existing side-scan mapping data.

38  
39 Moving on to the western Gulf of Mexico, and I apologize for all  
40 the graphics being slightly different, and they were all made by  
41 different folks, and I just kind of pulled them all together for  
42 the purposes here today, to share with you guys.

43  
44 The western Gulf of Mexico, for natural and artificial reefs, the  
45 sampling design looks something like this. We will basically  
46 deployed baited underwater, stationary underwater, cameras, and/or  
47 ROVs, depending on the type of structure, along with active  
48 acoustics, or echosounders, and, essentially, these will be

1 deployed for known natural and artificial reef locations within  
2 the selected grid cells that you see on the right-hand side.

3  
4 This is, again, a two-stage cluster sampling of known artificial  
5 and natural reefs, stratified by region, and it will be three  
6 different levels across the western Gulf, and I'm showing you just  
7 Louisiana in the maps here, but this same exact pattern will apply  
8 to northern and southern Texas.

9  
10 Depth, three different levels of depth and, for reef type, there  
11 are four different levels of reef type, which is what you're seeing  
12 in the map to the right, is artificial reefs, wrecks, and platforms  
13 will be sampled separately, and, again, those abundance estimates  
14 will be scaled up separately to the known list of reefs, wrecks,  
15 and platforms.

16  
17 Natural reefs will be sampled -- Basically, if the part of a  
18 natural reef polygon falls within a selected, randomly-selected,  
19 grid cell, we will drop ten random points on that polygon and  
20 sample all of those with the BRUV and/or ROV plus hydroacoustics.

21  
22 The sample design for the western Gulf of Mexico for  
23 uncharacterized bottom looks much the same. We've got three  
24 different depth categories, and we will deploy, in this case, an  
25 echosounder plus the drop cameras and/or ROVs, and, basically,  
26 we'll run five-nautical-mile transects at each of the selected  
27 cells, with the vessel echosounder, and, whenever the vessel  
28 echosounder identifies either structure or fish, they will stop  
29 and do a point survey with video and the scientific echosounder at  
30 those locations. Again, this is going to be stratified by region,  
31 three levels, and depth, three levels.

32  
33 The vessel echosounder data will also provide estimates of unknown  
34 natural and artificial reef density that will then kind of help to  
35 inform whether the lists of reefs that we have in the Gardner et  
36 al. polygons are covering what's out there, and to what degree we  
37 need to maybe scale those up a little bit, based on undocumented  
38 reefs.

39  
40 Sample design in the South Atlantic, again, this is arguably the  
41 most difficult of the regions, because of a lack of good, scalable  
42 habitat data for natural reefs, and the South Atlantic artificial  
43 and natural reefs are -- We're going to be leveraging the SERFS  
44 survey, which, as most of you -- As some of you probably know, it  
45 uses chevron traps to sample the fish community, but they also  
46 have trap-mounted cameras, and we don't expect the traps to catch  
47 very many greater amberjack, but they do have a pretty extensive  
48 historical dataset that shows catch of greater amberjack on the

1 cameras.

2  
3 These will be deployed on known natural reef point locations, and,  
4 again, they have an existing list of known point locations that  
5 are on known natural reefs, and they randomly select from those  
6 each year. This is a simple random sample from that list of known  
7 natural reef point locations. It does not cover artificial habitat  
8 at all, and their cameras are depth-limited. They use GoPros, and  
9 so, once you get those down to about seventy meters, they stop --  
10 They don't have enough light to give you good data, and they also  
11 don't cover southeast Florida, and so these are some holes that  
12 we're going to try and fill with our supplemental sampling.

13  
14 Essentially, Ted Switzer will be deploying a bunch of S-BRUVs and  
15 echosounders at known natural and artificial reef sites within  
16 this region, and he's going to be using two-stage cluster sampling  
17 of these known artificial and natural reef point locations,  
18 stratified by region and depth, and, essentially, what he's going  
19 to do is try and fill some of the holes left by SERFS, and so he'll  
20 cover all depths, but he'll expend extra effort in deeper waters,  
21 where the S-BRUV cameras are functional, because they're low-light  
22 -- They're special low-light cameras, and also in southeast  
23 Florida, where the SERFS coverage is lacking.

24  
25 Moving on to uncharacterized bottom in the South Atlantic, this is  
26 where we have a little bit of a perplexing issue, because there  
27 isn't really good -- Actually, this is where we're going to solve  
28 our perplexing issue, excuse me, about natural reef availability  
29 in the South Atlantic, and so we have to sample the uncharacterized  
30 bottom, and, essentially, we're doing that the same way that I've  
31 talked about for Florida and Mississippi-Alabama, by using the  
32 towed C-BASS camera, coupled with an echosounder, and this will be  
33 basically deployed using random sampling stratified by region,  
34 four levels, depth three levels, and the probability of natural  
35 reef, based on the NCCOS model, with high probability, low  
36 probability, and zero probability.

37  
38 What that allows us to do is simultaneously do our survey, but  
39 also evaluate that model and its accuracy, and, based on what we  
40 find, we can either not use that model at all, or we can -- If we  
41 basically verify that that model is giving us -- Where we think,  
42 you know, where there's 90 percent chance -- Where the model tells  
43 is it's 90 percent chance natural, if, nine out of ten times, we  
44 find natural reef at those locations, then we start to build our  
45 confidence in using that model, potentially, for extrapolating our  
46 abundance estimates at the end of the day.

47  
48 Just to reiterate, whenever we run C-BASS, we also are going to

1 have incidental multibeam mapping, which provides an estimate,  
2 again, of unknown, or undocumented, natural and artificial reefs,  
3 and this is what is going to potentially give us validation, or  
4 not, of that NCCOS model. Again, we may or may not be able to use  
5 it in the extrapolation, depending on those results. That is all  
6 I've got for you guys today, and I would like to take any questions  
7 that you might have.

8  
9 **CHAIRMAN NANCE:** I'm not sure we have any. No, I'm just kidding.  
10 We'll go ahead, and we have a few minutes here for questions, and  
11 so let's go ahead and entertain those. It was a good summary, for  
12 sure, and I appreciate you guys coming and being able to do that.

13  
14 **MR. ALBINS:** It's a big project, and I know some of you guys are  
15 probably hungry for more details about certain parts of it, and,  
16 you know, we'll try and do our best to provide those, if we can.

17  
18 **CHAIRMAN NANCE:** Let's go ahead, Sean, and then --

19  
20 **DR. POWERS:** One of the things we've asked is John Hoenig to add  
21 any comments he would like. In particular, Mark went through the  
22 backbone of what we proposed, and what we are optimizing, the two-  
23 stage clusters based on the stratified random kind of temporal  
24 fisheries backbone, but, also, we have a Bayesian model that will  
25 also work, based on that sampling design, and so I think we wanted  
26 to end with Hoenig just giving us about five minutes of some  
27 information on how those too will provide the estimates and the  
28 variance.

29  
30 **DR. HOENIG:** Okay. My head is kind of spinning, because that was  
31 a mouthful that Mark gave us to chew on, but the idea of doing a  
32 Bayesian model was not to be Bayesian, but rather to try a model-  
33 based inference instead of design-based inference, and so, with  
34 the design-based inference, which is a stratified random and the  
35 two-stage cluster and so on, you're using randomization to ensure  
36 that you have a representative sample, at least on average, so  
37 that you can get estimates of totals for a whole stratum, although  
38 you don't necessarily know why the animals occur where, or even  
39 where in the stratum they're occurring.

40  
41 The model-based sampling says let's see if we can take covariates,  
42 depth and whatever else we know, bottom type, and predict where  
43 the amberjack will be, and that's -- The reason for going both  
44 ways was just to not put all of our eggs in one basket, and I'm  
45 firm believer that, if something can go wrong, it will go wrong,  
46 and probably at the worst possible time and place, and so I  
47 thought, all right, let's try also have a model-based inference.

1 The fact that it's Bayesian is not really important, from an  
2 inference approach, other than the fact that the Bayesian structure  
3 makes it very easy to code up incredibly complicated, difficult-  
4 to-deal with models, and so that's why we brought in Grace, who is  
5 an authority on this kind of large-scale spatial model.

6  
7 The Bayesian model has to deal with the fact that we have  
8 essentially three kinds of cells. We have cells that, in the past,  
9 have been mapped, and now we're sampling them for greater  
10 amberjack, and so we actually have point estimates of abundance.  
11 Then you also have cells that have been mapped, but they're not  
12 being sampled for amberjack, and so you have the covariates that  
13 you could use for prediction, but you don't have the observations.

14  
15 Then you also have cells that have neither been mapped nor sampled  
16 for amberjack, and we need to make inferences about those also,  
17 and so the Bayesian model essentially uses those cells where we  
18 have observations and maps to develop a model, and then it applies  
19 it to cells that have been mapped, but not sampled, and it also  
20 applies the model to those cells that have not been mapped or  
21 sampled, and you might ask how can you estimate what's going on in  
22 a cell that's not sampled, with the Bayesian approach, and,  
23 essentially, if your covariates are missing, then you use -- You  
24 integrate it with a range of possibilities, or you essentially use  
25 the mean, and so, in other words, if you know that this cell here  
26 and this cell there have very similar characteristics to a cell  
27 that hasn't been mapped, then you can assume that the model uses  
28 that to predict what's in the unsampled one.

29  
30 At current, Grace is just using Alabama and Mississippi data,  
31 because that's simple, and she wanted to work out the model for  
32 one situation, and then she'll modify it for other situations, and  
33 she's playing with model structure, to see what's important, and  
34 so she tried building a model that had all three habitats in it,  
35 artificial reef, natural reef, and unconsolidated bottom, and she  
36 found that the structure of the model, for the three different  
37 types of habitat, were so different that there was really no  
38 advantage to putting it all in one model, because, essentially,  
39 the different habitats use different parts of the data, and so now  
40 she's working on separate models for each habitat type.

41  
42 I don't think it will really help if I were to start explaining  
43 the structure of the model, because it's complicated, and we would  
44 need to take the time to walk through it slowly, so that it makes  
45 sense, or, otherwise, it's just kind of a bunch of equations.

46  
47 **DR. POWERS:** No, and I think that's all right, John, and I just  
48 wanted you to add, because we didn't have time to go over it, and,

1 from what I understand from Grace and the modeling, the Bayesian  
2 will be able to deal with relative abundances, and we don't have  
3 to do absolute abundance in every grid cell for the Bayesian to  
4 work, just in case we have problems with that as well.

5  
6 **DR. HOENIG:** You can get the relative abundances from the Bayesian  
7 model and then convert to absolute with the calibrations, so you  
8 can keep the two components separate, and that's true. There are  
9 really three differences, primary differences, between the  
10 Bayesian approach and the design-based.

11  
12 The first I already alluded to, and was that the design-based  
13 requires random sampling, and it will give you an estimate for a  
14 stratum, whereas the Bayesian one builds a model, and so it can  
15 predict everywhere, and so what I didn't get into was that the  
16 model that Grace is doing has to do with two kinds of data, point-  
17 level data, like here's a region and this is what we saw, and cell-  
18 level data, like here's a cell and what we know is the average  
19 surface temperature, and it's such-and-such temp, or degrees, or  
20 the average depth is such-and-such, and she's building a model  
21 that can use both of them.

22  
23 Her model then, unlike the design-based, can predict anywhere. In  
24 other words, instead of saying, well, for the shallow stratum,  
25 here's the abundance, and she can make a prediction for each cell  
26 of it. What she can't do is say where in the cell things will be  
27 found, and so I don't want people to get the wrong impression,  
28 that, oh, it's a spatial model, and so you have contour lines and  
29 you can predict the -- You can't use it to say, if you want to  
30 drop your hook-and-line into the water, and here's where you go  
31 fishing, and it won't do that. It doesn't predict the locations  
32 of unknown artificial reefs, or unknown features, and it will just  
33 say, for this cell, here's what is the abundance, and so it is  
34 predicting spatially, but on a coarse scale.

35  
36 The third difference between the design-based and the Bayesian is  
37 that the Bayesian model can use all of the data, whatever  
38 covariates you have, and you don't have to have a complete set of  
39 covariates for every cell, and there is a cell effect, and so it's  
40 a hierarchical model that does deal with cells, and, in one cell,  
41 you might have say bottom type, but, in another cell, you don't,  
42 and it's okay.

43  
44 What's missing then gets interpolated, and so those are the three  
45 differences between the Bayesian and the design-based, and it was  
46 originally conceived of doing this approach to not put all of our  
47 eggs in one basket, but, also, we learned, from the Bayesian model,  
48 because it is a model, and it is saying this is the effect of

1 covariates on abundance, and so the design-based sampling, the  
2 two-stage clustering within a stratum, doesn't tell you, well, why  
3 are the fish there, and it just says, in this stratum, this is  
4 what we estimate is there, and, yes, depth varies, and this varies,  
5 and that varies, but that's not included in the calculations.

6  
7 The downside of doing a model is like, well, why doesn't everybody  
8 do a model, and you hope that a relatively simply model will have  
9 great predictive value, but, if what we were getting was covariates  
10 that were not terribly meaningful, then it wouldn't predict well.  
11 I mean, you could still do the model, but it would basically have  
12 huge error bars, but, in theory, if you have good covariates, and  
13 you can use all of that data, then we should have smaller standard  
14 errors. I guess, if there aren't questions, then I will stop at  
15 that.

16  
17 **DR. POWERS:** I think that's it for us, Jim. The plan is for us to  
18 give some progress along the way, and not one of these big general  
19 overviews again, but, when we go back to the SSC, we'll go with  
20 more discrete, focused things, and so, like I said, one of the  
21 things is we're involving the South Atlantic SSC, the Gulf SSC,  
22 and we also give updates and these presentations to a panel of  
23 NMFS scientists as well, Rick Methot and John, and so a lot more  
24 communication, I think, than the previous one.

25  
26 The other statistician involved with us is Lynn Stokes, and so the  
27 other thing we learned is, and you can see it here, is the  
28 statisticians are involved from proposal development all the way  
29 to the end, so they're not surprised by something we did, but I  
30 think that's it.

31  
32 **CHAIRMAN NANCE:** Okay. Will, I'll go ahead and address your  
33 question, and then we'll go ahead and end.

34  
35 **DR. PATTERSON:** Thanks. Thanks to Sean and Mark and John for  
36 coming and letting us know where things stand with this. I think  
37 the Bayesian hierarchical approach has real potential, and we're  
38 utilizing that in one of two methods to estimate red snapper  
39 population size in the Atlantic, in a study that's funded over  
40 there.

41  
42 One thing that John just mentioned is that it has the potential to  
43 have lower standard errors, and that can be true, but, based on  
44 what Sean just relayed about the Bayesian model can handle relative  
45 abundance, and then convert to absolute abundance, that relies on  
46 the calibrations, and the calibrations that we've seen so far --  
47 There is quite a bit of uncertainty going between the two gears in  
48 a given calibration, and so, if that uncertainty, or variance, is

1 sincerely tracked through the model into your population abundance  
2 estimate, it can actually blow up your variance considerably, and  
3 so, if that's the approach that ends up being the sort of primary  
4 approach to estimate population size -- You know, that has to be  
5 a careful consideration, about how that variance is actually  
6 tracked through the model.

7  
8 **MR. ALBINS:** Yes, and we've talked with Grace about -- You know,  
9 gear will be included somewhere in the hierarchical model, and so  
10 it will explicitly deal with any uncertainty in gear-to-gear  
11 correlations, or calibrations, and we -- You know, we see that we  
12 need more calibration data. Obviously, the stuff that I presented  
13 today hasn't made of us like, oh, home run, and we did it, and we  
14 still have some work to do in that department, and we're planning  
15 to put some effort there.

16  
17 **CHAIRMAN NANCE:** Thank you. We'll go ahead and --

18  
19 **DR. HOENIG:** May I quickly say that I agree with Will that the  
20 calibration is a critical thing. If it had been up to me, I would  
21 have doubled the budget and said, yes, why don't you spend \$10  
22 million on calibration, because that would be so valuable for all  
23 future research, but they didn't ask me, and they didn't give me  
24 the extra \$10 million, and so we can't do that, but the calibration  
25 issue will affect any kind of population estimate, whether it's  
26 Bayesian, if it's a model-based inference, or whether it's a  
27 design-based, and it's just a fundamental piece of uncertainty  
28 that we have to live with, and we're doing the best we can to  
29 estimate the calibration factors and the relative catchabilities.

30  
31 **CHAIRMAN NANCE:** John, thank you. We appreciate that. We'll go  
32 ahead and let's take a ten-minute break, and we'll get back here  
33 at 2:45. We've got two more items, at least two more items, that  
34 we need to take care of today, and so thanks.

35  
36 (Whereupon, a brief recess was taken.)

37  
38 **CHAIRMAN NANCE:** We'll go ahead and start. We need to really move  
39 forward, if we want to get done today, and so our next presentation  
40 is Item Number XXII, and Dr. John Ward is with us, and he's going  
41 to -- The title of his talk is "Examination of An Alternative  
42 Allocation Approach", and, John, it's good to have you with us,  
43 virtually though.

44  
45 **DR. JOHN WARD:** Thank you. I appreciate that.

46  
47 **CHAIRMAN NANCE:** We'll go ahead and have Ryan go through the scope  
48 of work, and then, John, we'll turn the time over to you.

1  
2 **DR. WARD:** Okay.

3  
4 **EXAMINATION OF AN ALTERNATIVE ALLOCATION APPROACH**  
5

6 **MR. RINDONE:** All right, and so Dr. Ward is going to present on an  
7 alternative approach to sector allocations between directed  
8 fleets, and he's going to talk about economic efficiency analyses  
9 and proposed policy options that haven't been a regular part of  
10 the fishery management process, and, historically, several factors  
11 have been considered too complex to expand the focus of fisheries  
12 management based on stock assessments, but the application of  
13 theory to the existing data collection program that exists to  
14 conduct these assessments, along with other sources of public data,  
15 could be used to develop empirical estimates of economic  
16 efficiency, as required under National Standard 5 and for optimum  
17 yield, and so Dr. Ward is going to describe using a surplus  
18 production model to develop a representation of the Gordon-  
19 Schaeffer-Copes model of a simplified fishery.

20  
21 The implications of ecosystem trophic levels are introduced into  
22 this model to demonstrate how ecosystem factors are included in  
23 the system of equations. Social factors are also included, as  
24 examples of how allocation and a sub-optimal management regime  
25 could be considered. The results of all this are estimated  
26 parameters that indicate the importance of ecological factors in  
27 developing these estimates, and Dr. Ward is going to discuss how,  
28 taking the existing economic inefficiencies, or market failures,  
29 into consideration, a hypothetical management proposal to allocate  
30 between stakeholder groups, can be developed.

31  
32 This suboptimal fishery can't provide an optimal allocation that  
33 maximizes net benefits, net of costs, because the management  
34 framework and an allocation between stakeholder groups should  
35 demonstrate an improvement over the existing system, and so you  
36 guys should ask Dr. Ward questions, as you deem appropriate, and  
37 make recommendations.

38  
39 **CHAIRMAN NANCE:** Thank you, Ryan. John, go ahead and take it away.

40  
41 **DR. WARD:** Ryan, you did an excellent job, and you've summarized  
42 my introduction perfectly, and so let's just skip down to the next  
43 slide. What we're going to talk about, initially, is the surplus  
44 production model that's been slightly modified, and it's going to  
45 follow this set of assumptions. Of particular interest here is  
46 the problem of free mobility of inputs and outputs, since marine  
47 resources are not unlimited, and that there are problems with  
48 identifying property rights for fish in the sea. There is also a

1 number of other assumptions there that you can review for  
2 yourselves that drive this whole process.

3  
4 This, of course, is a sustainable yield curve from the surplus  
5 production model, and, as you can see here, the MSY level of yield  
6 and the overfishing state that's identified here -- Really, the  
7 only difference is in the level of effort that's being applied,  
8 where the overfished effort, and the overfishing effort, are much  
9 greater than the effort level at maximum sustainable yield, as I'm  
10 sure that everybody is aware, and so what we're really looking at  
11 is how does effort change, in terms of efficiency for operating  
12 the fishery, and we can see how this has an effect on the population  
13 equilibrium in the next slide.

14  
15 You can see here that, as we look at biomass versus effort, that  
16 biomass declines, or moves towards the origin, when we're operating  
17 at the overfished effort level, as opposed to biomass at MSY.

18  
19 Now, why this is interesting is because the sustainable yield curve  
20 is what drives the supply curve and the marketplace. If you take  
21 a look at the next slide, what we see here is, if you rotate the  
22 sustainable yield curve, and the population equilibrium curve,  
23 about ninety degrees, we can plot the supply curve, the SOA curve,  
24 in the first quadrant up there under supply and demand, as a  
25 function of that sustainable yield curve, and we can impose an  
26 exogenous demand curve that's slightly elastic, as a slight  
27 downward slope, and, because we have this information, we can also  
28 plot a population equilibrium curve in Quadrant 2, to the left,  
29 which is a function of price for biomass determination, as opposed  
30 to effort.

31  
32 If we look at a change that occurs in terms of the catchability  
33 coefficient, we see there is a shift in the sustainable yield  
34 curve, from SY to SI prime in the fourth quadrant, and effort  
35 actually declines, to produce a level of harvest. However, because  
36 of that, harvest increase, even though effort has declined  
37 somewhat, and we see, in the supply and demand intersection points,  
38 the price falls from P to P prime.

39  
40 In the case for population equilibrium in both graphs, you get a  
41 shift in the population equilibrium curve that results from that  
42 that leads to a decline in biomass, and so something that happens  
43 on the side of the fishery where people are working in the fishery,  
44 fishing boats, has an impact on the fish stock.

45  
46 Just to prove that, you know, I'm not just drawing these things to  
47 be convenient, this entire process is actually driven by a computer  
48 program that is based on the Gordon-Schaefer-Copes surplus

1 production model, and what I'm trying to show here is the  
2 relationship between biomass at different levels of effort,  
3 really, and how the formulas change as a result of whether we treat  
4 the fishery as open access, in the second column there, where the  
5 fishing mortality discount rates equal infinity, versus the last  
6 column, where it's considered the sole owner solution, where the  
7 discount rates equal zero.

8  
9 This discount rate has a really important effect on how fishermen  
10 behave, and it represents how they view the future, what their  
11 expectations are in the fishery, and, if we have a sole-owner-type  
12 fishery, that is operated according to the eight assumptions that  
13 we looked at briefly in the beginning of this, you get an entirely  
14 different set of solutions than if fishermen have no faith in the  
15 future, and they have no expectations of being able to access the  
16 fish, and so those equilibrium solutions are actually representing  
17 people wanting to harvest as much as they can right now.

18  
19 That's really what drives a lot of the behavior that we see in  
20 this particular model, when you have an open-access fishery, but,  
21 in the real world, or the actual world, those assumptions don't  
22 hold. We don't have perfect information about the future, and so  
23 there is uncertainty and risk, as a result, and we don't have free  
24 mobility of inputs and outputs into the production process, and so  
25 nobody has to pay for the fish that they're harvesting.

26  
27 To incorporate things into this model, just besides the biology  
28 and the economics, you want to look at how the ecosystem operates,  
29 and, of course, this is a very complicated and involved situation,  
30 but the part that I'm going to look at today deals with that lower-  
31 left-hand corner that deals with fishing, capture, processing,  
32 supply, demand, and competition, and markets and how they affect  
33 what's going on in that fishery, and that's where the efficiency  
34 comes into it.

35  
36 This can be expressed a lot more simply by looking at how the  
37 ecological dimension impacts the human dimension, and we do this  
38 through a set of triangles that represent, on the bottom part, the  
39 different trophic levels in the environment, and, on the effort  
40 part, the human dimension that impacts it, and so we see commercial  
41 fishermen primarily going after the apex predator, but they also  
42 intersect tertiary, secondary, and primary consumers.

43  
44 Commercial fishermen feed dealers, who feed processors, who are  
45 affected by aquaculture from outside this particular system, and  
46 that goes to the wholesale, retail, and final consumer, who impacts  
47 the fishery through recreational fishing and by pollution that  
48 affects the very basis of the ecological dimension.

1  
2 When we do this, and we go back to that original graph that was  
3 derived, we can see how the sustainable yield curve is affected by  
4 that change in environmental carrying capacity, or growth rate,  
5 but also through predator-prey and competitor fishery effects, and  
6 that has an impact on the open access supply curve, the SOA curve,  
7 and so both of them shift outward.

8  
9 As a result of this, harvest increases, and prices fall, and effort  
10 increases, in this case, and both of these correspond to changes  
11 in the population equilibrium curve that, again, result in a  
12 decline in biomass.

13  
14 The important point to get out of this is not so much what this  
15 graph is doing, but the way that it interrelates between markets  
16 and fisheries. If something happens in the marketplace, in terms  
17 of being able to supply fish to the market, like a change in the  
18 catchability coefficient, that impacts the fish stock, and, if  
19 something happens in the environment, in the ecosystem, that  
20 impacts the fish stock, that's felt in the markets, and so markets  
21 tie together all these different people around the world, if not  
22 -- Besides just being in the United States, and then habitat can  
23 be affected by so many things that are totally unrelated to the  
24 fishery, global warming and oil production and natural disasters.

25  
26 We also want to incorporate the social and cultural effects of  
27 what's going on in the fishery besides the ecosystem and the  
28 economic effects. Normally, when you propose a model like this,  
29 you start out with maximizing a function, a dynamic model, that is  
30 focused on either the recreational or the commercial fishery, but,  
31 when you want to include different stakeholders in the fishery,  
32 you can add them into the maximization problem, and, here, we have  
33 the integral of  $E$  to the  $\delta - T \pi dt$ , and so we're looking at  
34 profits here, the discounted present value of profits.

35  
36 The second term, on the right-hand side, we could say represents  
37 recreational fishermen who are harvesting fish for their own  
38 satisfaction, their own use, and these two groups would be the  
39 consumptive fishermen, and then we add in a third group here, with  
40 a double-plus sign, which I missed when I was editing this, and  
41 ignore the second one, where you have the group of people who would  
42 be considered non-consumptive users of the resource, and they're  
43 people who have existence value for a marine organism, or any  
44 organism, for that matter.

45  
46 For example, the Marine Protection Act protects marine mammals,  
47 and people value knowing those mammals live out there, and they  
48 like to go out and view them, and that supports an industry,

1 actually, and so we have this term here that doesn't directly  
2 impact the resource, but it represents the satisfaction that people  
3 know that those marine resources actually exist.

4  
5 They actually get dissatisfaction when the population of those  
6 resources decline, and so this structural equation here is  
7 constrained by biomass, and, of course, we know that weight, growth  
8 rate, is constrained by natural mortality, plus we have fishing  
9 mortality from two consumptive user groups and a third group that  
10 does not affect that directly, which gets dissatisfaction from  
11 knowing that harvests are increasing, and then we have some  
12 terminal conditions, because it's a dynamic equation.

13  
14 One additional problem was that, in the model, we displayed demand  
15 as a relatively inelastic, slightly-downward-sloping linear  
16 function, and, as has been demonstrated a number of times in the  
17 literature, demand is really affected by certain attributes of the  
18 fish being delivered to the marketplace, and this homogeneous  
19 product assumption gets violated, because of that, and so what we  
20 really should be looking at are separate equations for each one of  
21 those attributes that uniquely describe a product moving into the  
22 marketplace, and that's what these size class, the J, J-plus-1,  
23 size class I, and I-plus-one, are representing.

24  
25 If we don't have that information, and we went out and we estimated  
26 what demand would look like, we get D prime, and that's what the  
27 actual data that is available on the internet, when we estimate it  
28 out, ignoring size class, actually comes up with, and the real  
29 demand function is represented by that backward-bending curve,  
30 because, at say price of  $P_i$ , we have landings, or yield, of  $Y_i$ ,  
31 and that's many small fish with a low price, while  $P_j$  is the same  
32 yield, but it's fewer fish, because they're larger at a higher  
33 price.

34  
35 This leads to a distortion, you know, D prime, instead of demand,  
36 or SC, that has to be dealt with, and, while we don't have  
37 information about size classes in the publicly-available data  
38 through NMFS, there is information from other sources that gives  
39 us information about size classes that can be used to correspond  
40 to certain prices that can be added to the database.

41  
42 Where that's not available, there are statistical methods, where,  
43 once adjusting for non-stationarity of the data, we can go in and  
44 group data into unique size classes that we can hypothesize  
45 accurately represent the different market prices for these  
46 species.

47  
48 Once we've done all this, and we've worked through the data and

1 been able to classify these different things, we can go back to  
2 the original model, and we can actually come up with a  
3 representation of what represents fishing effort, and what is  
4 discovered, from this equation, is that it's not something that  
5 you estimate directly, but it is the product of different  
6 relationships in the data.

7  
8 For example, in the numerator,  $F'$  is the derivative of the  
9 growth function with respect to  $F$ ,  $\delta$  is the discount rate  
10 that is used to reflect the different type of management programs  
11 that are in place and fishermen's expectations about the future,  
12 who operate in those programs. Price, as a function of  $qEX$ , is a  
13 demand curve, and it's the level of harvest, and  $-C$  is the  
14 marginal cost of fishing, of applying fishing effort.

15  
16 The denominator is made up of the discount rate, the derivative of  
17 growth, the marginal revenue,  $P'$  of  $qEX$ , and, as you go  
18 through this, you see the last of  $P$  raised to the  $X$ , and that's  
19 the derivative of demand relative to biomass, and so all these  
20 things can be calculated separately and then used to calculate  
21 effort as an algorithm in a computer program.

22  
23 We go through all this stuff, and we develop, using this model,  
24 for the recreational side, the household production function, and  
25 we get a very strong result, statistically, a max rescaled  $R^2$   
26 squared of 0.81, and we see that the probability greater than the  
27 chi-squared is at the alpha equals 0.999 level, and so, for the  
28 recreational data that we used, which comes out of the MRIP  
29 program, and a household production function model developed by  
30 Bockstael and McConnell, we get a fairly good model of what  
31 recreational anglers use to get satisfaction from fishing.

32  
33 For the demand system, this was named West Greenland Sea Kraken  
34 versus Bluefin Tuna, where bluefin tuna is the predator, and the  
35 kraken is the variable, and we see that we have a negative  
36 relationship between the kraken landings and its own price, and we  
37 see the effect of other prices on those level of landings, and  
38 these estimates pretty much came out to be highly significant, and  
39 of the proper sign, according to theory.

40  
41 This is the supply curve for the same process, solved  
42 simultaneously, and most of these coefficients for price, with  
43 bluefin tuna at the top and other fish species at the bottom, and  
44 these are the dependent variables, and then the prices across the  
45 top represent the effect of ecosystem, predator-prey, and  
46 competitor effects on these species.

47  
48 When we take that information, and we load it into a computer

simulation model, which is reminiscent of Wade Griffin's general bioeconomic fisheries simulation model, which also incorporates information about the social factors, as outlined in the previous slides, and the ecosystem factors that were outlined in the previous slides, we end up with these estimates for the different relationships, depending on the initial conditions that are due to the way the fishery is managed.

Under open access, the observed delta, the one we calculate from the model, is relatively high, and we see the F is -- It best represents the fishing mortality at that point, and we get an estimate of abundance by calculating the price supply elasticity, and then we can also, based on those equations, and, looking at compensating variation and producer surplus measures of benefits, we can get an estimate of rent.

That, of course, is a very small number, because it's assuming that the fishery is open access, with very little control over it by regulations, and then we can also look at placing an ACL in that fishery, and we see that the observed delta has declined substantially, and people have more faith, who are fishing in this fishery, in the future. The fishing mortality -- I'm sorry. The F factor there drops down slightly, and abundance stays about the same, and rents don't really go up all that much.

If we add ITQs to that ACL, still assuming it's an open-access fishery, we see the observed delta increases a great deal, and one would expect that expectations about the future, with an ITQ, would have improved, or an IFQ would have improved, but, because the ITQ does not create a property right, and that the council actually has the ability to go in and cancel the program, or change the program, at will, which apparently has occurred in the past, we see that people's expectations about the future degrade somewhat, but our F, I would say, has pretty much improved, and the abundance, again, has not changed much, and rents have improved, but they're still substantially low.

The last row here in this table represents sort of a metric of what constitutes the best result, based on all the assumptions of the model holding and actually being in place, and we see the observed delta is equal to the management delta of zero, and F has gone down quite a bit, and abundance has not really changed all that much, but it has improved, but what's really important here is the rent, the net benefits that are being generated, and those have gone from E to the minus-thirty-five and minus-thirty-two to E to the 138<sup>th</sup>, and so that really represents a target, and are you getting closer or farther away from that when you adopt fishery management regulations, and so that gives you one metric that you

1 could look at.

2  
3 The observed delta is another metric that you can look at, and you  
4 want one that approaches zero, but doesn't deviate from it, and so  
5 it's interesting that the ACL is actually an improvement and that  
6 the ITQ program needs to be really carefully crafted, and it really  
7 needs to cause fishermen to believe they have a very stable system.  
8 If it's one that's a little flexible, as this one was set up to  
9 be, it tends to make people have a worse view of the future.

10  
11 Once we've come up with all these net benefit figures, we can look  
12 at how our three stakeholders do in this fishery. Stakeholder 1,  
13 which is the consumptive group, and, as Stakeholder 2 and 3, their  
14 consumption levels rather overlap here, but they are actually  
15 separate functions, and, as they increase, Stakeholder 1's  
16 utility, from knowing that these stocks exist, decline, but it's  
17 interesting, at the end here, that, after the stakeholders get to  
18 a certain value, there's a kink in the system, a non-dynamic -- A  
19 non-linear dynamic effect that causes Stakeholder 1's existence  
20 value to decline dramatically, and so that's something to keep in  
21 mind when we're looking at efficiency and economics, when it's  
22 mixed in with ecology, user groups, and biology.

23  
24 The last graph here is the actual allocation that results from  
25 these two different groups who are harvesting from a resource,  
26 and, in this particular case, it came out to be 80 percent to one  
27 and 20 percent to the other, but you're looking at the marginal  
28 values of these two groups.

29  
30 Stakeholder 2's marginal value has increased at an increasing rate,  
31 and then it began increasing at a decreasing rate in this S-shaped  
32 curve, reflecting diminishing returns to scale, but Stakeholder  
33 1's marginal valuation declined linearly, and, of course, that's  
34 result of the empirical estimates that were derived from the data  
35 that came primarily from the internet, and these numbers definitely  
36 could be improved if we start accessing more accurate information,  
37 and I'm sure the NMFS staff has access to information that's  
38 already being collected that is much more extensive than NMFS makes  
39 available to the public, and plus there are many sources of data  
40 that I discovered on the internet that give information that can  
41 be used to create variables as proxies for missing cost data, for  
42 example.

43  
44 I have also noticed that many surveys that now exist are also  
45 making an effort to collect economic data, and, in fact, there's  
46 a court decision, that I believe Mike Travis referenced the other  
47 day, that actually dealt with that, and one of the reasons that  
48 court decision decided against NMFS was because they had not done

1 a cost-benefit analysis, and they mentioned that three or four  
2 times in their decision.

3  
4 Of course, they also said that it violated the 4<sup>th</sup> Amendment to the  
5 Constitution of the United States, which is a much more serious  
6 reason for not allowing the regulation to continue, but that  
7 database, obviously, supports being able to do these types of  
8 efficiency analysis, and, as National Standard 5 indicates, these  
9 things should, shall be, considered by the council, and that it is  
10 possible to do this kind of work, if that is required by the  
11 Magnuson Act, and the optimal yield definition also requires  
12 adjustment by economic factors, and this framework, as outlined  
13 here, brings in the ecological factors, and the social and cultural  
14 factors, that also need to be addressed there, and it brings it  
15 together in one framework that provides the interaction between  
16 all these different groups that results in this graph being able  
17 to determine what level of allocation represents a starting point  
18 for future discussions of the Gulf Council, in determining what  
19 the actual allocation should be.

20  
21 I say that because it's been demonstrated, and I believe it was by  
22 Abbott, who said that you can't have an optimal allocation if you  
23 don't have an optimally-managed fishery, and, you know, one point  
24 I tried to bring out here, explicitly, was that most fisheries  
25 that we manage, in the National Marine Fisheries Service and  
26 council system, are not optimal, and they're all based on an open-  
27 access system, and some of these externalities, these market  
28 inefficiencies, or market failures, that violate those initial  
29 assumptions prevent optimality from being achieved, and so, even  
30 ITQs, if you can't grant a property right, if people don't have  
31 ownership to the resource, then they're going to generate further  
32 inefficiencies, and reduce potential benefits, and so they need to  
33 be carefully crafted as well. That's about it for me. If people  
34 have questions, I'm happy to try to answer them.

35  
36 **CHAIRMAN NANCE:** John, thank you. I have a quick question, in the  
37 fact that -- So we had David Carter come, from the Center, and  
38 present ways to change allocations, and he gave us some different  
39 scenarios, like catch-based, lottery, auctions, intersector  
40 trading, and those types of things, and is what you're presenting  
41 here an initial look at how you would -- How you would look at a  
42 resource and then divide it between commercial and recreational,  
43 or is this a way to provide -- To look at the commercial pile and  
44 divide it among the different individuals?

45  
46 **DR. WARD:** It depends how you set your regulation up. Each one,  
47 in that structural equation that I talked about briefly, where  
48 you're maximizing over different groups -- The first term that

1 dealt with the commercial fleet's probability could be divided up  
2 to represent different types of gear, or, actually, individual  
3 fishing firms, because this is microeconomics, and that deals with  
4 individual households and individual firms.

5  
6 If you had the access to information, for example, about what an  
7 individual vessel landed, you could set that first term up as the  
8 entire fleet. However, in the computer simulation model, that  
9 takes that data and produces the results that we looked at at the  
10 end, and you are constrained by the resources of the computer to  
11 come to a conclusion, or a result, and so, in the model that I  
12 used, I actually had five fleets represented on the commercial,  
13 and, on the recreational side, the different modes that MRIP  
14 collects data over represented the recreational fleet, and so I  
15 believe, if I remember correctly, there were about twelve separate  
16 categories under fleet of vessels, and so there was multiple  
17 species that were being represented, stock sizes for each species,  
18 the resource areas that represented fishing grounds, and then we  
19 had fishing -- We had fishing fleets and then fishing vessels  
20 within those fleets.

21  
22 That program took about three hours to run, to get the results  
23 that you saw in the last few graphs, and so, you know, that's  
24 really the only thing that constrains you, in terms of how you  
25 want to look at users.

26  
27 In terms of David's presentation, which I listened to, he was  
28 talking about different methods of looking at creating more  
29 efficient markets, and those could each be programmed into the  
30 model to represent different scenarios, and then the delta, the  
31 discount rate, that is calculated could be used to compare them,  
32 for particular fisheries, to see which ones reduce that value  
33 closer to zero, so fishermen had more confidence, indicating that  
34 fishermen would have more confidence in the future, and anglers  
35 would have more confidence in the future, and so that would  
36 generate more benefits. The rent value would be a lot higher.  
37 Hopefully that makes sense.

38  
39 **CHAIRMAN NANCE:** Thank you, John. Dr. Woodward.

40  
41 **DR. WOODWARD:** John, thanks. I -- Well, first of all, there's a  
42 lot to chew on here, and I look forward to seeing the paper,  
43 because I could not follow an awful lot of what was going on, but  
44 I appreciate the effort to think rigorously about the problem of  
45 allocation, and I think there's a lot that we have to learn about  
46 that problem and hopefully contribute to the discussion on that  
47 issue.

1 With your regard to your table that had the numbers, particularly  
2 the numbers on rent, are those -- I am wondering if there is -- Is  
3 the rent column present value of -- Is it discounted present value  
4 of rents over the time horizon?

5  
6 **DR. WARD:** Yes.

7  
8 **DR. WOODWARD:** So I'm thinking that perhaps -- Well, first of all,  
9 if the discount rate is zero, then that would go to infinity, which  
10 would explain why you're getting such an incredibly high, big  
11 number, because a discount rate of infinity, if they've got any  
12 positive value per year, the infinite horizon value is equal to  
13 infinity, and so that may explain why those numbers are so sort of  
14 -- They're hundred orders of magnitude different from one to  
15 another, and so it might be more interesting to present sort of an  
16 average annual rent per year, rather than the infinite horizon  
17 value, but, anyway, that's just a comment, and, as I said, I would  
18 be very interested in looking at a complete development of it, so  
19 I could try to understand all of the math and the equations that  
20 you've pulled together. Thanks.

21  
22 **DR. WARD:** Yes, and you raise a very good point there, and I would  
23 like to point out that all those values were generated over a  
24 twenty-year time horizon, and so they're all on the same length of  
25 time, and so they would be comparable, because you're absolute  
26 right that the delta at zero, the discount rate equals zero, does  
27 produce really large numbers quickly, based on the empirical data  
28 that was available and what the equations had to say about it.

29  
30 **CHAIRMAN NANCE:** Akbar, please.

31  
32 **DR. MARVASTI:** Thank you. John, thank you very much for the  
33 presentation. It is interesting and thought-provoking. I have a  
34 question regarding the table in this slide-before-last, and you  
35 had various columns, and, on the fourth column, you have abundance,  
36 and they are measured for various types of property rights, or  
37 management regimes, and what was interesting, to me, was that the  
38 size of the abundance is fairly stable, regardless of the  
39 management regime, and that may be an outcome of your system of  
40 equations, and apparently there was no feedback between the  
41 management regimes and the dynamics of landings and stock size.

42  
43 There is, obviously, a relationship between the property rights  
44 and landings and, as a result, the size of the stocks, certainly,  
45 over time, and so would you expect wide abundance is apparently  
46 independent of the management regime?

47  
48 **DR. WARD:** I used a species, and I call it the west coast -- I'm

1 sorry. It's the Western Greenland kraken, which, of course, is a  
2 mythical creature, but I made the mistake of using a Humboldt squid  
3 as a stand-in for that species, and a number of people, when I was  
4 talking to them about this, advised to be very careful about the  
5 species that I used in this example, because it would probably  
6 generate more discussion about that result than what this approach  
7 is trying to demonstrate.

8  
9 Apparently that species has incredible growth and fecundity that,  
10 in the model, just overwhelmed the system, and so the abundance,  
11 really, seemed to be pretty much independent of anything that was  
12 done to it, not unlike shrimp.

13  
14 My experience with that fishery is that, every year, it came back,  
15 and it was more a function of the environment than the fishing  
16 effort that was applied to it, and so I think that's what is  
17 causing this abundance number not to change very much, but bear in  
18 mind, also, unrelated to your question, that what this whole  
19 presentation is trying to demonstrate is that it is possible to  
20 address economic efficiency, and, even with the drawbacks of what  
21 I have done here over the last few months, and I will point out  
22 that I was working on shrimp, to develop that model, and it took  
23 me about ten years, but, based on that experience, and what I tried  
24 to do here, it's really possible to address this stuff and do it  
25 in a multidisciplinary framework, an integrated framework, where  
26 the social scientists, the economists, and the biologists all work  
27 together.

28  
29 It's not individual people doing their own stuff, and the council  
30 trying to figure out, well, how do we put this together, and, you  
31 know, we put it together for them, and we present it to them, and  
32 then, when questions like this come up, you can try to work out  
33 what happened, or what went wrong, or what went right, and that's  
34 really what I was trying to demonstrate here.

35  
36 **DR. MARVASTI:** So it's just a proof of concept. Otherwise, if you  
37 run it, for say reef fish species in the Gulf, it's going to  
38 demonstrate the consequences of the management regime, in terms of  
39 the size of the abundance.

40  
41 **DR. WARD:** Yes, hopefully yes, and that's what it would do, and it  
42 would take a lot of input from a lot of different people, but  
43 hopefully it would demonstrate that, yes.

44  
45 **CHAIRMAN NANCE:** Thank you. John, for an old biologist like me to  
46 talk to the council about this, this -- What I'm seeing is this is  
47 a theoretical model that would need to be -- Like Wade put  
48 together, in a way, that would need biological inputs, economic

1 inputs, sociological inputs, to be able to develop and manage  
2 different allocations, when those times arise, and would that be  
3 fair to say?  
4

5 **DR. WARD:** The only thing I would add to that, Jim, is that this  
6 information is readily available, and this can be done.  
7

8 **CHAIRMAN NANCE:** Okay. Thank you. Matt, please.  
9

10 **DR. FREEMAN:** John, thank you for the presentation. If we could  
11 go back to the list of assumptions, and so you had eight very  
12 strong assumptions, in my opinion, and so the question I had --  
13

14 **CHAIRMAN NANCE:** It's Slide Number 1.  
15

16 **DR. FREEMAN:** Could you explain to the SSC sort of how reasonable  
17 those assumptions would be in fishery management, as well as how  
18 responsive the model would be, as those assumptions get weakened?  
19

20 **DR. WARD:** Well, I think that's the point, yes. If you want a  
21 perfectly-competitive fishery model, dating back to the Schaefer  
22 paper in the -- I think it was 1953 or 1954, where he originally  
23 set up the math for doing this, and he was trying to make a  
24 distinction between the perfectly-competitive model that economics  
25 has that it compares everything back to, and that's what the  
26 economic assumptions here are.  
27

28 He also added to them a set of assumptions about the fish in the  
29 sea. For example, the -- Where was it here? Each unit of effort  
30 is independent, you know, one, two, and three, and so building  
31 those together, and recognizing the fact that fish stocks are not  
32 unlimited, that there are constraints to them, post-World War II,  
33 we can build a model of a fishery, but then going from that model,  
34 the graphs that I initially presented, to the real world, the  
35 estimates of the coefficient at the end, you have to relax these  
36 assumptions, and, you know, they can't bind anymore.  
37

38 You can't have, for example, a homogenously perfectly divisible  
39 product, because you have fish, and fish weigh different weights,  
40 and they're different sizes, and they have different other  
41 characteristics that affect market prices, and so that's why size  
42 categories are important, for example, but, where you don't have  
43 that information, you have to take that into consideration in other  
44 ways.  
45

46 For example, you can't -- The demand curve, that is really  
47 backward-bending, but, when you estimated it, you get a different  
48 shape, because you're not taking into account size classes and

1 price differentials, and so, you know, you can go to another  
2 dataset online, which is what Gates did originally, and he went to  
3 the -- I think they called them the green sheets, and it was for  
4 the Fulton Fish Market, that showed what size fish were being sold  
5 for what price, and he related those back to the landings data  
6 prices and tried to divide the data up that way, and I think it  
7 was for yellow flounder, and he was able to use that to get a much  
8 better fit to the data, by accounting for these size classes  
9 through proxy variables.

10  
11 You can also do some statistical techniques, where you can sort  
12 the price data into groups that are statistically similar, and you  
13 can assign a variable to that and put that into the model as a  
14 series of qualitative variables, and, you know, you can interpret  
15 them, after you do the estimation procedure, but the whole idea,  
16 really, is that you have to take these initial assumptions into  
17 consideration, when you're building your mathematical model, and  
18 figure out ways to get that model to reflect, as well as you can,  
19 the actual world operations that are going on, and that's why you  
20 need so many different types of sciences working together to come  
21 up with this uniform set of results.

22  
23 **CHAIRMAN NANCE:** Thank you. Harry, please.

24  
25 **MR. BLANCHET:** Thank you. Going back to that Slide 16 that we  
26 were just on a minute ago, one thing that struck me was, when you  
27 went to the sole owner, what you ended up with was that your F  
28 value decreased a lot, and your rent was remarkably increased, and  
29 I don't know what that number is, but it's big, and that had no  
30 influence on the abundance.

31  
32 **DR. WARD:** Right.

33  
34 **MR. BLANCHET:** That blows my mind.

35  
36 **DR. WARD:** Well, the sole owner situation is where those  
37 assumptions that we were discussing before all hold, for example,  
38 perfect information about the past, present, and the future, and,  
39 of course, we don't have perfect information about the future, and  
40 so that number there is really just sort of a metric. Are you  
41 getting closer to a delta equal to zero, the discount rate equal  
42 to zero, or are you moving away from it, and, if you're getting  
43 closer, then you're going to get larger rents.

44  
45 Now, as to the actual magnitude of any of this stuff, it's really  
46 going to depend on the estimated coefficients of the supply and  
47 demand functions that are being generated, and so that's really  
48 where these results come from, and, the more information you have

1 for those equations, the more realistic these numbers will get,  
2 and so I would argue don't pay too much attention to the numbers,  
3 but just realize that we can actually do this stuff, that, you  
4 know, we can provide you with information about metrics, things  
5 are getting better or worse.

6  
7 **MR. BLANCHET:** I think that what struck me was that we're talking  
8 about a change in F of twenty orders of magnitude less.

9  
10 **DR. WARD:** Right.

11  
12 **MR. BLANCHET:** I think that's taking a minnow net and dipping it  
13 in the Atlantic Ocean.

14  
15 **CHAIRMAN NANCE:** Thanks, Harry. Mandy, please.

16  
17 **DR. KARNAUSKAS:** Thanks, Chair, and thank you, John. This is a  
18 very interesting presentation, and I am not an economist, and so  
19 I'm not even going to pretend to understand the presentation fully,  
20 but I do have a couple of questions, if you could go to Slide 17,  
21 with the plots of the -- Thank you.

22  
23 Remind me, please, and what are the three different stakeholder  
24 groups, and Number 1 is the non-consumptive, and 2 and three are  
25 consumptive, and that's commercial or recreational or they're just  
26 the --

27  
28 **DR. WARD:** You could consider them commercial and rec, and that's  
29 where the data to estimate them came from.

30  
31 **DR. KARNAUSKAS:** Okay, and so I have a couple of questions. First  
32 of all, I'm surprised to see that they have very similar functions.  
33 Is there a reason for that, or --

34  
35 **DR. WARD:** Well, I would have to go back and look at the data and  
36 try to explain it, but, in terms of generating net benefits, they  
37 did seem to track that way. In terms of how their marginal values  
38 changed in that last graph, there was a real distinction between  
39 the two.

40  
41 **DR. KARNAUSKAS:** Okay. Thanks. Then, I guess as a follow-up  
42 question, presumably you could get a set of parameters that, you  
43 know, might tell you that the optimal allocation is to, you know,  
44 allocate 100 percent of the resource to either the recreational or  
45 the commercial sector, and, in this plot, I would think that  
46 Stakeholders 2 and 3, the consumptive users, would also show this  
47 sort of cliff behavior, at some point, on the left, where, if the  
48 yield was so small, and they had such a small amount of allocation,

1 that there would be some sort of tipping point, where, for example,  
2 in the commercial industry, you don't have enough allocation to be  
3 able to run, you know, a sustainable business, or a stable business  
4 model.

5  
6 On the recreational side, there would be too little opportunity  
7 to, you know, even be worthwhile to go out and buy a boat, and so  
8 I'm wondering, and, in the analysis, in your maximization equation,  
9 in terms of the non-consumptive uses, in addition to, you know,  
10 including people who value the existence of the resource itself,  
11 do you also have to include people who value the existence of the  
12 sector, like people who value the existence of a working  
13 waterfront, like the tourists who come to Florida and think they're  
14 eating local seafood, or, you know, people who value the right to  
15 go out fishing, and so is there a way to include those sorts of  
16 values in this sort of framework, and would those have to be  
17 included, so that you don't run into a situation where, you know,  
18 it's optimal to allocate 100 percent to either sector?

19  
20 **DR. WARD:** I agree with everything you said, and there are ways of  
21 including those kinds of values in this approach. It really comes  
22 down to that what we call a utility function, that, for the group,  
23 in that structural equation, you know, the Stakeholder 1, what are  
24 the attributes that really drive his level of satisfaction, and  
25 are there groups that -- You know, one group might have an  
26 existence value for gray whales, and, as gray whale stocks decline,  
27 because there is not enough pollock for them to eat, they get  
28 dissatisfaction from the pollock commercial fishery.

29  
30 You know, you would have to represent them perhaps separately from  
31 a group that valued say salmon, as an iconic symbol that, you know,  
32 had greater meaning than just a food, and, you know, there are a  
33 lot of different ways of looking at non-consumptive use. I  
34 understand, in I think it's Scotland, people -- Tourists actually  
35 go to walkways around pools where salmon have swam to mate in these  
36 pools, and they actually go there and watch the salmon splash  
37 around in the water, and so, you know, all these things really  
38 need to be represented.

39  
40 These are things that, you know, economists recognize as being of  
41 value, but we're not particularly good at determining what they  
42 are, and, you know, I see a really important role for the other  
43 social scientists, the sociologists and anthropologists and other  
44 groups, who spend their time trying to figure out what these goals  
45 and objectives of these other stakeholders are that drive their  
46 satisfaction levels.

47  
48 That's why, you know, the framework allows for it all to be fit

1 in, and you just add more terms, as you go out, and you need a  
2 bigger and bigger computer, in order to come up with a numerical  
3 solution, but, when you don't have all of that, you end up with  
4 this distribution, the 80/20 graph, that says, based on what we  
5 know, the best available science, this is how it ought to be  
6 allocated between these two groups, but there is still a lot of  
7 room for discussion about things that are not represented in the  
8 model that would affect that allocation and that the council needs  
9 to consider.

10  
11 That's why I think it's so important to make this a  
12 multidisciplinary model that delivers them one result, that they  
13 then have information that they can discuss or, you know, ask  
14 people what-if scenarios, so they can run the new results for them  
15 to look at.

16  
17 **CHAIRMAN NANCE:** Yes, and I think that's important. We're going  
18 to have just one more, Mike Travis, and then I'm going to have to  
19 shut it off, and we're going to have to move on to another topic,  
20 but, Mike, go ahead.

21  
22 **DR. TRAVIS:** Thanks, Jim, and so I actually have a number of  
23 comments, and I will try to end with a few questions, and so can  
24 someone take it back to what John has been calling the 80/20 slide?  
25 It's the demand curves.

26  
27 John, you know, what you talked about at the end I think was, in  
28 my mind, the most important issues that you brought up, because  
29 this scenario that is implied by this graph implicitly assumes  
30 that we have a situation where fishing rights, or privileges, have  
31 been assigned, and we all know, as fishery economists, that we  
32 can't get here, right, and you basically explained why you can't  
33 get there, given the current way that a lot of fisheries are being  
34 managed, and, certainly, on the recreational side, we are nowhere  
35 near that.

36  
37 We do have the IFQ program for most of the commercial species, but  
38 I think it's very important to emphasize that the key issue here  
39 that has to be addressed, and there may be a second one, but is  
40 management itself, or the institutions of management, and then  
41 along with that is data, which we have -- We have made great  
42 strides in improving the data that we have to inform the  
43 allocation, the allocation actions and analyses, over the past  
44 several years, and so that doesn't mean that we can't make more  
45 improvements. We can, and we are, and so I just wanted to make  
46 that point.

47  
48 Then, also, just to clarify what I said the other day, regarding

1 that court decision, and we did a benefit-cost analysis. The court  
2 picked on us about not incorporating what they call privacy costs,  
3 which I think we're still trying to figure out exactly how one  
4 would do that, but, to make it very clear, we always do a benefit-  
5 cost analysis.

6  
7 It's required by multiple legal mandates, and so no one should  
8 come away from this thinking that the council, and the agency,  
9 does not do that, whether it's allocation decision or whatever it  
10 is. We do those analyses, and we do look at the economic efficiency  
11 implications of various alternatives that the council considers,  
12 and so, again, I don't want anyone to think that we're not doing  
13 that, and we are, to the extent the existing data allows.

14  
15 As far as social factors go, I'm still not quite sure where I'm  
16 seeing that here, and it's an area where we, again, are trying to  
17 plug some data holes, when it comes to things like demographics  
18 data, where we're trying to look at the effects of various policy  
19 alternatives on different demographic groups, and we also look at  
20 community-level effects, when we can, and so -- There was one other  
21 point that I wanted to make.

22  
23 The other thing, and this, John, I don't know if you're aware of  
24 this, and so one of the other complications that has come up, in  
25 recent years, is this implicitly assumes that you're trying to  
26 allocate a fixed pie, so to speak, whether you call it an ACL quota  
27 or what have you, and the problem is that the stock assessment  
28 scientists have made us aware that, in fact, if you change the  
29 sector allocations for certain species, particularly reef fish  
30 species, that will change the size of the pie, and so, in other  
31 words, you picked an allocation, and that will affect the MSY,  
32 OFL, ABC, and ACL estimates, and so those curves are not fixed in  
33 those scenarios.

34  
35 You are no longer just allocating a fixed pie anymore, and your  
36 pie literally changes size depending on the allocation that the  
37 council picks, and so that is another complication that we've had  
38 to deal with, in recent years, that complicates the analyses that  
39 we do, and I'm going to stop there, and I think I've probably said  
40 enough.

41  
42 **CHAIRMAN NANCE:** Okay. I think the key is -- We could go on, I  
43 think, for another hour, but I think the key is we have -- I think  
44 John has showed a mechanism that is there, and it hasn't been  
45 developed, but certainly is developable, where you can come up  
46 with an economic and biological and social, and be able to put  
47 this together, and so, John, I appreciate you bringing this to us.  
48 I appreciate your presentation and being able to show us that these

1 things are possible.

2  
3 **DR. WARD:** That's my full intent, and I appreciate your summary  
4 there. It was spot-on, Jim, and, Mike, I agree with a lot of the  
5 stuff that you said, and these are all things that need to be  
6 addressed in the future, but I think there is a path forward, and  
7 I think this work can be done, and it's nice to hear that the  
8 region is making efforts in that direction, and so thanks again  
9 for the opportunity to talk here, and I've really been enjoying  
10 the SSC so far.

11  
12 **DR. ISAACS:** For just a very quick moment, could you please define,  
13 for the benefit of our listening audience, what you mean by "rent"?

14  
15 **DR. WARD:** Well, for the --

16  
17 **CHAIRMAN NANCE:** Give me the biological definition, so I  
18 understand.

19  
20 **DR. WARD:** For the supply side, and let me put it that way, it's  
21 the difference between what it costs to produce something and what  
22 it sells for, and so the market price is determined where supply  
23 equals demand, and the area below that price line, and the supply  
24 curve, represents what they call producer surplus, and that's a  
25 part of the rent.

26  
27 Then the area underneath the demand curve, down to that price line,  
28 is the consumer surplus, in the form of compensated variation, in  
29 this case, which is just a word for how it's calculated without  
30 bias, and so those two numbers added together represent the value,  
31 really, of the resource, the resource rent. If you had a market  
32 for fish in the sea, what would they sell for, if you were the  
33 owner and you wanted to transfer them to someone else. ITQs, when  
34 they buy and sell ITQs, it's really based on the resource rent,  
35 and it's a function of that, and so hopefully that gets the idea  
36 across.

37  
38 **CHAIRMAN NANCE:** Perfect.

39  
40 **DR. ISAACS:** Thank you.

41  
42 **CHAIRMAN NANCE:** Thank you, John. We'll now go ahead and come to  
43 our last topic, and we're going to talk about wenchman, and, Ryan,  
44 would you give us our scope of work on that, and then I'll turn  
45 the time over to John, and then, John, you can deal with that, if  
46 Donna is going to be on and that type of thing, and so we'll go  
47 ahead and do that.

1       **REVIEW: WENCHMAN AND MID-WATER SNAPPER HISTORICAL LANDINGS**

2  
3       **MR. RINDONE:** All right. John is here to review the historical  
4 wenchman landings in the Gulf, and these data required unique  
5 handling, due to many confidentiality issues, such as the raw  
6 annual data not being available for public review, due to the  
7 number of fishermen and dealers. John worked with Gulf States  
8 Marine Fisheries Commission, over a period of several weeks, to  
9 put all this information together. The SSC should evaluate these  
10 data and determine if they are sufficient for providing annual  
11 catch advice to the council, and the SSC should make any other  
12 recommendations regarding the management of wenchman, as  
13 appropriate.  
14

15       **MR. MARESKA:** Well, hopefully we'll end the day like we started  
16 the day, and the presentation, the length of it, is proportion to  
17 the length of the title, and so I would like to thank Donna. She's  
18 online, and she is with the Gulf States Marine Fisheries  
19 Commission, and she worked with us in providing all the catch  
20 information, and so I've just got some slides that I'm going to go  
21 over briefly, kind of what we discussed at the previous meeting,  
22 to bring everybody back up to speed.  
23

24 All right, and so we made a recommendation to remove wenchman from  
25 the mid-water snapper complex, but we weren't able to come up with  
26 an OFL, and so we were looking at a time period of stable catches  
27 which we could recommend an OFL, and so we had a second motion to  
28 request to get these landings from the Gulf States Marine Fisheries  
29 Commission, and we had other concerns about the abundance of fish,  
30 the sustainability, due to the age composition, and we really  
31 wanted to look at those harvest years.  
32

33 I had the occasion to be digging through some old SEAMAP documents,  
34 and so, in 1984, the SEAMAP sub-committee had rumblings about  
35 developing a squid and butterfish fishery for Japanese markets,  
36 and so they implemented a squid and butterfish in 1985 and 1986,  
37 and so this is just a little snippet from a report to the TCC, and  
38 so we can see that the fishery was kind of well developed back in  
39 1986.  
40

41 There were eight boats that were working, and they got -- An  
42 estimated two-million pounds of butterfish were landed, and they  
43 said that catches were erratic, and catches were also erratic for  
44 the fishery-independent survey.  
45

46 In 1987, the SEAMAP sub-committee sanctioned a couple of surveys  
47 to try and figure out why they were so erratic, and so we've got  
48 some side-by-side comparisons, and this was the first fishery-

1 independent reference I could find that would kind of show what  
2 the proportion of wenchman is to the other fish that are in the  
3 fishery. We can see that the rough scad dominated the catch, as  
4 well as longspine porgies and butterfish and wenchman.

5  
6 Then, also, we've got Grace et al. in 2010, and so he was  
7 summarizing the SEAMAP fall deepwater catches, and this is using  
8 the standard forty-foot SEAMAP trawl, and, again, we have another  
9 fishery-independent look of what the proportion of wenchman  
10 catches should be in relation to the other two fish in the fishery.

11  
12 I believe this was a document, Pollack et al., that was from the  
13 SEDAR process that Shannon mentioned us being able to actually  
14 look at where the abundance of wenchman occur in the Gulf of  
15 Mexico, and they're predominantly in the west, and then we have a  
16 length frequency here that shows basically fish under ten inches  
17 are susceptible to harvest with that particular trawl, and most  
18 trawls, and I will note that the current world record is about 560  
19 centimeters in total length, and so it looks like these fish -- At  
20 some point, these fish should escape this gear.

21  
22 I found this little snippet online, showing where the distribution  
23 of the Gulf butterfish is, and I didn't present it as well, but  
24 scad follow the same kind of pattern. It's basically the western  
25 Gulf, from Desoto Canyon and going to the west, is where we're  
26 going to find these three species that we're concerned about in  
27 our motion.

28  
29 After the meeting in July, the two captains that were harvesting  
30 agreed to provide the State of Alabama with fishery-dependent  
31 samples, so that we could begin to look at what the length  
32 composition is, as well as get some otoliths, so that maybe we  
33 could start addressing the issues of sustainability related to the  
34 age composition, and so you see that we have a pretty good  
35 relationship between the otolith and the fork length.

36  
37 The samples are very few, and got them in July, and we got them in  
38 August, and we've got samples from November, and then, after  
39 November, both of the boats went to drydock, and we currently have  
40 one of the boats is working again.

41  
42 I guess, just so everybody can have kind of a better idea of the  
43 age structure and what we're looking at, this was the smallest  
44 fish that we got from the samples, and so, from a whole otolith,  
45 we see four opaque zones, and, in the whole otolith, as well as  
46 the cross-section -- At that point, we decided that we were going  
47 to have to cut everything, to look at it and get a better idea,  
48 and Will had mentioned, previously, that he had looked at some of

1 these, and they're not validated, and we haven't gone through the  
2 process of validating it yet, and hopefully we'll get a sufficient  
3 sample size that we can, at some point, validate these opaque  
4 zones, whether they're annual marks or not.

5  
6 Something that was just surprising, to me, was to see -- For  
7 something that was so small and slow-growing, to see such a wide  
8 variety of opaque zones in relation to the fork length and otolith  
9 weight.

10  
11 The Anderson et al. paper was also a paper that was produced for  
12 the SEDAR process, and very similar results, and those fishery  
13 were from a fishery-independent survey that came from the eastern  
14 Gulf, and the same results as we had, and ours are -- My samples,  
15 currently, are fishery-dependent, and I'm finding the same things,  
16 and so I guess there is potential for physical or environmental  
17 drivers to be driving these opaque zones, that they may not  
18 actually be annual marks.

19  
20 This is what you guys really wanted to see today, and so this is  
21 the landings, that I worked with Donna, and, if you have additional  
22 questions related specifically to the landings -- If I can't answer  
23 them, hopefully Donna can, and so we looked at wenchman across all  
24 gears in the Gulf of Mexico, and they're predominantly coming from  
25 the Zones 1 through 18.

26  
27 The trawl gear is fished mostly in the northern Gulf, Zones 8  
28 through 14, and the hook gears tend to be to the east and the west,  
29 and the southern portion of the Gulf, and so 82 percent of the  
30 harvest is reported as trawl, and it will increase to 98 percent  
31 if we add all those uncoded gears to the trawl, and so everybody  
32 knew that the gears were confidential, and so we worked with Donna,  
33 and we talked with Ryan, and we tried to look at moving-year  
34 averages, to see at what level we could get to a point where we  
35 could look at it, and Donna kept telling me no, and we finally got  
36 to a five-year average, and that was the smallest increment that  
37 I could get the landings to so that the SSC could review it.

38  
39 I just wanted to note that the ACL, and the accountability  
40 measures, for the mid-water snapper complex, and the trip tickets,  
41 were in effect for all five Gulf states starting in 2012.

42  
43 I think that becomes pretty evident for wenchman, when you look  
44 at, prior to 2012, that you see we have this dramatic jump-up in  
45 the landings, and then I've got a ten-year average, because,  
46 typically, we like to look at ten-year averages, and I will point  
47 out that 2022 is not finalized, and so probably -- I think most of  
48 the landings are there, but it's not completely finalized at this

1 point. I am not going to cover butterfish and wenchman, because  
2 I think our focus is -- I mean butterfish and scad, because our  
3 focus is on wenchman. Then the five-year average, and this is the  
4 smallest increment that we could look at.

5  
6 **CHAIRMAN NANCE:** Is that SEAMAP, John, when you say "gulf trawl  
7 landings"?

8  
9 **MR. MARESKA:** This is all commercial. These are all the commercial  
10 landings that are reported to the states.

11  
12 **CHAIRMAN NANCE:** Okay.

13  
14 **MR. MARESKA:** Again, we see that, when we incorporate 2021, we  
15 definitely see the landings jump up, because, that year, we had  
16 significant landings, that I think everybody was aware of from our  
17 previous meeting.

18  
19 Just a summary, and wenchman continue to be a smaller portion of  
20 the fishery-independent, as well as fishery-dependent, catch. The  
21 majority of the population is in the western Gulf. The trawl gear  
22 that we're evaluating -- They were concerned about, you know,  
23 harvesting fish, or operating in the northern part of the Gulf,  
24 and there was a large portion of the population that is not subject  
25 to the fishery. At some point, these fish grow large enough that  
26 they are able to escape this gear, and there's a lot of work left  
27 to be done with age structures, to determine the sustainability,  
28 based on ages.

29  
30 Hopefully, with this information, the SSC, this committee, has  
31 enough information that they can go back and select some reference  
32 years. The values that I've presented are just the trawl landings,  
33 and they are not all of the landings for all of the gears, and so  
34 we would not be making an OFL recommendation based on these  
35 numbers.

36  
37 **CHAIRMAN NANCE:** Thank you. I have two questions. Can you go  
38 back to Slide 13? Perfect. This doesn't have to do with this  
39 slide, but do we have any idea of the amount of catch from hook-  
40 and-line versus trawl?

41  
42 **MR. MARESKA:** I did not actually calculate that.

43  
44 **CHAIRMAN NANCE:** Okay. I was just thinking, and is like 2 percent  
45 hook-and-line, and the rest trawl, or --

46  
47 **MR. MARESKA:** Well, there is that uncoded gear, and so you saw  
48 that was a significant proportion, and I can't speak to it, and

1 Donna could probably speak better to what that uncoded gear means.

2  
3 **CHAIRMAN NANCE:** It's probably unknown gear, maybe, and it could  
4 be something like that. Then a question I have on this one is it  
5 looks like butterfish is, for all intents and purposes, pretty  
6 stable, as far as average pounds, but yet we've seen a tremendous  
7 increase in wenchman, and so is it wenchman that have increased,  
8 or were they thrown away before, and now they're landed?

9  
10 **MR. MARESKA:** Well, I think that was the point, and so, in 2012,  
11 the ACL was effect, and they were required to report the landings,  
12 and so, prior to that, they just weren't -- They were probably be  
13 landed, but they weren't being reported.

14  
15 **CHAIRMAN NANCE:** Thank you. Perfect.

16  
17 **MR. MARESKA:** That's my assumption.

18  
19 **CHAIRMAN NANCE:** Okay. Mike Travis, please.

20  
21 **DR. TRAVIS:** I just wanted to comment a little bit on the  
22 organization of the years, and I think the stability in the  
23 butterfish landings is a little deceptive, because of how the years  
24 were aggregated, because, if you go and look at the individual  
25 years, butterfish -- Butterfish has been, you know, a low-  
26 participation fishery, low-landings fishery, for a long time, and  
27 a lot of people thought that it had just gone away.

28  
29 However, if you look specifically at the 2020 and 2021 data, there  
30 was a huge increase in butterfish landings in those two years,  
31 compared to the previous seven years, and, actually, I will take  
32 some blame for that, because I had conversations with the  
33 butterfish fisherman who called me asking about how to establish  
34 markets, because -- I pointed them to the industry folks in the  
35 Mid-Atlantic, because the Mid-Atlantic has a very well-  
36 established, high-volume butterfish fishery, and has for decades  
37 now, and so there is definitely a change in that fishery, where  
38 you've got a lot more landings, a lot more participation, in 2020  
39 and 2021, and I think that has led to the issues with wenchman.

40  
41 **CHAIRMAN NANCE:** Okay. Thank you, Mike. Luiz, please.

42  
43 **DR. BARBIERI:** Thank you, Mr. Chairman. I am just wondering --  
44 It's hard, from this, right, to have a total picture of what the  
45 landings have been, even based on what Mike just mentioned, and,  
46 I mean, I wonder, and is wenchman perhaps one of those species  
47 that would belong more as an ecosystem component type species,  
48 that would not require annual catch limits?

1  
2 I mean, I wonder, because we already have so many things to deal  
3 with, right, so many data deficiencies, and so many things that we  
4 expect data inputs to be provided, you know, for both assessments  
5 and for interim analyses, plus all the regulatory analysis that  
6 needs to be done, and, I mean, given the magnitude of this fishery,  
7 and all of the other issues that we have to deal with, I just  
8 wonder if this is not something that --  
9

10 **CHAIRMAN NANCE:** Do we move it because of that? The issue is we're  
11 bumping up against a limit for the complex, and the complex wants  
12 to be fished for other species, but this one is being taken as  
13 bycatch, and, thus, the complex is in trouble.  
14

15 **DR. BARBIERI:** Right.  
16

17 **CHAIRMAN NANCE:** So can -- I guess my question is can you remove  
18 a species for -- Go ahead, Ryan.  
19

20 **MR. RINDONE:** I think the trouble of whether or not to remove the  
21 species from the FMP is a council issue. I think what you guys  
22 discussed the last time, and what you're discussing here, helps  
23 the council with building the record on why it might or might not  
24 consider that.  
25

26 The last time, you guys recommended removing it from the complex,  
27 because it's not caught, in any great numbers, with the other three  
28 species that are in the complex, and it associates with reef  
29 habitat in a completely different way than the other three species  
30 do, and there's a lot of unknowns about its life history, things  
31 that John had alluded to.  
32

33 I think the ecosystem component idea is certainly one to talk  
34 about, and just, as far as the scope of work is concerned, you  
35 know, what the council had originally asked -- I mean, one of the  
36 things is are there enough data to reliably establish annual catch  
37 limits for this species, and that would be something for you guys  
38 to weigh-in on.  
39

40 **CHAIRMAN NANCE:** Roy, please.  
41

42 **DR. CRABTREE:** I think the word "reliably" is a problem in that,  
43 and we have here trawl landings, but there are hook-and-line  
44 landings, I guess, and are there recreational -- There must be  
45 recreational landings, and so, if you wanted to set up a catch  
46 limit, you would have to look at all that, but one of the things  
47 that councils take into account, in determining whether to manage  
48 a species or not, is whether management can improve the status of

1 the stock, or can management succeed, or be effective, and, in  
2 this case, I would argue that, unless you're wanting --

3  
4 You're going to set up a butterfish FMP and manage that fishery,  
5 management is not going to succeed, and you can't do anything  
6 positive, because anything you set for a wenchman catch limit --  
7 If you hit it, all you're going to do is have the butterfish  
8 fishery throw this stuff into the garbage, and you won't reduce  
9 mortality or accomplish anything. It's not clear, to me, since I  
10 don't think we have a complete picture of the landings of the  
11 species, how we could set a catch limit today, but I guess we could  
12 get that information.

13  
14 **MR. RINDONE:** I have the recreational landings data here, and there  
15 are a lot of zeroes, but the average, for the last ten years, and  
16 so 2012 to 2021, for the recreational landings, for MRIP-FES, is  
17 thirty-eight pounds.

18  
19 **DR. CRABTREE:** I assume the hook-and-line commercial landings are  
20 negligible as well, and so the trawl fishery is pretty much it.

21  
22 **MR. RINDONE:** The trawl fishery is the main targeting fishery,  
23 and, based on what we heard from those guys, the last time that  
24 they were here and they talked to you guys, their primary target,  
25 when they're going out, is butterfish.

26  
27 **DR. CRABTREE:** Right.

28  
29 **MR. RINDONE:** They were saying, depending on how long the trawl is  
30 in the water, and where they are, sometimes they can get sometimes  
31 sizeable quantities of wenchman, but it's not a guarantee, and  
32 it's just -- It can be kind of haphazard.

33  
34 **DR. CRABTREE:** Jim, I think -- I mean, we could take average  
35 landings over one of these periods of time and say, okay, if you  
36 want an ABC, here it is, but it's not going to be meaningful, or  
37 effective, and I think, if the council wants to try and continue  
38 to manage wenchman, they've got to manage the butterfish fishery.

39  
40 If they're not going to do that, then I think Luiz's idea of making  
41 wenchman either an ecosystem component, or just taking it out of  
42 the FMP, is the way to go, because I don't think that management  
43 can have any positive impact on this stock.

44  
45 **CHAIRMAN NANCE:** Roy, on that point, I'm not sure we have all the  
46 trawl data, only because, if we have a category called "Unknown  
47 Gear", some of that could have been trawl, and some of it could be  
48 hook-and-line, you know, that type of thing, and so I would think

1 that we would want to see everything wenchman. Go ahead, Ryan.

2  
3 **MR. RINDONE:** I was going to tell Peter, you know, to be on deck,  
4 if you want to come up to the podium, since I see you've got your  
5 hand up, but, before that, I was going to say, as far as the  
6 unknown gears, I think they're usually labeled as "unclassified",  
7 and so sometimes it's like a gear might not have been input, or it  
8 might be one of, you know, a couple dozen the fall, you know,  
9 within just this --

10  
11 **CHAIRMAN NANCE:** That's all I'm saying, is it could be trawl that's  
12 in that group. Luiz and then Peter.

13  
14 **DR. BARBIERI:** Just a quick follow-up, because I think Roy made  
15 some points there that now are into the record, right, and they  
16 will help us, really, justify, or develop, our narrative, the  
17 argument, for basically presenting this as an idea to the council,  
18 because, whether we can do it today or not, in terms of going to  
19 the process -- I mean, I think, conceptually -- I just wonder if  
20 it makes sense.

21  
22 I mean, we already, in our region, and I mean the Southeast U.S.,  
23 in general, have a number of species, and we have a number of  
24 issues and data deficiencies to deal with, right, and we are always  
25 trying to address all of these bigger issues, and I wonder if this  
26 is not something that the council would consider, and it's really  
27 somewhat noise, from a fishery perspective itself, and, you know,  
28 not worth having dedicated tracking of quota.

29  
30 **CHAIRMAN NANCE:** Thank you. Peter, please.

31  
32 **MR. HOOD:** The reason why I had my hand up was basically to say  
33 what Ryan said about recreational landings being so low, but I did  
34 want to indicate that -- So, in 2020, we saw landings increase,  
35 and this was when the fishermen doing the trawling for butterfish  
36 were kind of gearing up, and, if I recall, they said that they got  
37 started in like July, or something like that, and so they didn't  
38 really have a whole year.

39  
40 I think we exceeded the ACL, but I don't think we exceeded the  
41 OFL, and then, in 2021, that's when they caught a -- They were  
42 fishing, you know, for the whole year, and we exceeded the OFL,  
43 and so we ended up having to close the fishery, and they didn't  
44 like that, because it meant that they had to stop fishing, and  
45 then, for 2022, we're below the ACL, and this is speculation on my  
46 part, but I would assume that, if they're targeting butterfish,  
47 and they want to keep fishing, and they're concerned about, you  
48 know, catching wenchman, and that possibly causing them to have to

1 stop fishing, that, you know, perhaps they're just not landing  
2 wenchman. They're landing the butterfish that they're targeting.

3  
4 **CHAIRMAN NANCE:** I guess that's my question, Peter. When you say  
5 we reached the OFL, and so they had to stop fishing, and I would  
6 probably say they quit landing, and they didn't quit fishing for  
7 butterfish, but they just quit landing wenchman in association  
8 with the butterfish, and would that be fair?

9  
10 **MR. HOOD:** Yes, although I'm trying to -- They came to this meeting,  
11 and I think it was to the SSC meeting.

12  
13 **CHAIRMAN NANCE:** They did.

14  
15 **MR. HOOD:** If I recall, they said that -- I think they said they  
16 stopped fishing, but maybe they just stopped fishing for wenchman,  
17 and they just weren't landing them, like you say, but, yes, that's  
18 sort of the big issue with this whole thing.

19  
20 **CHAIRMAN NANCE:** I am just asking. Ryan, please.

21  
22 **MR. RINDONE:** So they actually stopped fishing, because, when the  
23 mid-water snapper ACL is met, and the mid-water snapper is closed,  
24 where they're pulling these trawls -- I mean, if they catch any  
25 wenchman, then they're going to have to discard them, and so it's  
26 not like they have a very active ability to differentiate, at  
27 depth, and looking at fish finding gear, to be able to parse  
28 between, you know, this is wenchman, or this isn't, or this school  
29 of butterfish does, or does not, have wenchman in it.

30  
31 If they do an hour-long trawl, and they pull up, you know, 30,000  
32 or 40,000 pounds of say butterfish and miscellaneous fish, then  
33 they have to sort through all of that, and they have to throw all  
34 the wenchman back over, and they're probably dead, and so that's  
35 what they were trying to avoid, and so, basically, unless they  
36 want to have this risk of a massive amount of discards, they have  
37 to stop fishing, and, instead of being able to just take all the  
38 fish from the trawl and put it in the hold and then go on, now  
39 they have to spend all this time sorting and throwing dead fish  
40 back over, and so it destroys the efficiency of the operation, and  
41 so it's better that they just don't do it.

42  
43 **CHAIRMAN NANCE:** Roy, please.

44  
45 **DR. CRABTREE:** Yes, and so there's a big management problem here  
46 in how it's going to affect the fishermen and the fisheries, but  
47 I come back to we could give them -- If we think we have the  
48 landings and all that, we can give them a number, but it's not

1 going to fix their management problem, and I think the only fix  
2 for that is either stop managing wenchman or manage the butterfly  
3 fishery and come at this whole thing in a more comprehensive way.  
4

5 **CHAIRMAN NANCE:** Is the butterfly -- It sounds like the butterfly  
6 fishery is managed through Gulf States Marine Fisheries  
7 Commission. Is that -- John.  
8

9 **MR. MARESKA:** No, I don't believe there's any limit on butterfly.  
10

11 **CHAIRMAN NANCE:** Okay. Thank you.  
12

13 **DR. CRABTREE:** It is taking place in the EEZ.  
14

15 **MR. RINDONE:** Well, there's not a limit on butterfly. There's  
16 not like a commercial trip limit or anything like that, but the  
17 landings are monitored by Gulf States, in cooperation with the  
18 five Gulf states. The landings are monitored by the Gulf States  
19 Marine Fisheries Commission, in cooperation with the Gulf states.  
20

21 **CHAIRMAN NANCE:** Thank you. Jim Tolan, please.  
22

23 **DR. TOLAN:** Thank you, Mr. Chairman. Going down the road of the  
24 data-limited average landings over a stable period and come up  
25 with some number to set the ACL on, I'm looking at these, and we're  
26 handcuffed by these ten-year periods. No matter which one you  
27 pick, you can't really compare it to the other ones, to say it's  
28 stable, especially given the standard deviations that are almost  
29 bigger than the means in each case, and so it would be really tough  
30 to come up and say this is where they're standard, especially given  
31 some of the internal conversations we've heard about they're fairly  
32 erratic, year to year. Thank you.  
33

34 **CHAIRMAN NANCE:** Thank you, Jim. You sound better.  
35

36 **DR. TOLAN:** I feel a little better.  
37

38 **CHAIRMAN NANCE:** I'm glad. Harry, please.  
39

40 **MR. BLANCHET:** Hopefully this will be my last comment for the day.  
41

42 **CHAIRMAN NANCE:** Go ahead.  
43

44 **MR. BLANCHET:** It seems, to me, that John had already given us  
45 half of the information that we need to do a back-of-the-envelope  
46 calculation on the biomass of wenchman in the northern Gulf of  
47 Mexico when he showed the SEAMAP trawl.  
48

1 We have a forty-foot standard trawl, and we can calculate a swept  
2 area, and we have a value for how many kilograms of wenchman were  
3 landed in those random stratified trawls in a given depth zone,  
4 and I think you multiply the two together and you come up with a  
5 standing biomass. You divide that amongst a dozen or so age  
6 classes, and you come up with at least an order of magnitude of  
7 what your stock size might be. I'm done.

8  
9 **CHAIRMAN NANCE:** Roy, on that point?

10  
11 **DR. CRABTREE:** No, and I have a question.

12  
13 **CHAIRMAN NANCE:** Okay. Thank you, Harry. Roy.

14  
15 **DR. CRABTREE:** Is there an ABC currently for wenchman? Has the  
16 SSC given an ABC in the past?

17  
18 **MR. RINDONE:** No.

19  
20 **DR. CRABTREE:** All right, and so, if we determine that we don't  
21 have the basis to give an ABC, then the council would have to set  
22 -- I mean, they could change the ACL to do what they want, and  
23 there wouldn't be an ABC for them to exceed or not exceed.

24  
25 **MR. RINDONE:** If you guys decline to set an ABC, then the council  
26 basically has two key pieces of information to work off of. So it  
27 would be, one, that wenchman should be removed from the mid-water  
28 snapper complex, which was your recommendation the last time, and  
29 then, two, that you lack the information to be able to reliably  
30 set an ABC, and so, at that point, the council could evaluate the  
31 options that remain to it, like the ecosystem component or whether  
32 or not to consider removing wenchman from the FMP.

33  
34 Under either of those circumstances -- You know, once that decision  
35 is made by the council, whatever it is, then we would come back  
36 here and look at the landings that remain for the other three  
37 species, and then you guys could recommend an OFL and an ABC under  
38 Tier 3a, which I think is probably as best as you're going to be  
39 able to do for those, for what remains in the mid-water snapper  
40 complex.

41  
42 **CHAIRMAN NANCE:** Okay. Will, please.

43  
44 **DR. PATTERSON:** Thanks, Jim. Back to John's comments about the  
45 age and growth, I could show some slides from some recent work  
46 that we've done, or I can just talk about it, real quick, but I  
47 think the otolith that he showed might be underaged by a couple of  
48 years, but I don't think by many, and the work that we've done

1 with wenchman in the Bahamas -- I mentioned, the last time this  
2 came up, that we aged them to be -- Fifty-four was the oldest age  
3 estimate.

4  
5 That otolith is considerably bigger than the otolith that is shown  
6 here, the section here, and we have now validated the age estimate  
7 for that fish, and one other fish that was only seventeen, and we  
8 did it a couple of different ways. We extracted the core of the  
9 otolith, and we analyzed for radiocarbon, and we lined it up on  
10 the regional Gulf of Mexico/Northern Caribbean reference curve,  
11 and we also did the eye lens from the same fish.

12  
13 The reason we did both is because these deepwater snappers, and  
14 other deepwater fishes, the otoliths often appear to be depleted  
15 in radiocarbon, which makes it look like your age estimation is  
16 inaccurate, because the otolith is principally composed of  
17 dissolved inorganic carbon, where the protein in the lens is made  
18 up 100 percent of -- The carbon is 100 percent metabolic, and it  
19 comes from the food, and so the bomb radiocarbon signal that's up  
20 in the upper water column is being fixed by phytoplankton and  
21 transported to depth.

22  
23 The reason why it's important here that we did both is because  
24 they line up almost exactly in the same spot, and so that means,  
25 as juveniles, those fish were in the same -- They were in the upper  
26 well-mixed layer as juveniles, and then they were caught at about  
27 600 meters deep, on the upper slope in the Bahamas, and so they  
28 moved deeper as they went, as they -- You know, ontogenetically,  
29 they moved into deeper water, and so that was one thing that we  
30 were trying to test.

31  
32 I still think there's a lot more work to be done on wenchman life  
33 history in the Gulf of Mexico, but what this little bit of  
34 information suggests is the outer shelf is the juvenile habitat,  
35 and wenchman likely display an ontogenetic movement into deeper  
36 water, and so, to Harry's comment about being able to estimate the  
37 stock biomass of wenchman by the trawl, I don't think that's  
38 possible, and, if you look at the distribution map from earlier,  
39 it shows that the distribution of biomass doesn't drop off as you  
40 get to the outer shelf. It looks, you know, pretty constant in  
41 that zone, and I think it's because it actually moves into the  
42 deeper Gulf of Mexico.

43  
44 That's speculation, and it probably should be avoided, to some  
45 extent, but that's what these pieces of data suggest, is that  
46 wenchman can get quite old, and it's likely that the fish that are  
47 on the shelf are young, like John Mareska's section here shows,  
48 but that that's the juvenile habitat, and they may move into deeper

1 water as they get older.  
2  
3 **CHAIRMAN NANCE:** Thank you for that life history. I appreciate  
4 that. What do we want to do, gang? I think we've -- John and  
5 Donna, thank you.  
6  
7 **MS. DONNA BELLAIS:** You're welcome.  
8  
9 **CHAIRMAN NANCE:** I appreciate you being able to put this together  
10 and bring it to us. Thank you.  
11  
12 **MR. RINDONE:** We really do need a motion here.  
13  
14 **CHAIRMAN NANCE:** Yes.  
15  
16 **MR. RINDONE:** One way or another.  
17  
18 **CHAIRMAN NANCE:** Luiz, you look like you're ready.  
19  
20 **DR. BARBIERI:** Well, I will try, and you guys can help me along,  
21 but --  
22  
23 **CHAIRMAN NANCE:** Can I ask a question? We had a motion last time,  
24 and the recommendation was to move wenchman from the complex.  
25  
26 **MR. RINDONE:** Right.  
27  
28 **CHAIRMAN NANCE:** That motion is still in existence, which it sounds  
29 like that's what we're advocating today, also.  
30  
31 **MR. RINDONE:** Well, I think you've, you know, further solidified  
32 your position on that.  
33  
34 **CHAIRMAN NANCE:** Sean, please.  
35  
36 **DR. POWERS:** So it's either that motion or the motion that there's  
37 insufficient data for us to set an ABC.  
38  
39 **DR. BARBIERI:** To that point, Mr. Chairman, what I thought is that,  
40 you know, we can pull that motion, as the base, right, to provide  
41 the basis here, and then we add some language that says the SSC  
42 recommends that either wenchman be removed from the mid-water  
43 snapper complex or considered an ecosystem component species.  
44  
45 **DR. POWERS:** Or we just say there is insufficient data for us to  
46 do anything, and then it goes to the council.  
47  
48 **CHAIRMAN NANCE:** Okay. Think about that for a moment. Josh.

1  
2 **DR. KILBORN:** I just have a procedural question, because,  
3 yesterday, I asked whether or not we were allowed to remove scamp  
4 from the management complex, and I was told that was not our  
5 decision or recommendation to make, and so I'm curious why we're  
6 allowed to do that for wenchman.

7  
8 **CHAIRMAN NANCE:** All we make is a recommendation.  
9

10 **DR. KILBORN:** I understand that, and I would have made that  
11 recommendation for scamp yesterday, and so I'm just curious why we  
12 can make the recommendation to --  
13

14 **CHAIRMAN NANCE:** I guess did we have the data to be able to do  
15 that?  
16

17 **DR. KILBORN:** Well, that's a good question. I'm not sure.  
18

19 **CHAIRMAN NANCE:** Ryan.  
20

21 **MR. RINDONE:** I don't recall saying, no, you guys can't make the  
22 recommendation to remove it from the complex. If I need to eat  
23 crow on the verbatim minutes, I will be happy to grab a spoon, but  
24 I don't think that I said that, because you guys absolutely can  
25 make that recommendation, but, with respect to scamp, what I had  
26 said was that the council's strong preference was to manage the  
27 four species together as a complex and that you guys were asked by  
28 the council to provide catch recommendations in the context of it  
29 as a complex.  
30

31 Now, if you disagree with that, and what we ultimately said, later  
32 on in the day, was that, if it means that the council has to  
33 reexamine how the IFQ program for shallow-water groupers is put  
34 together, then that's a management problem, and that's not an SSC  
35 problem. The SSC can weigh-in on social and economic factors as  
36 it relates to the IFQ program, if it desires to, but that's still  
37 a management problem that the council would have to deal with in  
38 the face of what you guys provide for catch limits.  
39

40 With respect to this, you guys have already recommended removing  
41 wenchman from the complex, for the reasons that have been stated.  
42 What you were asked, by the council, was to provide updated catch  
43 limits for the complex, and the first part of you guys addressing  
44 that was to say that the complex should no longer include wenchman,  
45 and so, if you're going to provide catch limits for wenchman or  
46 not, that would be a recommendation that needs to come from this  
47 body.  
48

1 If it's that catch limits can't be provided for wenchman, or can't  
2 be reliably defended for wenchman, based on the data, then the  
3 next thing that would need to happen is we would need to consider  
4 catch limits for the remaining three species, and so that's our -  
5 - At least as I view it, that's our order of operations right now,  
6 based on what you've already recommended.

7  
8 **CHAIRMAN NANCE:** Thank you. Doug.

9  
10 **MR. GREGORY:** Thank you, Chair. In the past, NOAA General Counsel  
11 has been quite stringent in recommending to the council, and NOAA,  
12 that, if a fish is harvested and sold, it can't be relegated to  
13 the ecological category, but that was then, and things may have  
14 changed now, and clearly scamp would not be allowed to be taken  
15 out of the fishery, because it has enough data for us to do a stock  
16 assessment, and it is clearly part of the shallow-water grouper.

17  
18 Wenchman may be something else, but I suspect we'll end up having  
19 to -- We'll recommend taking wenchman out of that complex and  
20 setting up a new ABC for wenchman that is different than what we  
21 have now, because what we did was done ten or twelve years ago,  
22 based on landings prior to 2010, and, if what Mike Travis said is  
23 correct, that the fishery grew, for various reasons, and wenchman  
24 was being reported because of a new ABC, where before it wasn't  
25 being reported, clearly our estimate of ABC in 2010 was incorrect,  
26 but I will support whatever direction the SSC wants to go.

27  
28 **CHAIRMAN NANCE:** Thank you, Doug.

29  
30 **MR. GREGORY:** But it's going to be a challenge for the fishery.  
31 Thank you.

32  
33 **CHAIRMAN NANCE:** Steve.

34  
35 **DR. SAUL:** Thank you, Mr. Chair. Just for clarity, Ryan, you said  
36 that, if we, as a body, decide to recommend that it be removed  
37 from the complex, and then it goes to the Full Council, their  
38 options are either do nothing, pretty much, right, or not do  
39 nothing, but they set the limit, or make it be an ecosystem  
40 component, and is that correct?

41  
42 **MR. RINDONE:** You guys have already recommended removing it from  
43 the complex. At this point, the purview to remove it from the FMP  
44 is something that the council has to decide. If you guys do not  
45 recommend an ABC, because you can't reliably defend whatever  
46 numbers you would be recommending, based on the data you have to  
47 do so, then the council is in a situation where what it currently  
48 has on the books isn't supported by the SSC anymore, because it's

1 the SSC that determines the OFL and the ABC, and then the council  
2 works from there.

3  
4 If you guys say that you can't set an ABC, then the council has to  
5 decide its next move, which could be to classify wenchman as an  
6 ecosystem component species or to consider whether wenchman is in  
7 need of federal management or not, and those would be actions that  
8 the council would have to undertake.

9  
10 **DR. SAUL:** Okay. Thank you.

11  
12 **CHAIRMAN NANCE:** Thank you. At the July meeting, we had the motion  
13 that, based on review of catches and historical records, the SSC  
14 recommends wenchman snapper be removed from the mid-water snapper  
15 complex. Then we had further discussion, trying to set an OFL and  
16 those types of things for it as an individual, and then we had the  
17 motion to recommend the council ask Gulf States Marine Fisheries  
18 Commission to work with the five Gulf states to compile historical  
19 landings for butterfish, wenchman, scad, and other associated  
20 species from the mid-water trawl fishery for Gulf SSC evaluation.  
21 That is what we are doing today, and John was able to work with  
22 the Gulf States and bring that to us today, and so that's kind of  
23 where we're at right now, with those two motions. John and then  
24 Roy. Roy, please.

25  
26 **DR. CRABTREE:** So, we've already made a motion that it should be  
27 removed from the complex, and I don't think we need to revisit  
28 that. Whether it should be an ecosystem species or removed from  
29 the FMP, that's for the council to figure out, and there are a lot  
30 of guidelines and conditions on that that we don't have in front  
31 of us, and I think we should stay out of that.

32  
33 I think we ought to focus, right now, on one thing. Do we have  
34 enough here, or are we comfortable and prepared to give them an  
35 ABC, or do we feel like there just isn't enough, and we can't  
36 provide an ABC to them. I think we ought to focus on that, and  
37 that's really the question at-hand, and not get distracted by  
38 ecosystem components and all those other things.

39  
40 **CHAIRMAN NANCE:** Do we feel, as a body, and we talked about this  
41 last time too, whether we have enough information to set an OFL  
42 and ABC for wenchman? We talked about that last time, and we all  
43 felt, well, we don't have any information, and so we have the  
44 information now, and it's that table, and does that provide us any  
45 -- What's that?

46  
47 **MR. MARESKA:** That table, remember, is just the trawl landings,  
48 and we haven't actually looked at all of the landings across all

1 the gears, and so, if we had the table that had all the landings  
2 by year, that would be confidential, because that would be  
3 recreational, and that would be commercial trawl and commercial  
4 gear, and so I don't think we've looked at all that information,  
5 have we?

6  
7 **MR. RINDONE:** I don't think we can look at those data by year,  
8 because some of the recreational landings are zero, and so, if you  
9 looked at it by year, then the years where the recreational  
10 landings are zero, which you can look up through the MRIP database,  
11 and then, by default, what's left would be the commercial landings,  
12 which would be confidential, and so I don't think that we would be  
13 able to show that.

14  
15 **MR. MARESKA:** Maybe we can ask Donna if we can look at that across  
16 all gears, and what I presented is just the trawl gear.

17  
18 **CHAIRMAN NANCE:** I guess what we're saying is we want to look at  
19 this table, and it's going to still be by ten-year intervals, I  
20 assume.

21  
22 **MR. MARESKA:** The five-year interval was the smallest we could  
23 look at the trawl landings without reaching the confidentiality  
24 issue.

25  
26 **CHAIRMAN NANCE:** Okay, and so we could probably look at the total  
27 landings. Ryan.

28  
29 **MR. RINDONE:** I have a landings table from SERO that we got, very  
30 graciously, and thank you, Mike, about an hour ago, and, for  
31 wenchman, from 1986 through 2021, only two years are not  
32 confidential, and that's for all gears, and so -- That probably  
33 relates to the dealer side of things more than it does anything  
34 else, and so, from an annual perspective, we simply cannot show  
35 the annual landings, regardless of how the gear situation is dealt  
36 with.

37  
38 **CHAIRMAN NANCE:** John.

39  
40 **DR. FROESCHKE:** I guess I was just trying to look, and, I mean, I  
41 have some of these data, and Ryan is right on the commercial data,  
42 and it's super sparse, and so I don't know how, with what we have  
43 here -- We do have the recreational data, but I don't know how we  
44 would present this to have a discussion about it, to use it, and,  
45 I mean, I've looked at annual plots of both the shallow-water  
46 grouper in different ways, and it's highly erratic.

47  
48 I mean, we don't have the full back-in-time commercial, and, I

1 mean, it seems like, to me, we're going to have to think through  
2 this, maybe, and try to put it together in a different way, and  
3 let you guys take a look at it, but I'm just concerned we're not  
4 there at this exact moment.

5  
6 **CHAIRMAN NANCE:** Josh.

7  
8 **DR. KILBORN:** I tend to agree with what John is saying, and the  
9 problem I have with this table is that the standard deviations are  
10 all bigger than the average values, and so I really don't think we  
11 can make any decisions off of the data that we have in front of  
12 us.

13  
14 **CHAIRMAN NANCE:** I totally agree. Roy.

15  
16 **DR. CRABTREE:** I certainly would not be willing to provide what  
17 would be called an OFL on this. The notion that any of these  
18 numbers would represent overfishing or not is not -- It's a bridge  
19 farther than I would go, and so I'm not sure there's any more for  
20 us to do here today.

21  
22 **DR. BARBIERI:** A point, Mr. Chairman?

23  
24 **CHAIRMAN NANCE:** Yes, please, Luiz.

25  
26 **DR. BARBIERI:** To that point, Roy, I mean, the South Atlantic  
27 Council has been trying, for a while, to deal with those issues on  
28 the other side, right, and so, number one, for these types of  
29 species, we have basically decided that we cannot provide an OFL,  
30 and so we're doing to define the OFL as unknown, and General  
31 Counsel considered this acceptable, because there wasn't -- You  
32 know, there weren't enough data to provide an actual overfishing  
33 limit. You know, you can provide an ABC and say there's a limit  
34 on the landings that we think this stock can support, but we don't  
35 know at what point this would become overfishing, in any  
36 scientifically-credible way, and so, you know, that was stock  
37 status unknown.

38  
39 Going through that whole process, for a whole number of these very  
40 minor fisheries, I think that council proceeded to remove some of  
41 those species from the fishery management plan and to put them as  
42 ecosystem components, because I am just bringing this up because,  
43 you know, in the same region that we are, it provides some  
44 precedent, and background, for -- You know, if they were allowed  
45 to do it, then I cannot see why we wouldn't be.

46  
47 I'm not saying that the council will want to move this way, but I  
48 think, procedurally, I don't see any problem with that being done

1 here, and, to me, this is something that we can develop a number  
2 that's going to be highly, you know, uncertain, and it's throwing  
3 a dart, right, and so I don't see the point of this. You know, it  
4 wouldn't be meaningful, and I think our best advice to the council  
5 would be that there's enough data, you know, and Josh's point about  
6 the standard deviation and all of that, to provide reliable catch  
7 advice for this species. Steve is compiling a motion.

8  
9 **DR. SAUL:** I was cogitating on one, yes, but I will second that,  
10 or co-cogitate on it.

11  
12 **CHAIRMAN NANCE:** Thank you. Jim Tolan, please.

13  
14 **DR. TOLAN:** Thank you, Mr. Chairman. I went ahead and sent in a  
15 motion, to try to get us out of this hole. Thank you.

16  
17 **CHAIRMAN NANCE:** Good. I'm glad your brain is still working.  
18 Let's go ahead and -- This is a motion from Jim, and do you mind  
19 if I read it, Jim? I will go ahead and read it.

20  
21 **DR. TOLAN:** I typed it really fast, and so, obviously, my brain is  
22 not working all that well, and I'm still in a fog, but it captures  
23 the gist of it.

24  
25 **CHAIRMAN NANCE:** Okay. Due to the catch data confidentiality  
26 limits imposed on the Gulf States Marine Fisheries Commission  
27 provided information that was -- Ryan.

28  
29 **MR. RINDONE:** Jim, I'm going to help.

30  
31 **CHAIRMAN NANCE:** You're a good master at this.

32  
33 **DR. TOLAN:** Thank you.

34  
35 **MR. RINDONE:** It isn't just the data that was provided by John and  
36 the Gulf States Marine Fisheries Commission, and it's all the  
37 commercial data, and so, if you were to consider revisions, it  
38 could be that, due to the catch data, the commercial catch data  
39 confidentiality limits, and the near absence of recreational  
40 landings, which I think is fair thing to say with an average of  
41 thirty-eight pounds per year over the last ten years, and so the  
42 near absence of recreational landings presented to the SSC, or  
43 available to the SSC, the SSC currently cannot recommend catch  
44 advice for Gulf of Mexico wenchman. Jess, I think you can delete  
45 all the way down to right before the last sentence. We want to  
46 keep the last sentence, and so the SSC also reiterates their  
47 previous recommendation to the council that wenchman be removed  
48 from the mid-water snapper complex, and so delete "current" and

1 put the "mid-water snapper". Jim, do you want to give that a read?  
2  
3 **DR. TOLAN:** I fully support the changes you've made, and that  
4 covers it well.  
5  
6 **CHAIRMAN NANCE:** Thank you. Do we have a second for this motion?  
7  
8 **DR. WOODWARD:** Second.  
9  
10 **MR. BLANCHET:** The third-from-the-last line, it starts with "GOM  
11 wenchmen, and I think you want "wenchman".  
12  
13 **CHAIRMAN NANCE:** Thank you. Yes. Thank you, Harry. That was a  
14 good catch. Before everybody leaves, let's go ahead and -- Steven,  
15 please.  
16  
17 **DR. SAUL:** I was going to offer a quick possible friendly  
18 amendment, but let me know if this screws everything up, but, at  
19 the very end, "and recommends the council consider it part of the  
20 ecosystem component", but I don't know if that legally opens up a  
21 Pandora's Box of other stuff.  
22  
23 **SSC MEMBER:** (The comment is not audible on the recording.)  
24  
25 **DR. SAUL:** Don't go there? Okay. Let the more experienced folks  
26 -- I will defer to that. Thanks.  
27  
28 **CHAIRMAN NANCE:** Is there -- Let me -- I have to read this, and  
29 then I will ask for -- **The motion is, due to the commercial catch**  
30 **data confidentiality limits, and the near absence of recreational**  
31 **landings available to the SSC, the SSC currently cannot recommend**  
32 **catch advice for Gulf of Mexico wenchman. The SSC also reiterates**  
33 **its previous recommendation to the council that Gulf of Mexico**  
34 **wenchman be removed from the mid-water snapper complex. John.**  
35  
36 **DR. FROESCHKE:** I've been twitching my ear about this, that we  
37 have catch advice, and what I'm concerned is that, if we did this,  
38 there is some possibility that NMFS could say, well, if we cannot  
39 recommend catch advice, then the resulting ABC would be zero. I  
40 would recommend that we say, "cannot recommend revised catch  
41 advice", such that it would -- If they can't come up with something  
42 different, then it doesn't go to zero.  
43  
44 **CHAIRMAN NANCE:** Have we ever given catch advice for wenchman?  
45  
46 **DR. FROESCHKE:** Yes.  
47  
48 **CHAIRMAN NANCE:** We have given for the complex, but not for the

1 individual, and is that correct?

2  
3 **UNIDENTIFIED:** (The comment is not available on the recording.)

4  
5 **CHAIRMAN NANCE:** I think this is accurate, in that we have never  
6 given catch advice for wenchman as an individual. We've given it  
7 for the complex, and I think once -- If they remove wenchman from  
8 the complex, then we would have to come back and give some other  
9 information for that complex.

10  
11 **DR. CRABTREE:** You know, in my opinion, the council can set an ACL  
12 without an ABC and without giving them advice, but I don't know,  
13 and they will have to talk to GC and figure all of that out.

14  
15 **CHAIRMAN NANCE:** Will, please, Will Patterson.

16  
17 **DR. PATTERSON:** Just a friendly amendment here, if Jim and his  
18 seconder are amendable to it, is to move the second sentence first,  
19 and then say, "however", and then the first sentence.

20  
21 **CHAIRMAN NANCE:** Then do what, Will? I didn't hear that.

22  
23 **DR. PATTERSON:** Say, "however".

24  
25 **CHAIRMAN NANCE:** Then that would be, okay? Jim and Richard, would  
26 that be fine?

27  
28 **DR. WOODWARD:** Yes.

29  
30 **CHAIRMAN NANCE:** Okay. Jim, any issue there?

31  
32 **DR. TOLAN:** No, and that's fine by me.

33  
34 **CHAIRMAN NANCE:** Okay. I am going to read this. The SSC reiterates  
35 their previous recommendation to the council that Gulf of Mexico  
36 wenchman be removed from the mid-water snapper complex. However,  
37 due to the commercial catch data confidentiality limits, and the  
38 near absence of recreational landings available to the SSC, the  
39 SSC currently cannot recommend catch advice for the Gulf of Mexico  
40 wenchman. Is there any opposition to this motion? The motion  
41 carries without opposition.

42  
43 That ends our SSC component, and we now have public comment. Do  
44 we have any individuals online or in the audience? Captain, go  
45 ahead and come up.

46  
47 **PUBLIC COMMENT**

1 **MR. ERIC SCHMIDT:** I am going to speak in absolute agreement that  
2 wenchman should be taken out of the mid-water and deepwater snapper  
3 complex. It probably shouldn't even be managed, period. It's  
4 really an irrelevant fishery, with a miniscule amount of fish,  
5 when you come to the grand scheme of things.

6  
7 I do have a comment about something that's not on the agenda, and  
8 I won't take very much of your time, and I know this is day-three  
9 of an SSC meeting, and many of your heads are ready to explode,  
10 and so, last week, we had the court ruling on the VMS, and things  
11 have now changed in the charter industry.

12  
13 The charter industry came before the Gulf Council and requested  
14 electronic logbooks, so that they could build a catch history, and  
15 now there is no more electronic logbooks, and there's no more  
16 reporting, no more hail-in and no more hail-out, and I am torn a  
17 little bit at this, because SEFHIER, I think, went a little too  
18 far from what the industry originally wanted, but, at the meeting  
19 in Baton Rouge, NMFS suggested that we're going to know, pretty  
20 soon, whether or not the red grouper is going to close.

21  
22 Red grouper is a very valuable component to the charter industry,  
23 from Tampa to Key West, and it's probably the world's biggest  
24 population of red grouper live in that 180-mile stretch. There's  
25 a possibility that we could close in June, and southwest Florida  
26 was home to the second-largest-costliest hurricane in U.S. history  
27 on September 28.

28  
29 The area is struggling financially, and now we're also contending  
30 with a really bad red tide. 1979 was bad, and 1983 was bad, and  
31 2018 was the worst I've seen, and I hope I'm wrong, but I was on  
32 the water four days last week, and, from what I'm seeing, this is  
33 probably going to be worse.

34  
35 Kingfish, cobia, tarpon, pelagic species, species that you  
36 normally do not see die in red tide, are on the beach, and it is  
37 going to be exceptionally bad, and so, at the next council meeting,  
38 I am going to request the council seriously look at sector  
39 separation. The recreational sector overfished their quota by 200  
40 percent in the last two years, and has not been held accountable,  
41 and now the charter industry has suffered a closure, both on red  
42 grouper and lane snapper, early, two years in a row.

43  
44 If they close this year, after the financial hit that southwest  
45 Florida suffered with Hurricane Ian, and we get a six-month  
46 fishery, I don't how many individuals are going to be allowed to  
47 even stay in the fishery. You just can't do it. You can't walk  
48 into a bank and say, hey, I want to borrow money year-round, but

1 I'm only going to be able to be open for six months.

2  
3 It is time that we seriously look at something new. We did this  
4 for red snapper, and there was a motion made, three council  
5 meetings ago, by Susan Boggs, and she wanted to explore sector  
6 separation for red grouper, gag grouper, amberjack, and  
7 triggerfish, and I think it's time the council do this.

8  
9 As we sat this afternoon and heard discussions about amberjack,  
10 we've kicked the can down the road on amberjack for twenty-five  
11 years, and all we do is raise the size limit and close another  
12 month and decrease the trip and close this area, and it's not  
13 working. I don't know, and maybe the model is not working, and  
14 that's taboo to say that, but maybe it's not for that particular  
15 fish.

16  
17 It's time that we seriously look at something new, and I think  
18 it's time for sector separation, because the charter industry  
19 really has been paying the freight for one sector of the group  
20 that is growing exponentially, without any constraints. Thank  
21 you.

22  
23 **CHAIRMAN NANCE:** Thank you, Captain. Any questions or comments  
24 from the SSC? Eric, it's always great to have you here. Bob  
25 Zales, please.

26  
27 **MR. BOB ZALES, II:** Bob Zales, II. I agree with some of what Eric  
28 has talked about, and I think he needs to really look at the  
29 numbers on the four species he's talked about for sector  
30 separation, because, in most of them, the charter side gets very  
31 little, and so I don't know where that's going to go, but my main  
32 comments are on amberjack, on the release mortality issue that you  
33 all discussed earlier.

34  
35 I was glad to see that they had that, the larger the jack is, the  
36 more likely it is not to survive the release mortality, and that's  
37 upward of 40 percent, and I would argue that that figure is higher.  
38 We have argued, for years and years, that, the more you increase  
39 the size limit on amberjack, the more damage you're going to do to  
40 that fishery, because, as jacks hit twenty-nine or thirty inches  
41 and above, they don't survive release very well.

42  
43 They fight hard, and they're hard-fighting fish, and, by the time  
44 you get them up on the water, they're pretty well stressed out,  
45 and they hardly ever survive. Back in the 1990s, I tagged several  
46 hundred amberjack off of Panama City, and we had a real good return  
47 rate on those, and the smaller fish are very hardy. The smaller  
48 fish, you catch them, and you throw them back, and they scurry

1 off, unless a dolphin or a shark eats them, and they're going to  
2 survive, but the larger fish just float away, and they don't make  
3 it, and so I don't know what you all can do about this, but the  
4 managers that we have on the council, and with the Fisheries  
5 Service, they need to take a serious look at these size limits and  
6 what the mortality is on the larger fish, because, as you try to  
7 catch the large thirty-four-inch size on the recreational side,  
8 and you're discarding thirty, thirty-one, and thirty-two-inch  
9 fish, they're dying, and that's part of our problem.

10  
11 That's not the total problem, and, I mean, I've been concerned  
12 about jacks since Amendment 1 to the fishery in 1990, and  
13 amberjack, for whatever reason, and you all have heard me say this  
14 before, they have not responded to any type of management that's  
15 been put on them. Why that is, I don't know, and I can't figure  
16 it out, with my limited knowledge on this, and apparently nobody  
17 else has been able to figure it out, because we're still dealing  
18 with an overfished and overfishing fishery, and so something is  
19 going on with the jack population, and hopefully, at some point,  
20 we'll be able to figure that out, and so that's all I've got for  
21 now. Thank you.

22  
23 **CHAIRMAN NANCE:** Thank you, Bob. Any questions or comments from  
24 the SSC? I appreciate you being on, Bob, and I appreciate those  
25 comments, and I will see you in Gulfport. Okay. That ends our  
26 SSC meeting, and I want to thank everyone, and I thought we had a  
27 great meeting, and there was certainly a lot of discussion, and  
28 it's nice to see more of us in-person, and we'll go ahead and  
29 reconvene this meeting in May, and safe travels to everybody.

30  
31 (Whereupon, the meeting adjourned on March 9, 2023.)  
32  
33  
34

- - -