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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Luiz Barbieri...
Harry Blanchet..
David Chagaris..
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Don Behringer...
Peyton Cagle..
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30   Bob Zales, II...............................................FL
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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.

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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.
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 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.
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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.
9
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.
14
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.
23
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.
30
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.
35
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.
46
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.
48

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

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

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

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

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

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

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

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

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

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

DR. KILBORN: Sure. Then the next question is why did you select 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

22

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

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

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

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

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

CHAIRMAN NANCE: Thank you, Harry. Jason, please.

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

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

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

35

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

37

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?
48

CHAIRMAN NANCE: Sean, please.

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

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

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

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

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

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

46

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-

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

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

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

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

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

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

CHAIRMAN NANCE: Richard.

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

CHAIRMAN NANCE: Okay. Jim.

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

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

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

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

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

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.
48

51

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.
48

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.

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

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

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

18 **DR. GRIFFITH:** Yes.

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

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.

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 --

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

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

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.

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

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

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

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

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

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

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

CHAIRMAN NANCE: Put offshore Gulf of Mexico shrimp industry.

57

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.
9
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.
22
23 **CHAIRMAN NANCE:** Thank you for that. Mandy.
24
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.
37
38 **CHAIRMAN NANCE:** Thank you. We have a motion, made by Dr. Mickle.
39 Do we have a second for this motion? Richard.
40
41 **DR. WOODWARD:** I will second it.
42
43 **CHAIRMAN NANCE:** Okay, and so we have a motion, and we have a
44 second. Any further discussion? Do we have -- Jason, please.
45
46 **MR. SAUCIER:** Thank you, Mr. Chair. Sorry to jump in there late.
47
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

60

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**

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.

MS. MATOS: David Chagaris.

DR. CHAGARIS: Yes.

MS. MATOS: Josh Kilborn.

DR. KILBORN: Yes.

MS. MATOS: Cindy Grace-McCaskey.

DR. GRACE-MCCASKEY: Yes.

MS. MATOS: Mike Allen.

DR. ALLEN: Yes.

MS. MATOS: Luiz Barbieri.

DR. BARBIERI: Yes.

CHAIRMAN NANCE: I am going to have -- Mike, let's see, is Reef Fish, right?

MS. MATOS: Am I only doing Shrimp?

CHAIRMAN NANCE: I think, for this -- For motions, I think we need to do the -- Mike, thank you, and I appreciate -- It will be Shrimp and Standing. I'm sorry.

MS. MATOS: Okay. All right. Hold on. Jim Tolan.

DR. TOLAN: Yes.

MS. MATOS: Sean Powers.

DR. POWERS: Yes.

MS. MATOS: Trevor Moncrief.

MR. MONCRIEF: Yes.

MS. MATOS: Doug Gregory.

MR. GREGORY: No.

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 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
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DR. FAIRBANKS: Yes.

MS. MATOS: Mandy Karnauskas.

DR. KARNAUSKAS: Yes.

MS. MATOS: Don Behringer.

MR. BEHRINGER: Yes.

MS. MATOS: Steven Scyphers.

DR. SCYPHERS: Yes.

MS. MATOS: Jim Nance.

CHAIRMAN NANCE: Yes.

MS. MATOS: David Griffith.

DR. GRIFFITH: Yes.

MS. MATOS: Roy Crabtree.

DR. CRABTREE: Yes.

MS. MATOS: Luiz Barbieri.

DR. BARBIERI: Yes.

MS. MATOS: That's it, right? Correct? Cindy.

DR. GRACE-MCCASKEY: Yes.

MS. MATOS: Josh Kilborn.

DR. KILBORN: Yes.

MS. MATOS: David Chagaris?

DR. CHAGARIS: Yes.

MS. MATOS: Okay.

CHAIRMAN NANCE: Thank you. Okay, and so that takes care of that
motion. I think we've moved forward a lot on this. Matt, did you
have something, just from an endpoint?

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?
48

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.

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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

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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

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

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

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

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

DR. FREEMAN: It's a framework.

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

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

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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.
48

```
 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

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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

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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

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

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

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

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

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

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

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

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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 Am 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

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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

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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're 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

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

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

DR. CHAGARIS: Okay. Thank you.

DR. MUNCH: Sure.

CHAIRMAN NANCE: Steven.

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

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

DR. SAUL: Thank you.

DR. MUNCH: Sure.

CHAIRMAN NANCE: Any other questions? Any online, Jessica? Okay. Thank you. David, I have the same -- When it's being presented, I understand it, but, trying to wrap my head around it, I have a hard time, but I appreciate -- You know, your presentation is 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

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

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

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

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

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

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.
48

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

95

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.
48

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

DR. CHAGARIS: That's a fleet Q.

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

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

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

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

CHAIRMAN NANCE: Okay. Thank you. Doug Gregory, please.

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

DR. MUNCH: The setup that we're using is that we have -- We have an index of abundance this year, and catch this year, index of abundance last year, catch last year, and we go back four years for brown shrimp and three years for white shrimp. Actually, we did both to four or five years and found that four was sufficient 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.
9
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.
20
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.
25
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?
30
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?
34
35 **CHAIRMAN NANCE:** No, and I guess my -- For SEDAR 87, is effort
36 part of the SEDAR?
37
38 **DR. STEVENS:** The effort, like shrimp fishing effort?
39
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?
44
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

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

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

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

DR. STEVENS: Yes.

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

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

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

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

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

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

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 <div align="center">**REVIEW OF ROYAL RED SHRIMP LANDINGS**</div>
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?

105

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.
48

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.
48

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.
48

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.
48

113

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.
48

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.

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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

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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.
48

121

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.
48

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.
48

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.
48

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

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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

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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 you're 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.

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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.
48

In 2027, we would expect, based on the progress for the greater
amberjack research track, to have an operational assessment in
there, but, you know, we've left this blank, because, that far
out, it's kind of hard to tell at this point, but we would expect
to have the greater amberjack operational assessment, and then we
would be evaluating what other species we needed to do operational
for. You know, I could imagine red snapper being in here, you
know, perhaps looking at whether we can do another interim for
vermilion, or whether we need to do an operational, things like
that, to just go back and evaluate kind of where we are. Then a
standard assessment for yellowtail snapper, and so any thoughts on
any of this SEDAR schedule, as it stands?

CHAIRMAN NANCE: So red grouper comes up every once in a while.
Is it scheduled -- We've been doing an interim analysis for a while
on it.

MR. RINDONE: Yes, and it's scheduled for 2024.

CHAIRMAN NANCE: Okay. Thank you. I see it now. Perfect.

SSC MEMBER: Ryan, it looks like there's some typos in there for
the Florida assessments, and so mutton snapper starts in 2023,
with a terminal year of 2022, but, then, in 2024, it has a terminal
year of 2021.

MR. RINDONE: Good catch.

SSC MEMBER: The same thing happened for the hogfish as well.

CHAIRMAN NANCE: From the SSC perspective, any species that are
hanging out there that it's felt we need to bring up now? John,
please.

MR. MARESKA: I guess I will just ask, and what was the
consideration of red drum? That's a fish that just keeps going
down the road.

CHAIRMAN NANCE: It's just moving down the line. I know we had
that -- We had planned a workshop on goliath grouper, and we were
going to talk about red drum in that, and we have kind of put that
off, and we haven't done anything with that, and I think we need
to bring that back up, and I think that will help to maybe
materialize red drum, to move it along, or keep it out of the
picture, and I know we just kind of have not done things with it.
I know, when there's an assessment that is tried, it's -- You know,
it doesn't happen, but -- Sean.

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,

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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

the last meeting's summary, and gag is going to be attempted for
-- Is that still for July, Katie, for the July SSC meeting?

DR. SIEGFRIED: The last letter we got from the council said
September.

MR. RINDONE: September? Okay. That's going to look at using the
combined video index with -- Yes.

DR. SIEGFRIED: It's not the combined video index. It's going to
be truncated version of G-FISHER that matches what was used in the
assessment, but you can't fit that in that little box, and so I
don't care what you want to say.

MR. RINDONE: Well, I can do something there.

DR. SIEGFRIED: Can you say "truncated G-FISHER"?

MR. RINDONE: I can say that.

DR. SIEGFRIED: Lane snapper is iTarget, and I don't know if you
want to say that or not.

MR. RINDONE: I can say that, too. That's just fine. Technically,
the index is the headboat CPUE, for lane snapper, and so I could
just say that. That one is my fault. That was copy-and-paste.
Then vermilion snapper, and do you know what you guys are going to
use for that yet?

DR. SIEGFRIED: I am still checking. Sorry. I will be right back.

MR. RINDONE: I will just put "...". We still have the annual
request for red grouper, and so, until get the stock assessment,
which we'll expect to get, again, in 2024, and we would still
expect to get that interim analysis with the NMFS bottom longline,
as a health check, in early 2024.

We are requesting an interim for gray triggerfish, because it's
been a while since we've had one, but, again, just looking at that
as a health check, because we're quite a ways out from the last
time that we had a stock assessment done. Greater amberjack, the
same thing. We're not so far out from the last time the assessment
was done, but we have it listed as a health check, mostly because
of just some uncertainty about the ability to use a fishery-
independent index for doing an interim analysis for greater
amberjack, and I think that's one of the things that the Center is
looking into.

King mackerel is another one that is a question-mark. I had
talked, at one point, with John Walter about a Frankenstein
approach, using effort indices, but most of that was in Google
chat, and I know that I didn't save it, and I kind of wish that I
did, because I thought we had a decent idea, but that's something
that the Center is going to have to have to look at as well,
because any of the individual fishery-independent indices are kind
of weak to look at for an interim analysis, and the larval survey
is the only one that's included in the stock assessment, and it's
one of those things where it's like any one thing by itself isn't
quite enough, but several of the indices together make up enough
to generate a signal that can be examined.

The frequency with which we're doing these things is very
malleable, and it can be readdressed, based on council need, and
one of the things that I wanted to try to get out of you guys with
this though was relating back to red grouper and that interim
analysis and what happened there.

Is there a certain amount of time, beyond the completion of the
last stock assessment, when you guys are feeling like you kind of
want to push back on continuing to do interim analyses, revising
catch limits, based on one representative index of abundance, or
is it very, you know, situational? Is it very, you know, species
specific? You know, a discussion about that is something that you
guys could certainly have, and I know that the council would
probably appreciate it and have a better idea of what to expect
with interim analyses that are reviewed by the SSC, and so I will
open the floor on that.

DR. BARBIERI: To that point, I think we had discussed, when we
talked about the red grouper interim analysis, and I think we
discussed that this would be another agenda item for an upcoming
SSC meeting, so we could discuss a lot of these details more
directly and specifically, right, and probably have to -- It's
another one of those items that we probably will have to work in
tandem with the Science Center, because, of course, if they are
the ones conducing the analysis, right, and conducting -- Leading
most of the stock assessments, then this timing is going to have
to be coordinated between the two calendars, the SEDAR assessment
calendar and the interim analysis calendar, so that we have some
alignment there. Roy Crabtree.

DR. CRABTREE: Luiz, I think you're right, because we have some
things that we need to work out with the Center, in terms of the
deliverables with an interim assessment, to allow us to change the
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 arrear, 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.
48

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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

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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

defined as 50 percent of the spawning stock biomass at MSY.
Maximum fishing mortality threshold is defined as F at MSY, or its
proxy, and OY at 75 percent of F at FMSY, or its proxy. If
different status determination criteria are recommended, then
provide outputs for that.

Unless recommended, use the geometric mean of the previous three
fishing years fishing mortality to determine F current, and this
is generally what's been done for all of our past assessments. If
an alternative approach is recommended, provide justification and
outputs for that alternative, and provide yield and spawning stock
biomass streams for the overfishing limit. Yes, John.

MR. MARESKA: To that point, as I recall, when we were looking at
calibration, Florida wanted to request -- Was it 2020 or 2021 that
the effort was markedly down, and so, if you're trying to use three
years, determine if you wanted to remove one of those years, and
do you want the most current two years?

MR. RINDONE: Well, I think that would fall within the alternative
approach, right?

MR. MARESKA: It could. It's kind of already on the record that
there was issues with one of those years.

CHAIRMAN NANCE: Which state?

MR. MARESKA: Florida.

MR. RINDONE: It was Florida.

CHAIRMAN NANCE: No, I don't think so. I thought it was --

MR. MARESKA: Yes, and the survey effort for determining catch was
the --

MR. RINDONE: It's 2015 to 2019 and 2021. They excluded 2020.

MR. MARESKA: I thought the terminal year was 2022 for this.

MR. RINDONE: For this, it's 2022, but, to your point about the
calibration stuff, you're right. They did exclude it, originally.
It was 2020.

CHAIRMAN NANCE: 2020, yes.

MR. MARESKA: I thought I would just bring that point up. We can
consider it later.

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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.

157

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

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

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 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
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use a lot of fishery-dependent data in our stock assessments, and how that information propagates through the system, through the stock assessment models, to inform, ultimately, our management recommendations, and so, today, I would like to talk with you all a little bit about -- I will give a quick, two-minute general introduction to why human behavior is important to understand, and how it relates to uncertainty within fisheries assessment and management, and I will talk a bit about agent-based modeling and how that can be used to understand interactions and feedbacks within a system, particularly systems that are coupled human-natural systems, and the bidirectional feedbacks that occur within such systems.

I will then talk about the Gulf of Mexico agent-based simulation model that has become a large part of my career, and it started out as my PhD work, and it's sort of evolved since then, and so I will kind of explain where that's come from, where it is now, and where it's going.

I will talk a bit about the results of the simulation model and then talk about how I used those results to develop some Stock Synthesis assessment models to try and understand, again, how this idea of the way fishers behave, the way fishers fish, interact with the dynamics of fish populations. I will talk about some implications for those results, a brief introduction on -- Very briefly, some other applications of agent-based models in fisheries and future research directions.

This is not new news to anyone in the room here, but resource users, obviously, sometimes respond in surprising ways to the policies that we put in place, right, and so we sit around the room here, and we try to think about what some of the best management strategies might be for particular species, based on the scientific evidence that's presented to us. However, we're not fishers, right, and fishers are inherently extremely intelligent, innovative, and are often able to work with the regulations that we provide and find innovative solutions to continue fishing in ways that we may not have anticipated, despite introducing or putting those regulations in place.

Most research, to-date, has focused largely on the biological side of things, of stock assessments and fisheries science, and so understanding how population dynamics operate, and less time has been focused on trying to understand the implications of human behavior on these coupled human-natural systems, although that is increasingly changing over the past ten or fifteen years, which is 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

then try to formulate theories about the way these individuals interact within the simulation, and you develop those theories within your code, and you test them and implement them within the computer simulation.

Theories that do not reproduce the sort of patterns and dynamics that you observe in the natural system are discarded, and then you maintain those theories that do, and then you try to observe the sort of emergence of what are called system-level patterns, and so, again, this bottom-up approach, where you look at the interactions of the agents that have these sort of lower-level parameterizations, and then you observe the emergence of system-level patterns from all of these individual interactions within the system under different and changing state conditions. State conditions, by that, I mean changes in weather, changes in the financial structure, things like fuel price or fish price, changes in regulations, et cetera.

Briefly, what's an agent, right, and James Bond is obviously an agent, and what does James Bond do well? He has a clear goal, typically, right, to assassinate so-and-so for this purpose, and he is fairly autonomous in his decision-making around that goal, and, you know, agencies may tell him one thing, but he may deviate and do something else, right, because on-the-ground conditions change in real time rather quickly, and agents need to be adaptable to these changing conditions, and so they need to make on-the-fly decisions and change the way they operate to reflect different, or changing, state conditions. Agents in simulation models are no different, and the idea is that they should have these sort of characteristics.

If you think -- So traditional models, equation-based statistical models, I have nothing against those at all, and I continue to use those as extremely useful tools. However, the way they operate is they define aggregate behavior, right, and then they generate responses to the different shocks that we present them, and so our stock assessment models are configured and developed based on historical data, and we then try to impose a shock, meaning a change in fishing mortality, and then forecast, or project, forward what might happen in response to that shock.

Statistical and mathematical models tend to be a bit statistically brittle and rigid, right, and so some of these important components, and feedbacks, that I was mentioning earlier are a bit lost, or are essentially aggregated at a higher level, right, and so F, fishing mortality, there is a lot baked into that parameter, to that value, and so fishing behavior is in there, and the movement of fish stocks is baked into that parameter, as well as

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a number of other different processes that we don't explicitly
parse out, or separate, because it's hard, and, often, it's not
doable within the timeframes that we have for assessments.

Agent-based models are very useful when you have these sort of
bidirectional feedback mechanisms in place, where you have agents
interacting with the environment, policies, and then you see how
those -- How environmental conditions and policies, in turn, affect
the agent.

As a quick simple example, think about -- We all live in, or most
of us live in, places that have horrible traffic, and so think
about a car as an agent, and you driving that car, right, and we
could model the flow of traffic as using something like fluid
dynamics as an equation-based sort of process, right, and that
would be one way to sort of try to understand the way traffic moves
and ebbs and flows under various conditions, during rush hour,
when there's construction, when there's an accident, et cetera.

Another way to think about traffic, more modeling traffic, is as
agents in an agent-based model, and so let's define a car, right,
and let's say a car has two very simple properties, and it can
accelerate, if there is space, right, and, here, obviously, even
if there was a little bit of space, here, or in Miami, you zoom
into that space, and grab that spot, and then, if there's a car in
front of you, you better stop, or you are going to rear-end them,
and you'll be at fault, right, and so let's say that those are the
two properties that control, or make up, how a car operates.

If we do that, if we apply these two properties to traffic, to a
car -- So, if we look at what happens if we apply these two
properties to traffic, traffic piles up at certain places, and the
average speed of those cars is, you know, rather slow, right, and
so you have these sort of bottlenecks, which is not atypical of
what happens in a typical highway, right, and so what you can do
then is you can validate that with real-world observations, and so
you can -- Essentially, this is just showing a real-world example
of what would happen if you apply those two principles to cars in
traffic.

Let's say that we impose a simple policy, like a speed limit,
right, and not too far out there to this, and there will be more
-- Once you impose a policy, a speed limit, and you look at what
happens with traffic, traffic flows fairly evenly, and there is a
fairly consistent, or a constant, speed, and so agent-based models
are useful, if you sort of think about this very simple sense, to
exploring different policies and looking at the impact of those
policies on human behavior and how that changes different things.

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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

first version of the model that was developed was not -- It was to
capture important, realistic components of the system and
represent them, but not to essentially build every little detail
into the model and not to directly represent what exactly is going
on in the system.

The main purpose of building the simulation model was to build a
simulated environment, right, where fishers operate with some
realistic components of their behavior, where fish populations are
operating with some important components, realistic components, of
their behavior, and look at how the two interact, and so, again,
the trends here -- It's very tempting, because we're all very
familiar with this, and, in a little while, I'm going to show CPUE
trends from the simulation, Kobe plots from the assessment, but,
again, they are reflective of the simulation model dynamics and
not necessarily the dynamics that are going on in the actual Gulf.

Having said that, I will also show some figures, later on, that do
demonstrate that some of the realism that was built into the model
can be validated against some of the realistic patterns that we do
observe here in the Gulf of Mexico.

The model contained -- It explicitly represents, as agents, the
handline and longline fishing fleet, and so each agent is a fishing
boat. Across the Gulf of Mexico, the usual suspects, in terms of
fish species, are included. The West Florida Shelf model includes
the four species shown on the top row, and so red grouper, red
snapper, mutton, and gag, and then the full Gulf model adds gray
triggerfish, tilefish, vermilion, and yellowedge grouper as well.

Again, boats are represented as individual agents, and fish are
represented as individual agents, technically, quote, super
agents, where each dot represents -- Or it starts out as
recruitment representing twenty-five fish, but that quickly
deteriorates, as mortality is imposed, and so, each you, kind of
dot, or agent, is typically -- After a year or two, it's really
only two, three, four, or five species, and I will talk about the
spatial extent in a moment, but the agent-based model has three
main layers to it.

It has sort of a structural layer, which has bathymetric data,
sort of a model grid and the different sectors, and, by sectors,
I don't mean like sector separation that we often talk about in
the SSC, but sectors meaning spatial sectors, which I will show a
map in a moment to better define what I mean, and there is a
calendar that keeps track of daily conditions, things like wind
speed and changes in fuel price, fish price, market conditions, et
cetera, various metrics like that.

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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-

meter bathymetric intervals, and then that determines sort of a coarse distribution of where to put fish within each of those polygons.

Then, within each polygon, for the legacy version, we fit variograms to the video survey data and used those to simulate sort of patchy dynamics that would be sort of representative of the patchy dynamics that you find in the Gulf of Mexico, where you have these sort of clear hotspots with higher abundance, and then other places with a lower, or no, abundance, depending on the habitat structure, if there's artificial reef structure there, whether someone has dropped a car, or a washing machine, in that location to fish on, et cetera.

That gave us sort of a realistic pattern for the fishers to fish on. Now, this process was stochastic, and so, every time you reran the simulation model, you would get a slightly different pattern of abundance within each of these polygons, and that was intentional, to sort of test the robustness of the sort of patterning approach. However, again, it's not to say that, oh, yes, there is a hotspot right in the middle, where you see all of that red, but it's to say, okay, here's a somewhat realistic pattern of how abundance might be distributed within each of these polygons.

We have since, for the full -- For Version 2 of the model, we've since improved on that approach greatly, by applying a suite, or an ensemble, of machine learning models and techniques, also to the video survey data, in conjunction with the habitat data, and that's publicly available, and that's the data from the dbSEABED database that Chris Jenkins and others at the University of Colorado has sort of cobbled together from a variety of different datasets that have existed for a while.

Obviously, that's not the best habitat data, but it's what we sort of have available to work with, and I have approached the oil companies a couple of times, and they're not interested in sharing their information with me, unfortunately, but maybe one day in the future I can beg them enough, but, anyway, this approach developed much better spatial distributions for some of these species.

Again, I'm going to gloss over a lot of the details of that, and you can find them in the paper that's referenced below, and this is what sort of the distribution of red grouper looked like after going through this process, as an example, and this shows you how red snapper came out, or were spatially distributed, as a result 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

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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.
48

We've also -- The Gulf is, obviously, curved, right, from Florida
all the way around to Texas, and so, before, I dealt with that by
having fish only be able to migrate -- Limiting them to migrating
offshore to within the same NMFS statistical grid or one grid above
or below, north or south or east or west of them, but that kind of
made things a bit rigid, and so we've made changes to allow these
animals the ability to migrate along a parametrically-defined
curve, so that they can actually migrate -- You know, make the big
bend, at the Big Bend across where Florida is, and the same thing
around Texas, and it can kind of accommodate the nonlinear
coastline that we have in the Gulf.

In addition, both the legacy version of the model and the current
version has an algorithm to get fish that have been recruited to
places like Tampa Bay out of Tampa Bay, so that they don't get
stuck in Tampa Bay, just kind of bumping into the coastline, and
so we built in an algorithm to properly get fish migrating out of
those sort of environments and offshore. Again, this is high
level, and we can talk more about the details of some of these
later on, if people are interested.

Moving on to the human layer, so I took the commercial logbook
data and the vessel characteristic data that we have and combined
that with a bunch of other publicly-available state data, and so
information on wind speed, information on fuel price, fish price,
and market conditions, and some other information on policies,
expected catch, allocations, and such, and I developed what is
called, in behavioral economics, a panel dataset, to which I then
fit discrete choice modeling.

Discrete choice models are binomial or multinomial logistic
regressions that attempt to capture the decision-making of
individuals across time, and also and/or space, and so I fit three
sets of models, a binomial model to represent the decision of
whether or not an individual will take a fishing trip on a given
day, multinomial choice models to represent the decision of whether
or not -- Of where an individual will choose to go fishing, and so
I defined fifty broad fishing locations, again using the
intersection of depth strata and the NMFS statistical grids, and
so fishers would choose one of those polygons to fish in when
they're making their -- Once they decided to take a fishing trip,
then, within that polygon, they were initially randomly placed,
and then they had the opportunity to sort of look around and see,
okay, well, what do I know about this area, and there's a bit of
learning, and sort of memory kept by each fisher agent, and then,
from that, they can make general decisions and move around
accordingly, once they're placed in that polygon.

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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

choice models, and then this sort of IFQ period, where that is further away from Deepwater Horizon, where hopefully those effects have been resolved.

I need to do a little bit more work on this, to get this paper out and to really try to understand what happened with Deepwater Horizon, and see if I can parse out anything from this, by pulling the data apart a little bit more, but the parameters that were estimated for each of these time blocks were, again, used as -- They're used as inputs in the Version 2 of the model, the full Gulf model, to drive the decision-making, or help drive the decision-making, behaviors of the fishing agents.

Now, the fishing agents use the fitted parameters, right, and so let's say that wind speed is a fitted parameter, and the parameter is like negative-1.5 or something like that. In the simulation model, there are changing wind speeds every day that are essentially -- They were pulled -- Which are realistic wind speed patterns across multiple years in the past that are used to essentially forecast forward.

There are also realistic fuel price changes that are reflective of trends that happened in the past, and there are realistic changes in fishing, in the cost of fish, or the price of fish rather, et cetera, and so, as fishing -- As simulated fishing vessels apply these parameters, they multiply them times the realistic, or the state conditions rather, that are going on in the simulation model, or that are present that given day, and they also look at their past catch history, and sort of their economics, and so, you know, are they in the black, or are they in the red, and they use all of this information together to estimate a probability, essentially using the discrete choice model formulas.

Once they have that probability of taking a fishing trip, or probabilities across all the sites that they might select, they then toss a weighted coin and make a decision, based on that probability and that random sort of coin toss, and that's how they choose whether or not to make a fishing trip on a given day, and, if they do decide to make a fishing trip, where to go and fish.

The ITQ model that's been coded into the Version 2, the full Gulf model, is essentially directly adopted from the work that Rich Little and others did in 2009 to develop an ITQ model within an agent-based model, and that's a fairly simple model, where expected profit, marginal profit, is a function of the ex-vessel price, the costs, your expected catch, and your expected catch with respect to what you would expect to catch in other areas and at different times. Again, details are in his paper, and we had a couple of

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conversations with him when we were working to code his approach into the simulation model.

Okay, and so, as I mentioned, there's a limited amount of learning that goes on. Vessel agents keep a record of their personal CPUE. Their initial -- At the start of the simulation, they use the sort of CPUE by area that they've had from the logbook data, and that's sort of what essentially sets up the initial conditions, or their initial history, but their catch history, going forward, is reflective of what they've caught in the simulation model in prior simulation years, and so they use their catch history as one component for making decisions of where to go fishing, and to help make those site-choice decisions.

There is also, as folks know, a number of charter vessels that also hold commercial permits, and so they may not -- In the logbook data, it's reflected that they don't take a lot of fishing trips, but it's hard to parse out who, you know, is necessarily a charter boat captain that has a commercial permit, and takes some commercial trips, versus someone who is more of a serious commercial fisher and only makes dedicated commercial fishing trips, and so we also included a component, to try and represent that, which has to do with the frequency that individuals take fishing trips per month over time, and that's also used, or fit in, as a decision-making point for the fishing vessels.

One limitation is that, in some sense, fisher behavior is a little bit statistically rigid, or fixed, because they are beholden to using the parameters that come out of the choice model. However, as I said, those are multiplied against the sort of state conditions that are occurring at the moment, on that simulation day, across space and time in the model, and so there is kind of some flexibility there for fisher behavior.

Okay, and so, when you spin this thing up, and if we run it for twenty years, for a twenty-year projection going forward, again keep in mind that this was based on data, and parameterized with data, from the 2005-2006 state of the fishery, and that's before IFQ systems were in place, and so things were quite different then, but, again, the point of this exercise was, again, not to develop a projection tool that could be used by the Center, and that's a future research goal of mine that I'm starting to work on, and search for funding to achieve, but this exercise was predominantly to generate fairly realistic, or somewhat realistic, data that's representative of the types of fishery-dependent data that's collected, such that we can use that data in a stock assessment and then compare stock assessment results to what happens in the 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 interact 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.

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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

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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

depth, sort of trying to understand why some of these length
distributions are not being properly represented in Stock
Synthesis when sort of recreating the demographics of the
population.

When we look at Kobe plots from the Stock Synthesis runs, the
symbols on these Kobe plots -- So the diamond, and it's really
hard to see, and I realize that, and I apologize, and hopefully
you can open it up on your own computers to see, and you can't see
this at all on the screens, but the diamond represents the stock
status from the simulation model, and so that's what the actual
stock status was after the twenty-year simulation period, and then
the other symbols represent the different Stock Synthesis
configurations that I had just mentioned, and so the dark circle,
the filled circle, represents the model that just has your typical
standardization in there, together with your length observations
directly from the simulated fishery, and then you have the open
circle is the perfect information index, together with your length
observations from the simulated fishery.

The circle that is gray, shaded gray, has the extended CPUE index
in it, but with the length observations directly from the fishery,
and then the filled triangle, the dark triangle, has the perfect
information CPUE index, together with the length distributions
from the actual simulated population, and so you can see that, for
all of the these species, in very occasions was the stock
assessment model able to exactly match the benchmarks coming out
of the simulation model, or the -- Yes, the metrics that the
simulation model generated, and so the status of the stock at the
end of the twenty-year run.

When you look at things like the -- When you incorporated more
parameters into catch per unit of effort, you did, in most cases,
get closer to the diamond, which is, again, what actually happened
in the simulation, and so that did improve things slightly, for
some of these species, and, obviously, incorporating perfect
information, with perfect length, which is the triangle, in most
cases, gets you closer, but not in all, and what's particularly
problematic is the fact that, for some of these, the points sort
of straddle the dashed lines, which represent, you know, whether
or not you're overfished and whether or not overfishing is
occurring.

The fact that a lot of these estimates are kind of on either side
of those lines is a little disconcerting, because we use that,
obviously, to determine, or state, that, okay, yes, this fishery
is, or is not, overfished, or experiencing overfishing, and then
we decide whether or not to base policies, or to develop policies,

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based on that feedback.

To me, the fact that I was not able to essentially directly match the status of the stock coming out of the simulation, in any of these runs, is problematic. Now, the points are fairly well grouped, which is good, but, again, straddling a lot of these sort of management lines that can influence what we, as an SSC body, what the council, and the advice, or recommendations, from the Science Center might be.

When you look at the percentage contributions from the partial loglikelihood for catch per unit of effort and for the length distributions from the Stock Synthesis models, what you see is that the length observations contribute quite a bit of the loglikelihood sort of variability to the loglikelihood function, particularly for the two grouper species. For the snappers, not as much. CPUE does contribute quite a bit, but not, you know, on the order of -- On the most, 10 to 15 to 20 percent, depending on which index you put into these stock assessment model.

So what's going on here? Why are we seeing this mismatch? Again, remember this is from a simulation and not reflective of, you know, what's going on, necessarily, on the water, in reality.

In the simulation, what happened was, over time, what you see is, as these graphics iterate, is that fishing effort -- People go essentially to, more or less, the spots that they know, right, and they often go predominantly to the spots they know where they can catch fish, and so there is a sort of clustering in space, across time, or at least there was in the simulation model, of fishing effort in particular locations, and that, which is shown on the left panel, and, as you animate this through, I will do that again.

If you look at the right panel, what you will see is the change in spatial biomass over time that results, and so you sort of get this sort of local depletion effect happening, and this carving out of biomass in certain locations, and the preservation of biomass in other locations across the West Florida Shelf in the simulation model, and so sampling that is going into the stock assessment Stock Synthesis model is essentially predominantly representative of what's going on essentially on the Florida Middle Grounds, mostly, where the majority of the fishing effort was concentrated in the simulation model.

As a result, the stock assessment model cannot clearly see the entire picture of what's going on elsewhere in the Gulf of Mexico, or, sorry, on the West Florida Shelf in this simulation model.

There is sort of biased spatial sampling across the range of the
stock distribution in the simulation, and a changing size
distribution, that is predominantly reflective of what's going on
in key areas where fishing activity is highest, and it's probably
being more preserved in areas where fishing activity is not as
high, and there is clearly local depletion happening, and that we
know, from numerous studies, papers, et cetera, over the past ten
or twenty years, has an important impact on CPUE, and this idea of
the clustering of fishing effort I think is fairly realistic, from
speaking with fishers, and interviewing them, and from surveys.

They pretty much said, hey, look, here's my logbook, and I, you
know, go through it and pick the spots I know, and, you know, I
get a request for 10,000 pounds of red snapper from a restaurant,
or a fish broker, and I have to provide that, and I know I can go
get it here, here, and here, and so, to maintain efficiency, and
not have to waste fuel exploring, I will just go to the spots where
I know that I can get it, get what I need, and go back to port and
make some money, which makes total sense.

In the survey, responses suggest that exploratory fishing only
occurs a fraction of the time. Maybe, about 25 percent of the
time, people sort of guesstimated, and I don't know if that's
accurate, and that seemed a little high to me, but, you know, there
is some explanatory activity that goes on, but, anecdotally, from
talking with folks, even from newer captains, and also talking to
folks who own a handful of vessels, and sort of manage the captains
that operate those vessels.

What I was told is that, in some cases, and it, obviously, depends
on the owner of that group of vessels, the owner of that fish
house, et cetera, but, in some cases, they would provide their --
The owner would provide the new captain sort of a logbook, either
a complete logbook of places where they know they can get certain
fish or a partial logbook and say, okay, here's something to get
you started, and you need to learn the rest, and so that kind of
varied depending on who I spoke with, but, in either case, people
are at least -- Even if they are new, or green, starting out, they
are given some information at the start, which they can use to
base their decision-making on.

Then, obviously, as captains become more and more experienced,
then they're able to -- Their personal logbook expands, and they're
able to more efficiently select places to go fishing, where they
know they're guaranteed to catch what they need. Again, a lot of
this is, I think, market-driven, where I was told, repeatedly,
that, oh, you know, typically, we get a request for X amount of
pounds of this species, red grouper or red snapper or whatever it

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is, and we have to fulfill that within X number of days, and
there's not time to go goofing off and looking around, and so I
need to go to the places where I know I'm probably going to get
that and go get it and come back and fulfill the order and complete
-- You know, and make some money.

Trip duration, in the simulation model, and, also, we saw in the
discrete choice models, was often limited by hold size, at least,
again, pre-IFQ, and I imagine that these dynamics have probably
changed, post-IFQ, and some of the preliminary simulation model
runs I've done with the full Gulf model shows that, that some of
these dynamics are changing, where prices are higher because of
the IFQ system, and more stable over time, and you don't have that
boom and bust at the start of -- When one season is open at the
start of the year, and so people don't necessarily have to fill up
their entire hold to make a trip successful, or worthwhile.

Fishing effort is also spatially and temporally impacted by things
like weather and fuel price, regulations and such, and that's
important to keep in mind, because that impacts where and how --
Timing and placement of the fishery-dependent observations that we
use in stock assessment, and what I found is, so far, incorporating
additional variables into the CPUE standardization process does
not really guarantee that you will get an improved index, and I
was a bit personally surprised. I was hoping that what I got out
would better match the biomass trend, but it didn't. It did not.

Improved spatial resolution is needed in the commercial logbook
data, and I think we have this now, with the onset of VMS data,
and I think more work is needed to try and link the two, VMS
observations to logbook observations, so that we can do a much
better job standardizing CPUE and taking into account some of these
spatial effects that I think are, in some sense, real in the
fishery, but are not well accounted for in the indices that we
generate, and we also need to ensure that the trip interview
program is measuring landings that are best representative of,
yes, the fishery, but also the temporal and spatial distribution
of the stock itself as well, and that's tricky to do, obviously.

Some -- Before I go there -- Well, I will talk about
recommendations in a moment, but, as I kind of hammered, this is
a simulation model, and it doesn't necessarily reflect the reality
of dynamics in this system, but I was pleased to see that, by
baking in a fair amount of realism into the simulation model, I
was able to somewhat match some of the spatial patterns of catch
that you see in the real system, and so the panel on the left is
a graph that I grabbed, and I think it was from Andy Strelcheck,
from a presentation that he gave that shows VMS catch observations

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for red grouper, and then on the right represents what the
simulation predicted, in terms of spatial catch for red grouper,
and there is some similarity there, obviously.

There was also one generated for gag grouper, and it's not quite
as apparent, but you do see some overlap with respect to where
catches match in space,

Certainly mine is not the only fishery agent-based model out there,
and there are quite a few fishery agent-based models that exist,
and not a lot, but it's sort of a growing component of the fisheries
science field, and one that I am attempting to push forward.
Another project that I have helped work on was to develop a --
What we're attempting to do is to develop a generalizable piece of
agent-based modeling software that we've labeled Poseidon, which
is this long recursive algorithm, that I am not even going to waste
your time reading, on the left.

This model simulates fisher behavior, and fishery outcomes, and
the biology is presented at a very simplistic level, and it uses
machine learning and analytical tools to try and model fisher
behavior and fisher decision-making, and so there's a little bit
more flexibility in the way that fishers make decisions, based on
machine learning algorithms, and there are a number of management
levers baked into the model as well. There's a higher emphasis on
human and spatial dimensions, as I said, with much more simple
biology.

We initially used the west coast groundfish fishery as a testbed
for this, and I don't think -- There's a little eye candy video on
the right, and I don't know if it will play or not, but that's
fine if it does not, which shows just kind of how the vessel agents
were running around across the west coast, and what we found was
that -- So this graph represents what's called -- What we're
calling validation error, which is the distance between the
simulated outcomes of things like catch and average profits, days
out, distance from port, the duration and such, and so different
metrics that we compared -- That the simulation generated and that
we compared with the realistic observations from that fishery.

What we found was that the adaptive agents, which are the three
sort of algorithms that you see above the dashed line here on this
figure, performed better, in terms of validation error, meaning
they were better able to recreate some of the real-world dynamics,
or the real-world observations that we see in this fishery,
compared with when we provided either perfect information, which
is that large error bar in green, or we developed discrete choice
model logit models, or we sort of sort of statistically locked

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those agents in certain ways to force them to perform the way that
we were told that vessels in the groundfish fishery operate.

This shows a lot of promise for this approach, and there's still
a lot of work to do on the Poseidon model, to get it ready for
primetime and sort of use, and that work is coming along, and so
this just shows some of the -- That we were able to come close to,
or matching, some of the realistic values, which are the red-
dashed lines that you see from the output of these simulations for
the west coast groundfish fishery.

This is for simulated versus real quota attainment for some of the
species that were modeled, and we're currently using this model,
in cooperation with IATTC, to represent the fishery aggregation
device fisheries for tuna across the tropical eastern Pacific Ocean
and to represent boat movement, and that graphic is not going to
play, I guess, and, if not, it's fine, and it's more just eye
candy, and to represent boat movement as well.

In this approach, we have abandoned the sort of machine learning
component, because it did not well represent the behavior of the
tuna fleets that go out and fish, and so we had to do a lot of
work, in cooperation with IATTC, to explicitly code in some of the
behaviors that represent the fishing fleet for tropical tunas.
This work is ongoing, and IATTC just agreed to adopt this model
and start using it for a management strategy evaluation.

In summary, agent-based models have a number of places in fisheries
science and in stock assessment. I think that this is one of the
ways of the future, so to speak, to try and understand and test
different management policies that are under consideration, and
interventions that are under consideration, trying to avoid
surprises, right, and so, as managers, we do our best to try and
develop, or put in place, or recommend policies that we think would
best -- That would improve fisheries that are undergoing
overfishing or are overfished and need to be rebuilt, but we --
But fishers are extremely smart, and extremely innovative, and are
able to essentially either innovate around those policies, which
targets changed gears, and, I mean, a classic example is buoy gear.

Yes, we'll ban bottom longline, no problem, and then they said,
okay, we'll just, you know, create buoy gear to get around that,
and, you know, that was a really clever way around that policy,
and a very effective way for catching groundfish as well and
reducing turtle bycatch.

There are a lot of methods and ways for collecting data on fisher
behavior, and lots of modeling -- A handful of modeling tools that

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can represent fisher decision-making, and different kinds of information can also be synthesized and solicited from the data that we currently have, and so we can use the logbook data, observer datasets, questionnaires and surveys, do experiments with fishers, and we now have quite a time series of VMS data that we can use, and there are other sampling initiatives that we can use to sort of get at, and better understand, the decision-making process and the fishing patterns that commercial, and hopefully one day recreational, fishers use. Again, not as a way to share trade secrets, but as a way to greatly improve our ability, and our capacity, to estimate the status of stocks.

Models used to represent fisher behavior should be best identified, and best practices developed, to define when and how to apply each of these tools, and work is needed to better incorporate some of this information on fisher behavior into assessments and fisheries management.

Some ideas I have are finding ways to combine, or embed, discrete models, or link them to stock assessment models, where the stock assessment model is running together with a discrete choice model that's being fit over time, and that, obviously, greatly increases your parameter space of these multiple equation models that we have that are already have -- They have a heavy, or large, number of parameters that need to be estimated, and I think the red snapper SS model has over a thousand parameters that need to be estimated, which is not an easy task for a computer to do, and it results in a lot of statistical tradeoffs as that's being estimated, where you're up and down-weighting different things, either manually, or the model is sort of considering all these different things at once and trying to sort of thread the needle between them, and so adding more parameters is not ideal. However, it could help parse out some of the ways that fisher behavior enters into stock assessments.

There also, I think -- I think there's more work to be done in trying to explore other ways to parameterize the standardization of catch per unit of effort as well, and so I incorporated those handful of other parameters, and I didn't get quite the response that I was hoping for, but I think there are other things that can -- Even more things that can be incorporated, like environmental variables from satellite imagery, other economic components that might help us better explain some of this variability, and so there's more work to be done there.

There's also a lot more work that I need to do to explore the impact of length, incorporating length distributions, from the fishery into Stock Synthesis, or stock assessment models, and, in

general, explore the sensitivity of length observations within a stock assessment model as a way to better understand how those distributions push and pull stock assessment models and affect the estimation of status criterion coming out of those models.

Then, finally, I have sort of pipe dreams of developing agent-based models that could be used as an actual stock assessment tool, where there is a wrapper, of sorts, that fits the empirical data, and then an overlying agent-based model that sort of takes that empirical data that's being fit simultaneously and tries to also reconcile the dynamics across space and time.

I think we're a long way from that, but I think that's something that could be done, and is sort of -- It would be a really novel and innovative approach towards improving stock assessments. Again, you would combine your sort of estimation of parameters and likelihood with the sort of agent-based modeling framework, all in one kind of coupled -- Under one coupled approach, or tool.

With that, there are many folks to thank, many folks within the commercial fishing industry, folks that I became good friends with as well throughout this process, and a lot of folks shared a ton of information with me, and they let me on their boats, and they showed me their gear, and they showed me their fish house. They explained -- They took time away from their jobs, and their businesses, to show me, and teach me, kind of what they do and how they do it.

They provided access to their crew members, and to their vessel captains, to talk with and to interview, and they filled out my extremely long survey, and they just were really, really helpful in helping me conceptualize the fisher behavior component of the simulation model, and they really helped me learn about how the fishery operates and what their concerns are, what their sort of visions are, and also how they perceive biomass and abundance when they're out fishing, and how that informs their own decision-making, and so it was really a fascinating exercise to do and to really see firsthand how these folks work.

A special thanks to Glen Brooks, David Krebs, Jason Delacruz, and Bobby Spaeth, who spent a lot of time with me, talking to me and sharing some of their personal data with me, and piloting the survey and helping me develop, you know, what's a good or a crappy question to ask, those kind of things.

Then funding for this work has been from a number of sources, from GOMRI, Sea Grant, the Southeast Fisheries Science Center, the 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.
48

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.

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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.
48

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.ar
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

presentation, was on how ABM can help integrate socioeconomic
information into stock assessment models, and look at things like
biomass, or population dynamics, but it seems like it could also
be a powerful approach to look at social and economic outcomes,
and so kind of a two-part question is have you thought about
looking at social, or economic, outcomes with the current model
that you're building for the Gulf, and maybe a specific follow-up
on that is, you know, do you think these models could be used to
look at if regulations, or increased costs, or a disaster, forced
vessels, or agents, to like leave the fishery, and I know you
mentioned the management strategy evaluation potential of this,
but I wondered about it on more of the social and economic
outcomes. Thank you.

DR. SAUL: Thank you, Steven, for that question, and so, yes, the
full Gulf model tracks a lot more economic information, including
costs and earnings and expenditures, and it writes all that
information out, and so we are moving towards that, certainly, and
to better understanding the economic impacts of policy, and that's
critical, and I completely agree with you, and so, yes, a lot of
that has been built into Version 2 of this model, and I didn't
mention it here just for brevity, for time's sake. You had a
second part to your question that I'm forgetting.

DR. SCYPHERS: It was essentially if, you know, have the vessels
working as agents in the model, does it -- Is it able to tell you
something about if they live, if they exit, or do things get so,
you know, disruptive?

DR. SAUL: Okay. Perfect, and so, again, the exit and entry is
not explicitly coded in the model, and that's something that I do
need to add in. However, the Version 2 of the model, with the ITQ
system, does allow vessels to stop fishing if they're not making
a profit, and so they don't necessarily exit the fishery, like and
sell their boat, but they pretty much stop operating, and they
will, for a time, or permanently, depending on, you know, what
their financial situation ends up being as time goes on.

I need to include a component of, okay, you know, this person ends
up picking up additional work in another sector, and has an
additional income there, to help round-out that economic
component, but, yes, that is sort of built much further into the
second version, and it needs to be polished a little bit more,
going forward.

To your question about using the model to explore other outcomes,
I have submitted a number of research proposals, and I haven't
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.

197

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

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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

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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.

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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.
48

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

see that, also, you get better performance of the bottom fishing
closure on red snapper when you have a lower lambda.

On the other hand, if you look at the fall seasonal closure, that
has a big benefit to gag spawning stock biomass, because that's
when the bulk of the harvest occurs, and the catch rates are the
highest, but it could also have a negative effect on red snapper
if effort displacement is high, and so you see there's that small
negative biomass on red snapper in that scenario.

This is the same scenario, but looking at harvest, and so harvest
actually increases for gag grouper when -- Under a spring closure,
again, because effort piles into other months with higher catch
rates, but it's drastically -- It's having a big effect on harvest
for red snapper, and this is the point where -- Because we put a
fishing closure in the time period when the harvest season is open,
and so, in reality, you would adjust that harvest season to allow,
you know, for some fishing to occur for red snapper, and so you
see big declines in harvest for red snapper, under that spring
closure, because that's when all the harvest takes place.

When you close the fall closure, again, it's kind of the same story
with gag grouper. You're shutting down the fishery at a time when
catch rates are highest for gag grouper. If that effort displaces
to other months, it could result in an increase in catch for red
snapper.

Then we could also look at -- Like we looked at harvest, we could
also look at dead discards, and so, for example, when we --
Discards mostly were reduced in both of these scenarios, except
when effort displacement was high, and, again, it's that same
tradeoff. Effort from April and June is piling into other months,
when discard rates are a little bit higher, and the same could be
said for the fall closure on red snapper.

That's how these tradeoffs are working, and I'm just trying to
highlight that, where you have these species with contrasting catch
rate patterns, and whether or not effort moves to those months
with higher catch rates, you can have these tradeoffs.

If we look at this sort of combined over all species, and all
scenarios, trying to identify what would be, you know, a good time
-- Not a good time of the year, but what might be a feasible time
period, within a year, that would reduce discards and improve what
I'm calling harvest efficiency here, and harvest efficiency is the
proportion of harvested fish to discarded fish, and so you want a
higher harvest efficiency in the fishery.

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You can see that harvest efficiency is improved most during that
-- It looks like March and April period, and that's prior to sort
of the red snapper season being open, and there's more -- The
discarding rates are higher during that time period, and so the
results suggest that that would be one particular period when you
might be able to reduce dead discards and improve the harvest
efficiency.

The net increase in total abundance allowed effort to increase,
depending on that long-term response parameter, and so, over the
long term, the model estimated this did create more fishing
opportunities over time, and so we're actually -- Some of the
closures resulted in improved biomass, and that allowed for more
fishing to enter -- More effort to enter the fishery, and so
creating additional opportunities, but, if that effort response
was really fast, then any gains in the spawning stock biomass would
basically be, you know, exhausted by that fast response, and so
you get a little bit of increase in spawning stock biomass, and it
immediately attracts a lot of effort, and then it fishes it back
down, and so that's kind of highlighting those long -- The fast
versus slow long-term effort response.

Just to kind of summarize what we've done, and think about, you
know, what might be some overall conclusions, and maybe some
recommendations, if this were to, you know -- If this type of
analysis were to move forward.

The first thing, obviously, is that the results are all very
sensitive to the assumptions about the angler response, and, you
know, primarily that lambda value, and how does effort redistribute
within a year, and what species are going to be targeted when that
effort goes to a different month.

We don't understand what that lambda is, and so some choice
experiments could be used to try to understand that decision-
making process, and then that could actually be factored into this
simulation approach. As I mentioned before, the timing of any
scenario is likely to have disproportionate impacts across all
species, and so you cannot expect that a closure during one time
of the year is going to globally benefit all the species, and it
could be exacerbated by effort displacement.

It's really important to weigh the gains in biomass and reductions
in discards against what might be potentially broad and intense
social and economic tradeoffs, and it would be very prudent to
conduct regional economic impact analyses around these types of
policies and, also, generate some stakeholder buy-in, because it's
likely that anglers could be very dissatisfied with many of these

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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

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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

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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

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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

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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.

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DISCUSSION OF DECISION POINTS FOR EVALUATING PROXIES FOR MAXIMUM SUSTAINABLE YIELD

MR. RINDONE: Thank you, sir, and so Bill is here to present a primer on selection of appropriate proxies for MSY applicable for fisheries in the Gulf, and you guys have contended with a lot of decision-making regarding changes in established MSY proxies recently, and Bill is here to discuss the kinds of biological and ecological factors that should be evaluated when estimating MSY, or designating a proxy, with attention paid to the ultimate goals for an individual species management.

He's also going to review some of the generalized effects of making decisions more in favor of harvest over a resilient biomass, and you guys should, again, ask lots of questions and make any recommendations, as appropriate.

CHAIRMAN NANCE: Thank you. Go ahead, please.

DR. BILL HARFORD: Great. Thank you. Thank you, Ryan, and thank you, Mr. Chairman, and so, as mentioned, my name is Bill Harford, and I'm with a consultancy called Nature Analytics based in Toronto, and I'm going to discuss some work that was done while I was employed at the University of Miami.

This work was published in 2019, with my colleagues Skyler Sagarese and Mandy Karnauskas, and, basically, the bulk of this discussion is going to highlight some of the findings from the paper, and so the way that -- The way that I would like to jump into this discussion is to show something pretty simple, and that is create a sort of simple representation of a fishery, a rather oversimplified representation, and I have represented it in three parts here, with the objective that we are going to talk about how to delineate MSY-based reference points, and these steps, these oversimplified steps, are going to lead us through how we thought about getting there in the paper, and hopefully to highlight some of the talking points, as we move along.

If we start out with this idea that we have a decision to be made, and that is very simple, and we would like to fish at FMSY, we need -- To achieve that, we need some inputs, and that's highlighted under the thing called Needs, and life history, selectivity, and steepness are just a few of them, and, mainly, these would come from the stock assessment, in a data-rich assessment context.

The effect, of course, of fishing at that level influences the

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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

that reference point without knowing anything about steepness, and
so we can calculate a value of F 30 percent SPR, knowing only about
the life history and the selectivity of the stock, and so that's
great, and so, in a way, we've sidestepped the steepness issue,
but not quite, because, again, getting back to my simple example
here, if we sidestep the issue, we start at the top of the diagram,
and we say, look, we're going to make a decision based on some
assumed F X percent SPR, and we don't need steepness to get there,
but I think that there's something lacking here, because, when we
get to the bottom of the diagram, what we see is that we have this
question about whether we've achieved our desired outcomes.

Those outcomes are sometimes relabeled as the yield at F X percent
SPR, in replacement for MSY, or in replacement for BMSY, the
biomass produced at F X SPR, but the problem here is we haven't
necessarily changed our fishery management objectives, and we've
just changed some terminology on the slide, and so, again, we
haven't -- We've made a step forward, in terms of working with an
FMSY proxy, but we haven't sorted out whether that proxy will
enable us to achieve our fishery management objectives.

I am going to flip the script on this now, and I have relabeled a
bunch of things and highlighted them, and so what if we took a
different approach that says, okay, look, we're going to make an
assumption about the FMSY proxy, and, in this case, I've assumed
F 30 percent SPR. Great. We can get that without steepness, and
what if we could then run a simulation and ask the question of how
well does that proxy do in achieving our desired outcomes?

Okay, and so we can ask how close does the FMSY proxy come to
achieving MSY in the long term, let's say, over repeat application
of that decision. Okay, and so, again, we've advanced the -- We've
advanced the problem, and we haven't quite solved it yet. The
reason for that is because, if you've noticed, in order to do the
simulation, I have to make an assumption about steepness, and so,
again, the outcome of the simulation, in terms of how well that
proxy might perform in achieving our goals, is dependent on the
assumed steepness in the simulation, and so there's something left
to be desired there.

Okay, and so, again, we're partway to the solution, or a solution,
but not quite, and so the alternative, and I'm going to stay on
this slide for a little while, and there's a lot to explain here.

The solution that is -- Perhaps we could take a probabilistic
approach and define a prior for steepness, and so, in other words,
what we're trying to do is characterize our level of confidence in
the values for steepness, and this is a subjective thing,

potentially, and it puts us in this realm of science where, as I
pointed out, our choice of F proxies is going to affect catches,
and so the decision stakes are high. It affects people's
livelihoods, but uncertainty is high, and I am specifically
speaking about uncertainty in steepness.

That is high, and possibly unresolvable, and so this puts us in
this sort of realm of decision-making where we may very well have
multiple viewpoints about steepness, or its uncertainty, or, in
more technical terms, the shape of that steepness distribution on
the lower-right in the plot, and what can we do about it?

Instead of making a decision about a point estimate of steepness,
if we are able to characterize our degree of uncertainty in
steepness, we can then produce a simulation where the results of
a given proxy are not conditional on any single value, but,
instead, performance is marginalized across the distribution,
using what is known as probability rules, and so this is the only
method slide that I have in this talk, and so I'm going to stay
here for a few minutes, because there's a few things to point out
here.

First, there are four steps. I think this group is probably fairly
familiar with simulation modeling, and we've talked about it all
morning, simulating fish stocks, and so we what we do is we create
a simulated fish stock, and we then make an assumption about
steepness for that stock, in Step 2, and we produce a simulation
that gives us a performance under an assumed F percent SPR proxy.

We repeat that many times, for many values of steepness, and we
then have the results that are conditional on that value, a given
value, of steepness, right, and so then we want to make Steps 3
and 4, which essentially make the results no longer conditional on
a single value, but to reflect our degree of belief, according to
that distribution, and one of the reasons that we took this
approach -- By the way, Step 4 is generally what is called
probability-weighted performance, and this is a very simple
example of probability-weighted performance.

In more complicated applications, we might refer to this as a
Bayesian network, but the reason that we chose this framework was
because, when I began working on this, I envisioned a tool that
could be used in meetings like this, to help people think through
decisions like this, and the reason we picked this framework is
because Steps 1 and 2 are computationally intensive. They would
typically be done ahead of a meeting like this, right, by an
analyst.

However, Steps 3 and 4 could be done with a small chunk of code, some kind of toolkit, and we can get results instantly, at a click of the mouse, and why that's valuable, I think, is because then we can do two things. We can, in forums like this, change the shape of that prior and ask how does it change the output of our analysis on the fly, and I think that one of the things that is valuable about this is, and the reason we chose this framework, is because it then allows you to take the audience along on the journey with you through this science, right, and I'm talking about both technical audiences, experts like yourselves, but also non-technical audiences.

We need to reach both, and, second, we can start to ask questions, because we're not going to resolve the shape of that distribution, right, and there are going to be multiple valid viewpoints about it, but what we can then do is start asking questions of how does the shape of that distribution change my decision about which proxy to utilize, and does it, and to what extent would we have to change that prior, manipulate it, in order to come to a different conclusion about the FSPR proxy that we might want to choose, and all of that can be done transparently in a setting like this. This just summarizes what I just said, and I'm going to keep moving.

All right, and so, for that paper, we carried out this exercise for seventeen different species, I think ten of which are snappers and seven grouper species, and all this slide shows you is what I've already shown you, that changing the value of steepness changes your expectations about reference points, and it just is basically a list of the species that we included in the study.

This is the same slide for groupers, and there were seven of those, and, just as a note, this work was done in 2018 and 2019, and so we used the life histories that were available from the stock assessments at the time, and these species were selected for inclusion, based on judgment by the authors that they had reasonable quality life history information, and usually that was based on there being a data-rich stock assessment.

This slide gets back to the point that I made earlier, where there's potential -- Where uncertainty is high, and there is potential for multiple valid viewpoints on the state of nature, right, and so I'm showing you three different distributions that we used as examples to demonstrate this problem in the paper. Importantly, this is an opportunity to formalize subjectivity, to formalize expert judgement, and, in this case, it brings this particular key uncertainty to the forefront of the policy discussion, in this case the reference point discussion.

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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?
48

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 FMSY. 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

some consideration that, when it comes to hermaphroditic species, that biomass should be calculated as total spawning biomass and not female spawning biomass, and so, if that's the case, again, this is one of those places where I would consider rerunning this analysis.

There are other issues related to scientific uncertainty that I think are also worth considering here, and this paper I think most aligns with the question of the role of the F proxy in OFL calculation, and there are certainly other issues at-hand, including environmental variability, and I believe that red tide was in the news last night again, and so I don't want to weigh-in on how the other metrics should be calculated, and it wasn't part of this paper, but I think it's a point that's worth just raising here, in terms of, if you're considering this framework, expanding upon it and asking how does the framework fit across the entire breadth of decisions and recommendations that this group is involved with.

This slide just summarizes all of the times to apply the guidance and times to rethink the guidance, just in one slide, and I will give you a moment here.

We're getting into some final conclusions in the paper here, and this one just reiterates what I have said several times, that the F 40 percent SPR seems to make sense for a variety of snappers, where F 50 percent seems to make sense for the grouper species.

Now, this thought is a bit of an aside, but what this slide is showing is the second-half of the paper. Everything I have talked to, up to this point, centered on the theme of proxy estimation, but I did want to point out that there are other themes addressed in this paper that might be worthwhile considering.

The paper goes into some depth on using what are known as broken stick or threshold F or hockey-stick-type control rules, which are shown on the left, where the F reference point -- Sorry. The fishing mortality used to determine OFL varies according to the biomass, right, and so one of the things that we did was we looked at how to use -- If whether these broken stick approaches could be used under rebuilding circumstances.

What we did is we simulated a variety of broken stick approaches, and we also simulated a rule that I called, in the paper, the NS 1 Rule that simulates, to the letter, the way in which rebuilding plans are expected to be applied under NS 1, and what's interesting is NS 1 typically requires some form of projection modeling, which, in my mind, had to be tied to steepness, because projections are

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forecasting future recruitment, and I realize there are a variety
of ways to tackle that topic, but this is what connected, in my
mind, to the broken stick rules, and I wanted to ask, and could
you achieve rebuilding without making a projection, and could you
achieve rebuilding according to the timeframes expected under NS
1, without requiring a single projection?

In some cases, the answer is yes. I think there's some fine-
tuning to be done, but you could generally, if you set up your
broken stick rule properly, achieve rebuilding in ten years, or
whatever the expectation was, and that's all I'm highlighting here,
and we probably don't have time to get into this too much, and
there are some other topics of discussion here, and like I've made
this note there that says FMSY versus F proxy, and there may be
cases where you are quite comfortable estimating steepness, or
using a steepness prior in your stock assessment, and so it does
beg the question of do you need a proxy at all. This paper assumes
that you would use a proxy, but, again, that's an assumption, and
that's possibly a discussion point to revisit.

Finally, the issue of data-limited stocks, where you need these
reference points, and not only is steepness uncertain, but it's
difficult, or impossible, to do an assessment, or a data-rich
assessment, and so I think there are some issues here, and
especially in the data-limited issue, and the usual expectation is
more precautionary reference points than under data-rich stock
assessments, and so, again, that's another dimension of the problem
that might be worth considering here, moving forward.

I think this is almost the final slide, and so, again, I think
that what the paper illustrates is a possible framework that could
be applied, and so the conclusion, the first conclusion, is it may
be worthwhile considering a process for proxy specification, an
overarching process, of which this framework could play a role,
but my point is, in terms of we thought about process in the paper,
and I implore you to also think about developing that process,
sometimes called better practices, and sometimes called best
practices, et cetera.

The analysis itself could certainly be strengthened, according to
some of the issues that I called rethinking, which is -- My
apologies. Actually, the second box is something different. There
are extensions of the analysis that we did not cover.

The analysis does not include life history uncertainty, and it
just used point estimates for life history, and so all of that
uncertainty could also be propagated forward into the analysis and
the characterization of those probability distributions that I

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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

234

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.
48

235

DR. HARFORD: Right. Okay, and so let me answer that. It's definitely limit, and the entire paper is based on identifying the highest fishing mortality rate that you might consider under any circumstance that is expected to achieve MSY in the long-term, and so limit. The short answer is it's a limit that we looked at, yes.

DR. BARBIERI: Okay, and then, to interpret your simulations, right, and so Slide 15, how did you obtain BMSY and CMSY, right, because, I mean, now we are looking at how the performance of this proxy -- Against what the true MSY is.

DR. HARFORD: Right.

DR. BARBIERI: I have to know what that MSY is to be able to evaluate that performance.

DR. HARFORD: Absolutely. Okay. Great question. Yes, and so the -- What we might refer to as the true simulated catch MSY comes out of the simulation, but I take your point that it varies according to steepness, and I think this is where you're probably going with this, right?

DR. BARBIERI: Well, steepness and selectivity.

DR. HARFORD: I hear you, and life history. Right. Okay, and so the true BMSY and the true CMSY come from the simulations, because it's a simulation and we know what it is. In these simulations, for a given species, the life history and selectivity are held constant, and so let's just set those aside for a second, right, and really what's varying from different run to run is the steepness value, right, and so what we can do is -- Basically, what we do is we calculate MSY at a given steepness and run a simulation, okay, and we ask how well did that proxy achieve that, and we repeat that many hundreds of times.

We then use the probability rules to integrate it all together, and I probably can't get into the probability rules right off the top of my head here, but that is how we do that, and so I think what you might be getting at is how can I know MSY if I don't know steepness, and so it's simulation-run-specific MSY.

DR. BARBIERI: To obtain that MSY, you have to make an assumption.

DR. HARFORD: About steepness.

DR. BARBIERI: About steepness.

DR. HARFORD: Absolutely. Right, and so each run is -- Let me put it to you this way. Each simulation run is conditional on the simulated value of steepness, and then we use probability rules to marginalize across that, so that what we achieve is a distribution of outcomes that is not conditional on any given value of steepness.

CHAIRMAN NANCE: Roy, to that point, please.

DR. CRABTREE: Yes, and so the choice of the prior, I think, in this case, is 0.8.

DR. HARFORD: Yes.

DR. CRABTREE: So, if I chose a prior of 0.9, how much would that shift how all of this comes out?

DR. HARFORD: Right. Right. So, on this slide, the top is showing -- If we just assumed that it's 0.8, right, generally -- As a general rule, the more that steepness goes towards one, the harder you can fish at FMSY.

DR. CRABTREE: Right.

DR. HARFORD: So that means -- That's why, at 0.8, it's showing F 30 percent. I don't know exactly what would happen if we pushed it to 0.9, but it would move lower than F 30 percent. It would move in that direction.

DR. CRABTREE: So it's sort of like, by choosing the prior, you're effectively choosing the SPR proxy.

DR. HARFORD: Yes.

DR. CRABTREE: Well, so you're right back to where you started, if you don't know what steepness is and you're choosing --

CHAIRMAN NANCE: (Chairman Nance's comment is not audible on the recording.)

DR. CRABTREE: Right.

CHAIRMAN NANCE: You have that variety of steepness, and 0.9 being one of them, and probably 0.9 is the one that pushes it more to the left, as far as where all of the others are pushing it more toward the right, and you get a broader distribution, because steepness is unknown.

237

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

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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.

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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.
48

DR. CRABTREE: Yes, but the goal is not necessarily to reduce Z. The goal is to find the F that produces the maximum catches you're able to get out of it, and, if they're living shorter lives, and more of them are dying periodically, then you -- It's not entirely clear, to me, that fishing harder, or less hard, is going to let you catch more fish.

CHAIRMAN NANCE: It seems like you're only saying that the older ones are dying.

DR. CRABTREE: Well, no, but they're all -- I mean, it's affecting different ages differently, but, on average, you're going to see fewer old fish out there, over time, because more of them are dying.

DR. BARBIERI: This is probably another Dave Chagaris talk for another day, right, and Dave comes back and kind of revisits that.

DR. TOLAN: I was just going to bring that up, and didn't you come up and say, for red grouper, that, after a big mortality event for red tide, there is a bump in recruitment in the subsequent years?

DR. CHAGARIS: I don't know that that's necessarily relevant to this discussion. I mean, that was more of an emergent property of the model, related the food web dynamics, but there have been quite a few simulation studies, even recent ones, looking at time-varying natural mortality in stock assessments, and I think that's really what we're talking about here, and I agree with the point that you made earlier, Luiz, about having sort of a long-term mortality that is reflective of just the life history and average natural mortality rate, and then these episodic events -- We think of them as components of natural mortality, because they aren't anthropogenic, but, if you think of them as not natural mortality, then I think it fits maybe within, you know, the approach that we're taking of reducing fishing pressure in the face of those red tide events.

DR. CRABTREE: Yes, but I have a hard time not thinking of them as natural mortality, because they are, right?

DR. CHAGARIS: So this has come up before, where -- I think actually Ryan may have brought this up, as far as like what if you assumed some -- There might be some average low-level red tide mortality, right, that is a part of your average natural mortality of 0.2 or whatever, and like maybe there's a small amount of red tide mortality that, on average, is there year after year, but, when it spikes, that severe increase in red tide mortality is not part of 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 GROUPER**
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

course, if they're below, they tend to be discarded.

We didn't think there was enough information there, and that's why that decision was made and accepted by the panel throughout the research track process, and so what you see with -- I mentioned in the previous slide, and you can see that we have 2018 through 2020.

The way Stock Synthesis works is, because we're not estimating deviation there, it just pulls and says your recruitment estimates for those years, those last three years, come directly from the spawner-recruit curve, which, in this case, is an estimate of recruitment of about 1.2 million scamp each year for those three years.

Where this became an issue is, normally, it's very easy for us to just update our projections and change the assumption of recruitment to the recent mean, and we have no issue, but, in this case, you can see that that 2018 to 2020 -- That's three years at the end of the assessment, and changing that one assumption about those recruitment estimates actually did have somewhat of a noticeable difference on our assessment model, and it did not converge.

The reason why it did not converge is because the recruitment estimates in those three years led to slightly different parameter estimates. We looked at the differences, and only twelve of the parameters had differences within more than 5 percent from the base model estimates, and many of them were recruitment deviations. As you can imagine, when you change a recruitment estimate for one year, it can kind of go back in time and affect the others, but it was also a big difference due to the recreational fisheries, especially the charter and private. One of the length-based selectivity parameters was different, and it had one of those larger differences, which we did emphasize in the base model.

There was a lot of uncertainty in some of these parameters anyway, and so I think what we're seeing here is just that small change in how recruitment was handled in the last few years of the assessment period. You see that there was a slight difference there, and so, when we tried to project forward with this model, it did not do what we thought it was doing, and it was not using the same model parameters, and so we were uncomfortable with that. We didn't want to present results from the model that did not converge throughout the projection.

What we did to alleviate this issue, and I think Katie mentioned this when she presented in September, and this was one of the options that we were going to look into, and, essentially, what

we've done is we've run a sensitivity run for our base model that
is documented throughout all of the SEDAR 68 operational assessment
documentation. All we did here was allow the model to estimate
recruitment deviations through 2020, and what see -- I am just
plotting -- This is a comparison of the recruitment deviations,
estimated by each model on the left, and then the age-zero
recruitment estimates on the right.

Now, of course, I screwed up the labeling here, because I manually
entered the labels, but, on the left, you will see that our base
model -- Our base model is the one in blue, where we estimated
recruitment deviations through 2017, and you can see that, from
2018 to 2020, the recruitment deviations are zero, whereas, in our
sensitivity model, we did estimate recruitment deviations through
the terminal year of 2020. The first thing to note on that figure
is the huge uncertainty when you actually do estimate those
deviations, particularly in 2019 and 2020.

Of course, you know, the more recent -- We don't have a lot of
information, and so we expected that high uncertainty, but the
good thing here is that, you know, the zero estimate, that we
assumed previously, does fall within those wide ranges for each of
those years, and so, on the right, you can just see the changes in
recruitment, and so what we initially had thought was a little
overly optimistic, and you see that, yes, the model -- If you did
estimate the deviations in those years, you would see lower
recruitment, which is more in line with what you thought might be
occurring.

CHAIRMAN NANCE: Skyler, just so I'm clear, the right-hand graph
is estimate through 2017, like we've seen, and the right is the
base model estimated through 2020.

DR. SAGARESE: Both figures show the base model in red -- Sorry.
The base model is in blue points, and then the sensitivity run is
in red, and so they're just the different trajectories through
each of the models. Both models have terminal years of 2020, but
one stops the recruitment deviations in 2017, which was our base
model, in blue.

CHAIRMAN NANCE: That's the one on the left, isn't it? Then the
right is the new run. No?

DR. SAGARESE: No, and both runs are shown in each figure.

CHAIRMAN NANCE: Okay. Thank you. That's why I was -- I was
having a hard time understanding this one. Okay. Thank you.

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DR. SAGARESE: Yes, and so these are our comparison plots, and, if you look in the documentation report, the projection report, the labels are correct, and we show a couple more comparison plots that you're using to seeing in our assessment reports, and so this is just comparing essentially the dry quantities for each of the model runs. The take-home here is that what we showed with the base model, in blue, that those trends don't deviate that much from what we saw in our sensitivity run. They do remain within the bounds. Any other questions, or should I continue?

CHAIRMAN NANCE: Only me was frustrated. Go ahead.

DR. SAGARESE: Okay. Next slide, please. Okay, and so, just to refresh, what I'm going to show now -- I'm going to walk us through a couple of different projection iterations that we've done. The first set I'm going to show -- The only difference from what we've shown in the past, with what Katie presented, is this is looking at trying to get at our OFL estimates, and so, for these projections, we're really interested in the short-term, and so we're assuming that our recruitment is derived from the recent mean, and so it's lower than what our benchmark had shown, and so that's the only change highlighted in red here. The scenario is -- Everything else is the same, the way we've assumed selectivity and retention, the interim landings, and all of that remains the same as what you've seen in all the SEDAR 68 operational documentation to this point.

Again, this is kind of the continuity from what you've seen in the past. Just a refresher for scamp is it was recommended to look at the MSY proxy of 40 percent SPR, and so these results that we're showing now -- This is starting our projection in 2023, which is what we've done in the past, and also redefining our optimum yield as 90 percent of our MSY, and so it's not 90 percent of the exploitation rate, and I know we've had some discussion on showing these results this way.

A reminder that this is our OFL projection, and we're only interested in the short-term. This is essentially changing -- The only thing that has changed from the benchmark to this is how we treat recruitment in our projection period, and so we're assuming much lower recruitment than if recruitment were derived from the spawner-recruit curve.

The first thing to check that is looking at the recruitment column. Instead of about, what did we say, 1.2 million, you can see that it's about 900,000, and so our recruitment is lower than -- It's essentially that average recruitment from 2008 to 2017. We're fishing -- Looking at the F over F SPR 40 percent column, we're

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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

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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.
48

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.
48

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

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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

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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.
48

When you're looking at the landings, and you can fiddle with -- In
the file that was sent around, you can fiddle with looking at
species-specific landings. If you use the drop-down menu and you
pick specific common names, you can look at the average. You can
look at the yearly landings and the average landings for different
species, or combinations of species, and you can see what the
species-specific trends are in those landings as well, and not
just the complex as a whole.

What Dr. Saul had said about, over time, the landings being on a
decline, if you were to fit linear trend lines to that, that is
what you would see -- We have seen an increase in recreational
landings in the recent years, which makes sense, because there's
larger boats, more engines, better bottom-finding equipment,
better mapping technology available, and especially for species
like scamp, which are still considered shallow-water grouper, but
do occur in deeper waters, generally speaking, especially in the
northern Gulf. Some of those equipment characteristics are going
to be necessary to successfully target other species, and so --
Steve.

DR. SAUL: I just have a procedural question, I guess, to that
point. So we have an assessment for scamp, and a projection, but
are we -- What I'm hearing is that we're charged with setting the
ABC and OFL for the whole complex, and is that correct?

MR. RINDONE: Yes, because that's how it's currently managed, and
so, if you guys were recommending something else -- Essentially,
the council is going to have to have a status quo alternative to
go off of, and then, if you guys were recommending to break scamp
and yellowmouth grouper out, and for them to be managed separately,
then we would still need to do something with black grouper and
yellowfin grouper. Those species couldn't then just not have an
ACL. There would have to be something for them as well.

DR. SAUL: Okay, because I was going through all these sort of
ratio exercises in my head, of how to like take the yield estimates
from the projection for scamp and then apply the other catches, I
guess, or fractions thereof, to come up with a total ACL and OFL
for the whole complex, and is that what has to happen, or I guess
how do you move forward, when you're given the charge to manage
the complex, or provide limits for the complex, when we just have
an assessment for one component of that?

MR. RINDONE: Having an assessment for a component of it, like I
said, can serve as an indicator for, generally speaking, how the
complex is doing, and so by no means is the assessment without
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

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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

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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.
48

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DR. BARBIERI: Right, and they would handle that. That's a management -- Yes.

CHAIRMAN NANCE: John, please.

DR. FROESCHKE: Just so I'm clear, I thought, originally, Luiz, you were suggesting that we just take the numbers that we have on the book now for the shallow-water grouper complex, and say that's a million pounds, and I don't know, but whatever it is. At that time, the scamp contribution to that was 25 percent, 250,000, and say now it's 300,000, and so then the new complex was -- It raised the whole thing up by 50,000 pounds, and is that what you were suggesting?

DR. BARBIERI: Yes. Yes, it was, because we still have to look at this on a species-by-species basis, and so, if the council wants an update -- Think about this. If the council wants an update of the shallow-water grouper complex, they can request that, right, and so the council decided to request management advice on scamp, and the Science Center conducted the assessment, and the SSC reviewed it, and now we'll provide that management advice.

To update the entire complex, it will require updating the numbers, or not, because, if we didn't -- I suppose, if we didn't do this for scamp, right, the numbers for black grouper, and yellowfin, would remain the same, right?

DR. FROESCHKE: The problem is, if you were to do that, you're going to have scamp in FES units and the other ones that are in different currencies, and so then you're changing the percent of, you know, what could be landed, just based on a currency, and that potentially could allow more harvest on the non-scamp species and the complex, simply by virtue of migrating the currency to the FES and scamp.

DR. BARBIERI: Absolutely, and so then this is done in two steps. One step is we provide management advice based on the assessment for scamp, and the council requests updated management advice, catch advice, for black grouper and yellowfin based on FES, right, and we get those landings, right, and we -- We're going to have to look at plots of them, and remember how we handled this for the -- Remember?

DR. FROESCHKE: Yes, and I kind of thought that we were prepared to do that today, but maybe not.

CHAIRMAN NANCE: We may be. Steve, please.

DR. SAUL: To Luiz's and whoever was on the phone, and I can't remember -- Will's, and I agree with that. Sorry. I am taking a pause, because I don't see scamp in this table that's being shown on the screen in the deepwater complex, but it is?

MR. RINDONE: The way that it works is that scamp is included in the shallow-water grouper complex. However, if you -- If you're a shareholder, and you have landed all of your allocation of shallow-water grouper, but you still have some deepwater grouper, then you can continue to land scamp under your deepwater grouper allocation.

That is an allowance that currently exists within the grouper-tilefish IFQ program, and so it doesn't go the other way though, and like you have to have had shallow-water grouper allocation to be able to land scamp under deepwater, and you have to have shallow-water grouper and deepwater grouper allocation, and you have to exhaust that shallow-water grouper allocation to land scamp under deepwater.

DR. SAUL: Okay. That clarifies it a little bit.

MR. RINDONE: I realize that that's a complicating factor, and I promise it is not the only one.

CHAIRMAN NANCE: Doug Gregory, please.

MR. GREGORY: Thank you, sir. I have to admit that I'm confused, but I'm thinking that -- I think Luiz made the point earlier that we just give them the scamp information and let them make the adjustments, whatever it is, and it's not required -- It might be desirable, but it's not required to update the black grouper assessment when the -- Particularly since, the last time it was tried, it was stated that it was impossible to do, and the yellowmouth is probably such a small population that you can't do an assessment on it, and so why get wrapped up in all that?

Just give them the numbers and let the Regional Office handle the FES and CHTS differences. I think they can work out, and, if the Center and the council staff feel like it's got to come back to us, then fine, but I don't -- I'm confused why we're getting all wrapped up in it now, but that just could be me.

CHAIRMAN NANCE: Thank you, Doug. Ryan, please.

MR. RINDONE: Thank you, Mr. Chair, and so we're not talking about redoing the black grouper assessment here. I think what's being talked about is taking the information from SEDAR 68 and then,

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which is in MRIP-FES units, and then examining black grouper and
yellowfin grouper in FES units also, and then coming up with an
aggregated -- An aggregated OFL and ABC.

CHAIRMAN NANCE: Yes. Katie, please.

DR. SIEGFRIED: This is something that we had discussed with
council staff when the request came through for these data in FES
units, and, of course, I'm not a member of the committee, but isn't
it possible to send this to the IPT level and have the Science
Center weigh-in on how to ratio these things out, based on this
table? It's still possible to move forward with the projections
that Skyler has provided and then work on this in the IPT, isn't
it?

CHAIRMAN NANCE: Absolutely.

DR. SIEGFRIED: Okay.

CHAIRMAN NANCE: Absolutely. I just -- Where I'm coming from,
Katie, is I don't have any problem with doing the ABC for scamp
today and putting it in this table. I think we can come up with
numbers for black grouper and yellowfin grouper in this table,
also, and come up with values to give a total, or we could just do
-- We could just do scamp today and tell the council that we could
come back at a later meeting and do the others. I mean, that's an
option too, but I do think we could come up with the numbers in
this table. Carrie.

EXECUTIVE DIRECTOR SIMMONS: The ABC has to come from the SSC and
not the -- The ABC has to come from the SSC and not the
interdisciplinary planning team that we're talking about.

CHAIRMAN NANCE: Right.

EXECUTIVE DIRECTOR SIMMONS: So you can give us the scamp numbers
today, but we really can't do anything with them, management-wise,
until we figure out what we're going to do with those other minimal
species in that complex.

CHAIRMAN NANCE: I do think -- I do think that we have enough
information, on this table that's been provided, to come up with
-- Maybe I'm the only one, but come up with values that would be
comfortable with to be able to give to the council for the whole
complex. Carrie, please.

EXECUTIVE DIRECTOR SIMMONS: Just one more point of clarification,
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.

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.

10 **CHAIRMAN NANCE:** Harry, please.

12 **MR. BLANCHET:** A simple question, perhaps, and then a troublesome
13 one, maybe.

15 **CHAIRMAN NANCE:** You never ask a simple one.

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.

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.

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.

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.

42 **CHAIRMAN NANCE:** Thank you, Harry. Tom.

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.
48

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.
48

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.
48

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

298

1 like a heavy lift, and I think we have the recreational data, but
2 we just need the commercial data extended back.

4 **CHAIRMAN NANCE:** Okay. The commercial data is the Regional Office,
5 and is that correct? Katie.

7 **DR. SIEGFRIED:** I guess I wonder why you would want it for the
8 pre-IFQ period.

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.

23 **CHAIRMAN NANCE:** Okay. Was there a comment online?

25 **MR. RINDONE:** Well, I have one, operationally.

27 **CHAIRMAN NANCE:** Okay. Go ahead, Ryan.

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.

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.

I think there's two principles to keep in mind, increasing the long-term resilience of our stocks while also increasing short-term adaptability, through things like interim assessments, and so Bill's SPR analysis I think gave the SSC some good advice on some recommendations to increase that long-term resilience, but, overall, that's one point in the council's risk policy and harvest control rules, and I hope the work of the ABC Control Rule discussion can keep moving forward.

Chris Free et al. published a paper, Harvest Control Rules in the U.S. Federal Fisheries Management and the Implications for Climate Resilience, and there was key, really easy recommendation in that paper, and it was to move from constant-F-based harvest control rules, which we mostly do here, with the exception of when a stock is rebuilding, to these ramped-F controls that we see in the Pacific, and that's one very easy, clear recommendation that he teased out simulation and that we could do to increase the long-term resilience of our stocks.

Last, I just want to lend support for the use of agent-based models. I've been working, learning, with Steve Saul for a long time on these agent-based models, and, in the Gulf fisheries context, I think, you know, they could be really useful as they integrate all the layers of the fisheries system, biological and ecological, and allows you, by integrating them in a simulation framework, to use information from each of these components of the fishery and combine them, and so, some of the work we did in Indonesia, it was a situation where biological data wasn't great, and we did about a hundred fishermen surveys.

The fishermen survey data had actually a higher kind of pedigree, and we believed it more than the biological data, and you could see that either something -- Fishermen were reporting that profits were increasing, and that couldn't be true, given the current biological assumptions we had, and so it really allows you to kind of integrate those pieces of information in a useful way.

Second, they're spatial, and so they're good at things like looking at how fishers might redistribute their effort, based on a closure or other measures, and then, last, once you have a model you believe, you can really apply their policies, and, of course, we have a lot of technical interactions and overlapping fisheries in the Gulf of Mexico, but the model -- The agents adapt to anything you put in them, and so, if you're looking at a spatial closure, you can also look at bag limits, or a lot of the complex policies we have here, and then, last, I would certainly support development 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 indictors.
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 predicators, 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

bottom panel, those are the time series of the recruit deviations that I will be looking at.

We have the same thing for three different snapper species, gray, red, and vermilion, and then those are the recruit deviation time series there, and then I also have gray triggerfish, and this one was also treated independently on its own, and so that is the time series of recruit deviations. Okay, and so that is all the stuff that I was using as responses in the asymmetric eigenvector exercises.

When it comes to the time components -- Like I said before, this is all dictated by the time series itself, right, and so one of the things that is a little kind of quirky about redundancy analysis, and many multivariate methods, is that you kind of need all of your data to actually match up, right, and so, if I have a -- If I am eventually going to be bringing in a dissolved oxygen variable, and I am missing some information within that, you know, would match up to my other values for my recruit deviations, then I have to kind of either truncate my time series, so that everybody has data for all of the observations, or I need to start tossing out variables or imputing missing variables or things like that.

Given some of the focus of the models for the amberjack, where we were really interested in looking at sargassum coverage influence, some eutrophication questions, some general ecological questions, and some habitat questions, the data that I had for those specific models kind of changed the times available, right, and so the amberjack time series was relatively long, and it was limited.

The analyses were limited though by the environmental factors that I ultimately wanted to bring into the picture, right, and so I have four different temporal models that were used in the amberjack exercises, and those time scales were based on the environmental data.

For the reef fish, like I said, that project had a slightly different focus, and it was more geared for the multivariate kind of questions, and multispecies questions, and so we did try to combine the recruit deviations together for some of these ones, and so I had three different models here, one of them with all of the reef fish species that I discussed earlier, one with just snappers, one with hogfish and red grouper, and then one only with gray triggerfish, and, again, by changing, you know, the parameterization of those models, it changed the available time series, and so we have slightly different coverage periods for 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.
48

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 perturbance-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

that I was trying to collect, and we just had different time
periods that I was assembling them over, and slightly different
focuses for the assemblages of reef fishes, but this one was the
climate and sea surface temperature model that I looked at, and
then I had a food web and overfishing model that also included
waterbird indicators, like pelicans, magnificent frigate birds,
the spoonbills, white ibises, and wood storks, and then I also
have the Ryther index of overfishing included in here as well.

Then these are the eutrophication indicators that were used in the
reef fish models, and they're no different, really, than the other
ones, but just different time series.

Okay, and so getting into the results now, starting with the
amberjack, and so I had four different, or five, actually, models,
and the sargassum model was actually two models, but only in the
environmental context, right, and, in the context of the AEMs, the
sargassum model was just a sixteen-year model, right, and so I can
look at the response there, you know, once, and then relate those
asymmetric eigenvectors back to both of those environmental models
later, but, in all cases in amberjack, I was able to find temporal
autocorrelation variables that did a decent job of explaining
variability in those recruit deviations, and so, if we look a
little bit closer at them, and specifically the time periods that
they cover, you know, we can see that, in the case of the
eutrophication model, right, which went from 1987 to 2014, there
were two different temporal signals that were kind of prevalent in
that model.

They were able to capture 22 percent of the deviations, of the
variability in those deviations, and it's explained by this twenty-
eight-year kind of continuous trend and this eight-year kind of
cycle, right, and then the other model that I'm showing here was
just an eight-year cycle, and that one had a 32 percent explained
variability for its deviations. The other two models were right
around 17 and 18 percent, respectively.

Again, the point here -- The point that I really want to make here
is that between 17 and 30 percent of the variability in recruit
deviations was able to be modeled using these synthetic
autocorrelation structures over time, and so I'm seeing these kind
of decadal signals present in many of the models, and a long-term
multidecadal signal present as well, in at least one of the models.

The question that I ultimately have, and that we can discuss a
little bit later, is why is this happening? Like, if it's not an
environmental process, that's a problem, in my opinion, and maybe
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

sargassum at the same time, then we could be potentially setting up a really nice habitat for those juveniles to kind of do some of their early life stage business, and so maybe getting at that match-mismatch hypothesis.

Now let's move into the reef fish stuff, and, again, this one was taking a little bit more of a multivariate approach, and, as a result, I didn't really get good results, which kind of bummed me out, but, if you think about it, that kind of makes sense, maybe, because, at the end of the day, when you're putting things together in a matrix, you know, you're hypothesizing that those variables need to be together, because they describe some kind of system, right, and I have, somewhat arbitrarily, put together hogfish and red grouper deviations and all of the snapper deviations, and maybe I shouldn't have done that, right, because, if you think about why would you do that, the idea would be that those recruit deviations would theoretically respond in the same way to environmental conditions, or they have similar ontogenies, and they maybe are spawned at the same time, in the same place, and we have reason to believe that they would act similarly.

I don't know that we got that right in this exercise, and so I think that might be part of the reason why the all-species model, the hogfish and red grouper model, and the all-snapper model, didn't have temporal signals that could explain that.

Maybe they just don't have temporal signals, and that's fine too, but the point is that those are multivariate systems that are trying to be explained in that temporal context. Gray triggerfish, on the other hand, was one species that I was looking at, and that one had really good results, to the tune of almost 84 percent of the variability being explained by those three asymmetric eigenvector maps, right, and so those ADMs cover three different time periods, and they explained a really large proportion of the variability in those recruit deviations.

Just to kind of remind ourselves what they look like, the triangles are the recruit deviations that we're trying to explain, and the green line is the fitted model from that, and that's the 84 percent that was explained, basically, right, and so that's what the model was able to capture, and then the blue line is what was left over after that, right, and so that's the detrended stuff, and so, like I said, 84 percent of the variability in those triangles is explained by these three eigenvector maps, right, and so we have an oscillating seven-year signal, and we have an oscillating thirteen-year signal, and a more or less continuous twenty-six-year signal that, you know, combined together into that composite time series that you see there, right, and that's kind of -- You

313

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

315

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.
48

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

327

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

330

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

years for those recruits to actually get in the fishery, and so, two years from now, we're going to be able to have huge fishing pressure on red snapper, because I'm saying, right now, we're going to have a huge recruitment event, versus what if I said the environment was going to be really bad this year for red snapper recruitment, and we're expecting really low recruitment, and then your catch advice, two years from now, is very different, because you're projecting forward that assumed year class strength.

Because those last years of data are informed by basically nothing, because we have no information, or very little information, for most of our species, on the strength of recruitment, this year, last year, or the year before, but that's driving the catch advice -- I mean, it's just basic math. Like the amount of new recruits coming into the population next year is going to drive the catch two or three years down the road, and so that's the issue. That's why it's particularly informative.

DR. KILBORN: But aren't we doing that already?

DR. KARNAUSKAS: Sorry. Doing what?

DR. KILBORN: Aren't we using the last few years of data to make those projections?

DR. KARNAUSKAS: We are, yes, and we're assuming mostly, by default, that they're average, because, when you have no data, it reverts to the stock assessment curve, and it assumes average recruitment.

CHAIRMAN NANCE: Luiz.

DR. BARBIERI: Thank you, Mr. Chairman, and thank you for the presentation, Josh. You know, not to rehash, and a lot of people brought up a lot of good concerns here, but I applaud your effort to come and present, because, obviously, this has generated a lot of good discussion, and there is a lot of interest, right, in general, in understanding some of this unexplained, right, causes for recruitment variations and stock dynamics and all of that, and so, you know, thank you for that.

My question is really more of -- You know, it could be for Mandy as well, and, I mean, really -- Well, first of all, I think that the committee would benefit from having an overview presentation, and it has been quite a while since we've received, as a committee, an overview presentation of our integrated ecosystem assessment program, you know, just an update for all of us, and it's great 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.
48

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.
48

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.
9
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.
16
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.
25
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.
29
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.
42
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

that's difficult, and, also, interpreting the satellite data is
quite difficult, and a lot better minds than me are doing that,
but we were even looking at like the predictive power, and that's
something that would be interesting for you work, is, you know,
using a shorter time series of the recruitment and trying to see
if your associations -- If your results actually allow you to
predict the deviations that are in the model, but we weren't even
sure how much of a lag and what level of predictive power we would
have with a recruitment index that was based on sargassum, because
of the data quality, and it's good to hear that you're thinking
about those things.

DR. KILBORN: Thank you.

CHAIRMAN NANCE: Thank you, Katie. Mike, please.

DR. ALLEN: Thank you, Mr. Chair, and thank you, Josh, for the
presentation. You know, given the uncertainty coming out of SS 3
about whether these recruitment residuals are really signaling the
recruitment deviations, I wonder if an approach might be to take
some species that have juvenile survey indices and run this kind
of paired analysis just on the recruitment data, like the field
data, and see how those patterns might match up to what's coming
out of SS 3, because I agree with Mandy that those recruitment
deviations are really just a bucket of additional variation that
may or may not be actual recruitment deviations, and it would be
nice -- It would be interesting to do this analysis paired with
some actual recruitment time series that are field collected and
see how well they match up, and so that's just a thought. There's
a few species you could probably do that for, some of the reef
fish species that have estuarine juvenile phases, and, you know,
there are some data, and so just a thought.

DR. KILBORN: Thank you.

CHAIRMAN NANCE: Good point. Any other questions for Josh? Jack,
please.

DR. ISAACS: I think I should point out that the ibis was the
sacred animal who taught the Egyptian god of writing, and maybe
the council needs to consider the appropriate ritual sacrifices.

CHAIRMAN NANCE: Thank you. We appreciate that.

DR. ISAACS: You're welcome.

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

time period, and, as you kind of arch up and around, to the left,
we end up in the latter part of the time series, right, and so
it's actually a fairly continuous movement through this
multivariate ordination space.

We can see that the primary axis of variability, which accounts
for 45 percent of the variability, is best explained by that
twenty-seven-year AEM, and the secondary axis is best explained by
the thirteen-and-a-half-year trend. The other trends, you can see
their correlation biplot vectors are more towards the origin of
the diagram, and so they're not as influential as the other two,
although they did, you know, get picked in the variable selection
method, and so they are statistically significantly accounting for
some of the variability in this response state that we see here.

One of the things that we can do with these is look at changes
over time, right, and so remember that first axis is the kind of
twenty-seven-year period, and what we generally see is that, over
the time of the time series, several of the responses increased
over time, and several decreased over time, and so some of that is
good, and some of that is bad, right, and, you know, the point
though is that we can do this exercise, and we can see how the
resources shift in their magnitude and abundance and composition
over the time series, and we can start to put some limits on that
timing, right, and so we think it takes about thirty years for
this kind of change to happen with these resources.

Now, what drove that, I can't tell you, and we can make some, you
know, guesses, based on the environmental factors, but the point
is there is a consistent, long-term trend change in some of these
variables.

The same thing with this kind of up-down model here, with that
thirteen-and-a-half-year trend. Cobia had that sort of up-down
action over time, whereas all the other species had more of a down
than up kind of framework, right, and so, even though that temporal
structure kind of represents the down to up to down pattern, you
know, something could be negatively related to that, right, and it
could have an opposite manifestation, but, again, the point being
that we can start to kind of nail down differences, over time,
from say 1997 to 2013, and, you know, those sorts of changes would
be affected more on a thirteen-and-a-half-year time scale than the
larger time scale.

All right, and so those ordination diagrams -- If you take out the
coordinates for the first two axes and plot them independently
against time, this is what you get, right, and so the first axis
is the blue line, and the second axis is that orange line, right,

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and so this is basically just another way to kind of represent
these ordination diagrams, but you can go through that stepwise
variable selection process for each of those, like we did before,
and kind of start nailing down some potential covariates that
appear to be operating on similar time scales, right, and so,
again, don't get too lost in the details here.

We're not talking about mechanism of these things affecting the
system, and what we're seeing though is these predictors are
changing in the similar ways as the response in our complex
adaptive fisheries ecosystem.

This slide is really just to point out that we can identify
temporal autocorrelation scales at the Gulf-wide level, and we can
start to tease out, you know, some of the changes that happened
over those time periods, but the thing I want to talk about is
that trajectory idea, right, and so, if we use these two canonical
axes, which are derived from the temporal model itself, how do we
-- How can we understand them, you know, with respect to the
composition and abundance of the different variables that went
into our response matrix, and what we see here is, in the first
part of that time series, before the two axes kind of cross, it
appears as though there is a set of controlling dynamics in the
Gulf of Mexico that are, you know, configured in whatever way they
are, right, and I don't know how to name that configuration, but,
you know, the two lines -- The blue line is above the orange line,
and they are separated quite a bit, and they seem to be converging
somewhere around 1994.

On the right-hand side, you've got the canonical, you know, axes,
and the ordination, but the colors are related to a resemblance
profile clustering analysis, and so those colors are related to
groups of years that are numerically distinct with respect to the
underlying resources in the fishery ecosystem, and so what we see
is that that first time period, with one set of controlling
dynamics, encompasses three little kind of sub-clusters that, you
know, kind of show this system changing through time, and
potentially operating under one set of controlling dynamics, and
then, after 1995, when, you know, those two axes cross, we see a
whole different pattern in the system state movement, right, and
we've got that weird little wiggle right there, and it kind of
seems to be more of just a constant trend, or a constant slow-
burn, of change.

Relating this back to the concept of, you know, the shapes of these
trajectories, and what that might mean for our ecosystem, the
question is what do we have in the Gulf of Mexico, right, and it
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.

7 **CHAIRMAN NANCE:** Thank you, Benny. Is there discussion? David,
8 please.

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.

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 --

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.

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.

38 **CHAIRMAN NANCE:** Any other discussion from the SSC? Harry.

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 predicator

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.
48

343

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

345

associated with post-release mortality, like fight time and other
things, and one of the things that they took data on was a release
condition, and so an assessment of how quickly the fish was able
to descend on its own, or if it was floating at the surface for a
while, with kind of the highest score if it was dead at the surface,
and release condition was the kind of sole significant predictor
of post-release mortality in that study.

In addition to post-release mortality, I'll be talking a little
bit this morning about the potential for sub-lethal impacts
assessed by changes in activity level in the fish and changes in
their depth use and position in the water column over the course
of a day, over a diel cycle.

In the current study that we're talking about today, we were
interested in examining the potential of barotrauma to impact post-
release mortality in these fish, and so, in part, following up on
results from Curtis et al., studying post-release mortality and
delayed mortality in red snapper, where they found that fish that
were non-vented were three-times more likely to die than fish that
were released with a descending device, to help the fish obtain
depth and repressurize the swim bladder, and, also, that fish
released at the surface that weren't vented were 1.9-times more
likely to die than vented fish, and so that was part of the
motivation of this study.

We, like Laura, used sensor tags, although, in this case, we had
dual sensor tags from INOVASI that looked at the depth that the
tag and fish was at and the swimming activity, using a tail beat
accelerometer in the tag, and we used recreational fishing methods
to obtain fish, working with a commercial guide and deckhands to
help catch the fish, and we used live bait with circle hooks and
jigging in the study.

During the study, we took data on site depth, water temperature at
the surface and mid-depth, along with dissolved oxygen and salinity
and at the bottom of sites, and so that was taken on the day of
tagging and fishing, and we also had water temperature data
available at depth from acoustic receivers that were in place at
these sites, and we recorded fight time with a stopwatch on the
deck of the boat while fishing. Fish size, handling time, also
with a stopwatch, and fish were measured and tagged and ventilated
with a saltwater hose during handling.

Then we randomly determined a starting release treatment on each
day of fishing, as either the first fish would be released as the
surface or released using a descender device from Seaqualizer, and
then we alternated for each fish, in the order of the fish being

346

landed on that day of fishing, so that we would have an equal
sample size of fish released at the surface and fish released with
a descender device.

The descender device, we had a camera, a GoPro camera, attached to
a foil, to see if we could determine what happened as the fish was
released and if there was any depredation on the way down. One
challenge we had with this was that the leader between the foil
and the weight that was attached to the descender device had to be
pretty long for greater amberjack, and so, often, the fish was out
of view upon release, and so we didn't often -- We weren't able to
see the actual release event for most fish, but no depredation was
observed, and so we didn't really incorporate those data, just
because those video events weren't really showing the fish.

For this study, we had three field outings, and so the first
beginning in August of 2018, and the second in the spring of 2019,
and the third, again, in August in 2020, and, initially, we used
an external stainless steel dart tag that we epoxied the acoustic
transmitter to, so that we could be sure that we wouldn't
inadvertently vent the swim bladder, because none of the fish were
vented in our study, but I will talk about this in a moment.

We had issues with tag shedding, and so we switched our tagging
procedures up for the following two seasons and placed transmitters
internally. We didn't vent the swim bladder, and we had no
evidence of inadvertently venting the swim bladder, but we still
had to implant these in the body cavities on the caudal portion of
the peritoneal cavity. In both field seasons, we had a secondary
tag, a nylon dart tag, that had phone numbers and information for
recapturing from anglers.

Our field sites are shown here, and we had some common field sites
between the second and third field seasons, and we picked sites
based on trying to have both a depth range throughout the study,
and so our sites ranged from thirty to sixty-five meters depth,
our artificial reef sites, but we also did some fishing trips ahead
of time, so that we could improve our chances of being able to
catch amberjack where we put receivers down, and so that's why the
sites varied a little bit over the course of the study.

We looked at post-release fate, and we considered mortality that
could occur pre-landing, and so from depredation before being
landed or severe fishing injury, where it was clear that the fish
was dead before being landed, and, in one case, a fish was hit by
the propellor of the vessel, for example. Capture and handling
mortality we considered for any fish that was dead before being
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.
48

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.

353

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

354

each fish were examined, and so this is looking at patterns of
similarity within each fish.

Then we graphed this, to look at it visually, but we also did a
resampling procedure, to see, if we randomized the -- If we random
determined which day we selected, if the pattern that we observed
in days-one through seven would differ greater than expected by
chance, and so I can explain this a little bit better with a
visual, I think.

This is looking at these pairs of plots for five fish here, and
it's looking at depth use over days post-release, and so beginning
at day-zero, immediately after release, and so depth is on the Y-
axis, and days post-release is on the X-axis, and so, for Fish 28,
you can see there's sort of greater diel kind of oscillation
occurring as the days increased over the study period, and so like,
by around day-fifteen, you start to see this kind of vertical
migration that's a little more repeatable, and it becomes more
pronounced later on.

The plot, just to the right of each of these plots, is looking at
the median, or it's looking at the correlation values of each day
relative to the entire dataset, and so the median correlation value
of that day among all other days, and so a value that is high would
be indicative of a day that was more similar to the overall
pattern, and a value that is low would be more atypical, and so,
for example, in Fish 38, the first couple of observations are a
little more atypical, and they have lower values relative to the
kind of repeated pattern that begins to occur around day-ten and
continues almost to day-forty.

For depth, we see some cases, like Fish 38, for example, and Fish
12, where the depth use is pretty different in the first couple of
days, but this was not the case for all fishes, and some fish were
actually more different later on in the study period, like in Fish
25.

This is showing the same kind of analysis, but for swimming
activity, and so, for Fish 42, you can see that there's sort of
greater accelerometry values, or acceleration values, in the first
couple of days post-release, relative to about day-five, and then
things become kind of more stereotyped for the rest of the study
period, and that's reflected by the low values, the kind of lower
values, that approach that kind of asymptote of around 0.4 as a
correlation throughout the rest of the period.

Among these fish that were observed with swimming activity
immediately after the release, the ones that were different tended

to have higher swimming activity for the first couple of days, and
so it's evident in Fish 42, and it's especially evident in Fish 25
as well, and you can see those kind of higher values that are
sustained, and the zero is a little bit shifted on the X-axis
there, but, between days, about post-release day-one and two, there
is much more elevated swimming activity and then more pronounced
diel oscillations at around day-ten.

These fish, in general, the resampling procedure indicated that we
tended to see cross-correlation values that were lower than
expected by chance in the resampling procedure for the first five
days post-release, and so they were lower than expected, if you
sampled at random and shuffled the days, essentially, and that was
the case whether you were looking at the mean value observed, the
mean cross-correlation coefficient or the median, and it was kind
of the same effect.

Another thing that we observed, among fish after tagging in this
study, was emigrations associated with cyclonic storms that had
moved through the area, and so, particularly in 2020, and that was
a busy hurricane and tropical storm year in the northern Gulf, and
Hurricane Sally passed pretty close to the study sites, and eight
fish were found to have emigrated as Hurricane Sally passed over,
and five of those fish were detected on other reefs where we happen
to have receivers, and so we could hear from those fish later on,
and so the fish highlighted here are fish that left either on the
fourteenth or fifteenth from various reefs, and some of these fish
had actually already emigrated and moved to a third reef.

We took a look at the depth profiles and swimming activity of some
of the fish that were -- That did not emigrate and still had
twenty-four hours of data during storm passing relative to their
patterns of swimming activity and depth use when there were no
storms present, for example, and so, in these two fish, for
example, Fish 108 and 111, their depth profiles, in a resampling
test, appeared different than what we would have expected, just by
change, relative to non-storm days, and the big difference seems
to be associated with avoiding these kind of avoiding these kind
of shallower depths on the day when Hurricane Laura was nearby.

Similarly, we had a couple of fish, during Hurricane Sally, that
we had twenty-four hours of data from, from some of the days when
the storm had likely affected sea conditions in the area, and those
days were observed to have differences in swimming patterns that
were kind of aberrant, based on the results of the resampling
procedure, and the differences seem to be associated with kind of
higher than typical observed swimming activity as the fish were
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.
48

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

364

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

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through the whole body of the fish, and we're able to use those
slices to then build a three-dimensional model of the different
tissues in the fish, and so we can build a model that contains
skeleton, swim bladder, skin, whatever we think is important for
the acoustic signature of the fish. Here you see basically the
swim bladder in red and the skeleton in gray.

That three-dimensional model, particularly of the swim bladder
primarily, but also of the other tissues, if we deem it necessary,
is then basically translated into a three-dimensional backscatter
model, and this is where it gets a little bit computing intensive,
and so we have to use like high-performance computer clusters to
do this step, to go from this swim bladder model to this, and what
you're seeing here is essentially the acoustic fingerprint of
different fish species, and so we've got nine different fish
species plotted on these graphs.

On the left, you've got the normalized backscatter, and on the
right you've got the target strength, across the X-axis, which is
different frequencies, and so the idea is that, if you're hitting
these fish with a wide enough band of frequencies, and you have
this model for your species, you can potentially differentiate
that species from other species, just based on the active acoustics
data themselves, and so we have a lot of high hopes for this, and
we're also seeing this as a proving ground, and a development
ground, for this kind of technology, but we're also not necessarily
relying on just the hydroacoustics, and that's why we're coupling
that with cameras across the whole project.

Okay, and so our calibrations, and, as Sean said, we've conducted
two dedicated calibration studies so far, and we're planning to do
at least a third, as well as integrating some calibration with our
regular sampling, by deploying the same gears at the same times in
the same places, but I'm going to share with you the preliminary
results from the two calibration studies that we've done so far.

The first calibration study we did in Florida, in early May in
2022, and, essentially, what -- I will give you the end of the
story first, and what came out of this calibration, I think, was
that we got to ground-test all of our gears, and we got to work
out some of the bugs, and we learned a lot about what we wanted to
do in our next calibration, but I'm going to go through a little
bit more detail here.

The objectives, obviously, is to test out our gears, to deploy
multiple gears at the same time in the same place, to compare the
results among those gears, and then hopefully to estimate
calibration factors from those comparisons.

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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.

The C-BASS only saw four S. dumerili and seven unidentified Seriola, and we're currently, as I said, finishing up the habitat data for the C-BASS transects.

The echosounder, basically, that's what you're seeing in the image here, is some of the echosounder data at five different frequencies of the same part of the transect for those five frequencies. A lot of fish were observed on the echosounder data, but what we -- One of the things that we learned was that it's really hard to apply any kind of abundance models to an always on echosounder track, and so that's a little bit problematic mathematically, and I think we came up with a solution for the second calibration for that. The S-BRUV video reads, as I said before, are not yet finished, and so we don't have a complete comparison of those.

The next steps for processing the data from this first calibration are first to finish those S-BRUV video reads, to compare the S-BRUV to the ROV counts, and to parse the C-BASS data -- Right now, we're parsing the C-BASS data for those points in which it overlaps with the other camera gears, so that we can compare it with the other camera gears, and we also need to test alternative echosounder survey patterns, which I will talk about here in a second, at the next calibration.

The main take-aways here was that we learned a lot about how our gears functioned, and the water clarity was good. We think that, once those video reads are completed, we'll have some data to inform a calibration factor estimate, at least among those three camera gears that I talked about, but probably not with the echosounder, for this particular set of efforts, because the always-on echosounder was of limited value for calculating areal abundance. This led us to conclude that we need to use patterned parallel lines, or flower surveys, for spatial models of abundance with the echosounder.

Moving into our second calibration effort, where we brought lessons learned from the first calibration to bear, hopefully, we conducted this calibration off of Mississippi and Alabama, where the system is, in some ways, more tractable, but, in some ways, a little bit less representative of the diversity that's out there, and so what we wanted to do, for this calibration, was, first of all, establish two virtual positioning system arrays with acoustically-tagged S. dumerili and then conduct our calibrations within those VPS arrays, so that we have better data on how many fish are present and what they're doing while the gears are deployed.

We then deployed multiple camera gears near concurrently in those

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arrays, and we ran two different echosounder survey patterns, a
parallel pattern and a flower pattern, near concurrently with the
camera gears in those arrays, and then we used those VPS
triangulated positions, in combination with camera observations of
tagged and untagged S. dumerili from the camera gears to calculate
a Lincoln-Peterson abundance estimator, as kind of an independent
groundtruth of amberjack abundance within the array.

We also used, or are using, I should say, those VPS triangulated
positions to quantify behavioral changes in response to gear
deployments. We also trialed eDNA sample collections and assay
efficacy at sites with known S. dumerili during this calibration
effort.

This is a map of those two sites, and they're both in the Alabama
Artificial Reef Permit Zone, and you can see them in the kind of
blow-up map here on the right, and it's kind of hard to see the
lines in the map to the bottom-right, but that's essentially what
each site looked like, right, and there's a big, twenty-five-foot-
tall pyramid in the center, and then the dots around that that you
see are our acoustic receivers, and we spaced them so that we could
get optimal coverage, with an estimated range of about 250 meters,
which is probably a pretty significant underestimate.

VPS arrays were deployed at both sites, and they were both super
pyramids. They are twenty-five-foot-tall-by-fifteen-foot-wide
artificial structures, and we have eight receivers per site. Like
I said, the minimum range, we believe, is about 250 meters on
these, and that's on a bad day, with a minimum coverage area of
about twenty hectares, and so, essentially, any fish, within the
four outside receivers, we should have been able to get a pretty
good triangulation on, based on this information.

We put out both fish that had both acoustic tags and external dart
tags, eighteen on one side and twenty on the other, and then we
also had some fish that did not have acoustic tags, that just had
dart tags in those, but the numbers were fairly small, five and
three fish at the two sites.

These are the two vessels that we used, and, because of vessel
size and crew limitations, we basically were limited to three
different gears per vessel, and so, off the Escape, we deployed
the ROV, which is the typical gear that will be used in Alabama
and Mississippi, and we deployed a drop camera, which is something
that's been developed by the LSU folks, and it's going to be used
as the primary camera gear in the western Gulf of Mexico, and then
we used, as I said, active acoustics, which will be used across
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

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the camera falls from the surface to the bottom, to the time that
it sits on the bottom to the time that it's being recovered to the
boat, because other -- Anecdotally, we've heard about following
behaviors, and aggregated behaviors of this species, and so we
wanted to know if it mattered what time during the video you take
your max N count from.

For some gears, the drop cam, the trap cam, and the S-BRUV, we
separated our max N counts for different periods over the
deployment, and the descent period had the highest, but the most
variable, counts, much higher and more variable than the bottom
and ascent periods, and the ascent period had the most counts, and
they were mostly zeroes, and so I think, moving forward -- Why
this is important is because, as Sean said, we are piggybacking on
projects that already have certain methods set, and so it's
important to understand how the different groups -- How they choose
to analyze their videos can have an effect on their max N counts.

We may be able to augment some of the video processing as well,
to, for example, add descent counts to a gear that doesn't
typically -- That isn't typically analyzed that way.

Preliminary results, comparing the camera gears to each other,
here is some actual hard data for you guys, and, essentially, the
one thing that came out of this -- I don't know what we really
expected from these, because we're only looking at two sites, and
so a correlation between two points is either there or not there,
right, and what we found was that, if you compare the two sites,
all the gears had higher counts on one pyramid, 28, than on Pyramid
26, but, if you look at the individual sets of deployments of gears
on the individual days, and try and correlate them together, what
you see is there aren't a lot of strong correlations among camera
gears, although ROV counts were generally higher than counts from
other camera gears, and, other than a general trend of higher
counts on Pyramid 28, there didn't appear to be really strong
correlations among camera gears, and so we think that we can
resolve this issue with a lot more concurrent samples of gears, at
a larger number of sites, with a wider range of natural abundance
at those sites, and so, essentially, if you're just -- Like I said,
if you're just looking at two points in time, it's maybe not the
best way to look for a correlation, or especially not to measure
the slope of one.

We know that we need more calibration work, and we're going to do
that by some dedicated -- Another dedicated calibration cruise,
but we're also going to do that by deploying some of these gears
together across a wide range of sites during the abundance
estimation.

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The VPS array gave us some interesting results, and I just want to
go through those, really quick. These numbers aren't that
important to go through individually, but, essentially, we had a
number of fish that were dart tagged and a number of fish that
were both acoustic tagged and dart tagged on each of the two sites,
and, of those fish, you know, there was only a subset that were
detected. Of that subset, there was only another subset, a further
subset, that we got good triangulation positions on, and then some
of the fish were either mortality events, and so the tag was
stationary on the bottom, or stationary just outside of the array,
and you can see those numbers there, 4 and 6, at the two different
sites.

Then, for the tags that were acting like fish should act, we had
only one that had low persistence, and so the other eighteen fish
that we tagged, where the tag actually behaved like a fish should
behave, they stayed on the reefs and had fairly high persistence
over the about a month that we had our receivers out.

I am going to kind of drill down in this Pyramid 28 for a second,
real quick, and this is one fish tracked from Pyramid 28, and I'm
showing you this one because it's fairly representative of the
eleven fish that had high residency around the reef, and what you
maybe can't see, because the time is going by so quick, is that
this fish seems to be very tightly associated with the reef
structure during the nighttime hours, and then, during the daytime
hours, its range increases, but it stays within about a hundred
meters of the reef or so, and so that whole twenty-four-hour
period.

What's cool about these data, and I'll talk a little bit more about
it later, is that we can correlate these movement patterns with
the actual timing of gear deployments and see if deployment of say
an S-BRUV causes the step length, and/or direction, to change from
before, during and after the gear deployments.

If you look at those data just and kind of freeze them, or if you
look at all those points, all the triangulations, for fish during
the week in which we deployed our gears, this is what those clouds
look like, and so the point of this slide is to show you that, for
all eight of these fish, if you filter to that week, they spent
most of their time within about a hundred meters of the reef, and
so these should be -- You know, we would hope that any kind of
gears that are measuring fish around a reef would count most of
these fish, or at least have an opportunity to count most of these
fish, when they're in the water.

These data were useful in another way, and we basically used them to create a Lincoln-Peterson density estimate of amberjack abundance within the array during the gear deployments, and, essentially, Lincoln-Peterson is just a standard mark-recapture density estimator, right, and it calculates the number of fish in the system as the number of fish tagged times the number of fish recaptured divided by the number of recaptures that were tagged.

This estimator, obviously, assumes that a system is closed, and so it assumes that no tagged fish die or leave the system between the time that you tagged them and the time that your recapture occurs, and so it doesn't work very well in the open ocean, but what the VPS array allows us to do is it allows us to basically use the acoustically-tagged fish to estimate the loss factor, to estimate the combined effect of emigration and mortality for all tagged fish between the tagging event and recapture event, and so, essentially, what you do is calculate your number tagged at the recapture event is equal to the number of acoustically-tagged fish present at the recapture event plus the number of, if you have any non-acoustically-tagged, but externally-tagged fish, plus those times the number of acoustically-tagged fish at the recapture event divided by the number of acoustically-tagged fish that you started off with.

You just apply that same ratio to the fish that don't have acoustic tags, and you get the number of external tags present during the recapture event, and then you use that estimate of tagged fish in your Lincoln-Peterson density estimator.

Essentially, what our Lincoln-Peterson density estimates look like is we had very few samples were tagged fish were observed. The highest number of tagged fish in a single sample was one, and the ROV had five of these samples, out of thirteen, and so five videos, out of thirteen videos, had a tagged fish observed. The LSU drop camera had zero, out of their fourteen drops, with a tagged fish, and the trap cam had two, and the S-BRUV had two.

Where we could, we used those tagged to untagged ratios to estimate the Lincoln-Peterson density estimates, and, essentially, we were able to get four estimates, or at least we were able to get Lincoln-Peterson density estimates on Pyramid 26 for four of the days and Pyramid 28 for two of the days. Now, you will notice that, in some of these cases, you've got different numbers, right, and that's because, during a different drop, or a different dive, you may have seen a different number of untagged fish, and so that changes the ratio, but we think that these numbers are, you know, fairly representative of the number of fish that were in the array at the time of the other camera surveys.

378

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.
48

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

project, but it looks like you would benefit from having additional
time to continue this preliminary work, and I'm thinking about
this in regard to the timeline that Sean talked about, right, and
usually these projects have a hard, right, end time that hardly
can be extended, and so is it possible, right, to get an extension
to continue some of this preliminary work, because it looks like
this issue of lessons learned, right, from the Great Red Snapper
Count, trying to optimize sampling for this next project, is going
to be very helpful, but, but there's so much to do and so much to
be handled. Any thoughts on that?

MR. ALBINS: More time would be great, but I will have to kick
that to Sean, right, because that's not something we really have
control over.

DR. POWERS: So, unfortunately, no. I mean, the project was
supposed to be two years, and we're assuming a one-year no-cost
extension, which is similar to what happened, and my PIs are
planning for that, all the co-PIs, on it, but, no, and, I mean, we
would love to be able to a whole other field season of calibration
and VPS, but I guess one of the things you will hear, when John
Hoenig talks, is the big question is, okay, what happens if you do
that and there's just simply no correlation amongst the years, and
so we have a plan for that, a back-up, to make sure that the
regional estimates are as absolute as possible and, hence,
standalone, and by that way go additive, but, in addition to our
traditional kind of randomized sampling universe, we have a
Bayesian model being developed that could also deal with relative
abundance estimates, and so you will -- Because we've asked this
all along the way.

Okay, and what if the hydroacoustics can't tell a species, and how
do we then get proportion, and what happens if an S-BRUV and a
chevron trap will never correlate to each other, and what do we do
in that situation, and it would be -- We would benefit, definitely,
from a whole other year of calibration, and then pushing the field
season into 2024, but that's not an option with the funders.

CHAIRMAN NANCE: Thank you. Will Patterson, please.

MR. ALBINS: That's a great answer, Sean. Thanks.

DR. PATTERSON: Thanks, Jim. Mark, when you were presenting the
calibration results, looking at the estimates from the sonar versus
the various camera gears, you know, you had counts that were an
order of magnitude higher with the sonar, and your estimates were
much higher than the number of tagged fish there, which makes
sense, because you have this large population of untagged fish,

but that lack of correspondence -- You know, it's tough to figure out what's causing that, and it seems, to me, that detectability is something that's going to be a real concern here.

You know, Kelly gave a talk, Kelly Boyle gave a talk, earlier today, looking at the depth distribution of acoustically-tagged amberjack, and they spent most of their time above, you know, the seabed, by at least a few meters, and so why would we ever expect a chevron trap, or a BRUV, or even an ROV that's flying a couple of meters off the seabed, to accurately count the number of amberjack present on a site?

MR. ALBINS: Those are great questions, Will, and I will start with the last one first, I think. Our max Ns that we used for the calibration were the highest of the max Ns from a particular video deployment, and so that's surface to surface, and so we are getting counts, sometimes from the descent, and sometimes our maximum counts are happening on the bottom, and so we're trying to incorporate that into the calibration, as kind of a cofactor, that, while the camera is descending from the surface to the bottom, it could be the time when you get the best view of amberjack, because they are potentially distributed up in the water column.

They're also very curious fish, and so we believe that sometimes, when the ROV goes down to the bottom, or when the S-BRUV hits the bottom, those fish will come down from that middle water column, swim around and investigate, and then go back up and do their thing, and so, either way, you're getting a relative -- You know, a relative abundance estimate of those fish, and, to the question about -- First of all, the Lincoln-Peterson estimate didn't give us an estimate of how many tagged fish were there, and it gave us an estimate of the total number of fish that were there, because we know how many tagged fish were there, and we know the ratio of tagged fish to untagged fish from the camera gear, and so we use that to estimate the total number of fish present, just like your classic Lincoln-Peterson density estimator.

Those numbers actually agreed really well with the active acoustic numbers at the seventy-kilohertz frequency, and so they gave us about the same numbers. They were on the order of fifty or sixty fish per site.

One of the Lincoln-Peterson estimates was way high, and it was like 147 or something, and we all find that kind of hard to believe, and so there's, you know, some sources of noise here, and there's multiplication factors that mean, when you have something go a little bit off, it goes way off, and so we're trying to figure out 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.
48

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.

48

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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.

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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.
48

MR. ALBINS: Sounds very good. Thank you. As I mentioned, we've
done -- We've put a lot of effort into, or I should say Josh
Kilborn has put a lot of effort into pulling together a whole lot
of disparate and difficult-to-handle datasets, both on existing
habitat and existing abundance data, and make some sense of those,
right, and so what I'm going to present to you now is kind of what
we, as a group, have arrived at as being the best available data
to use both for sampling and for our ultimate extrapolation up to
the absolute abundance estimates.

As Sean mentioned, the region -- We've divided it into these six
sub-regions, and each of these regions has different pre-existing
historical data, both on habitat and catch, and so we have to deal
with them differently in terms of that, and we also, as you will
see later, when I talk about sampling design, have some projects
that we're leveraging that have pre-existing sample designs that
we have to integrate into the sampling design for this project.

Habitat synthesis for the eastern Gulf of Mexico region --
Essentially, we started with the easiest part, which is just
compiling all these different lists of -- I say the easiest, but
it wasn't by any means easy, but all these different lists of
artificial reef locations, types, and sizes, and we got them from
state sources, from federal sources, from BOEM, from the NOAA
wrecks and obstructions database, and we basically looked at them
all and put them all into, you know, a GIS software package and
looked at overlap between them, where they agreed, where they
disagreed, and tried to pick out the layers, and the sets, of these
points that we had the most confidence in for being a good
representation of what's out there now.

That being said, that's not all we have, right, and, especially
for the eastern Gulf of Mexico regions, both the Florida shelf and
for the Alabama-Mississippi region, we have scalable habitat data,
and, in other words, we have two different projects that have both,
over the course of the last several years, collected manually-
digitized side-scan sonar habitat data for randomly-selected grid
cells across the region.

Now, this is, as you can imagine, extremely useful, because it
gives us a list -- Beyond the list of published sites that we might
get from any particular state agency, this gives us an estimate
of, on the ground, what's actually out there, and so we can select
from these contacts both for sampling and also use that to estimate
the number of reefs that are out there that are not documented.

We'll use these lists, along with the scalable habitat data, to
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

et al. polygons for natural reefs, in this western Gulf region, are probably our best bet for high probability of artificial structures, and I think that's what we're going to be moving forward with, although we are considering using -- There are some places where the state shapefiles show artificial reefs that Gardner does not show, and we're trying to figure out exactly how to deal with sampling those.

I believe the consensus, at this point, is to subsume those within the uncharacterized stratum and to potentially stratify by uncharacterized, but suspected, hardbottom, for the uncharacterized stratum, but that's something that we're working on currently.

The South Atlantic, we're in kind of even worse shape, I guess, so to speak, for natural reef, and I'll talk a little bit about what we have for the South Atlantic. The South Atlantic, we, again, have a list of artificial reef location, types, and sizes, from a couple of different sources that we can cross-check against each other and use those for choosing sites and for extrapolation.

We also have a list of known natural reef point locations, and so the NOAA SERFS survey has an extensive list, and I believe there's about 5,000 points of known natural reef points. They don't have any data on how large those reefs are, but they know that there are points that are natural reef points, and so we can sample from those as well, and, of course, that's what SERFS is going to do. They randomly select about half of those 5,000 sites each year to survey, and so we'll be incorporating those data into this project for 2023.

The natural reef is a little bit more problematic. There is location and extent info for natural reefs, but it comes from the NCCOS model, which is essentially a probability of encounter model, and after, again, extensive discussion, and bouncing this back and forth among the PIs, we don't have a high enough confidence in this to use it like we're planning to use the Gardner et al. natural reef polygons for the Gulf, but what we are going to do, and I will talk about it in the sampling design section, is use that to stratify our unconsolidated bottom surveys.

There are, at this time, no scalable habitat map products for this region, and, again, I'm going to talk about how we're going to solve that problem in the next section of my talk.

This is -- I am not going to spend a lot of time on the abundance synthesis, because this is something that we're still basically 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.
48

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

covariates on abundance, and so the design-based sampling, the
two-stage clustering within a stratum, doesn't tell you, well, why
are the fish there, and it just says, in this stratum, this is
what we estimate is there, and, yes, depth varies, and this varies,
and that varies, but that's not included in the calculations.

The downside of doing a model is like, well, why doesn't everybody
do a model, and you hope that a relatively simply model will have
great predictive value, but, if what we were getting was covariates
that were not terribly meaningful, then it wouldn't predict well.
I mean, you could still do the model, but it would basically have
huge error bars, but, in theory, if you have good covariates, and
you can use all of that data, then we should have smaller standard
errors. I guess, if there aren't questions, then I will stop at
that.

DR. POWERS: I think that's it for us, Jim. The plan is for us to
give some progress along the way, and not one of these big general
overviews again, but, when we go back to the SSC, we'll go with
more discrete, focused things, and so, like I said, one of the
things is we're involving the South Atlantic SSC, the Gulf SSC,
and we also give updates and these presentations to a panel of
NMFS scientists as well, Rick Methot and John, and so a lot more
communication, I think, than the previous one.

The other statistician involved with us is Lynn Stokes, and so the
other thing we learned is, and you can see it here, is the
statisticians are involved from proposal development all the way
to the end, so they're not surprised by something we did, but I
think that's it.

CHAIRMAN NANCE: Okay. Will, I'll go ahead and address your
question, and then we'll go ahead and end.

DR. PATTERSON: Thanks. Thanks to Sean and Mark and John for
coming and letting us know where things stand with this. I think
the Bayesian hierarchical approach has real potential, and we're
utilizing that in one of two methods to estimate red snapper
population size in the Atlantic, in a study that's funded over
there.

One thing that John just mentioned is that it has the potential to
have lower standard errors, and that can be true, but, based on
what Sean just relayed about the Bayesian model can handle relative
abundance, and then convert to absolute abundance, that relies on
the calibrations, and the calibrations that we've seen so far --
There is quite a bit of uncertainty going between the two gears in
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

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production model, and what I'm trying to show here is the relationship between biomass at different levels of effort, really, and how the formulas change as a result of whether we treat the fishery as open access, in the second column there, where the fishing mortality discount rates equal infinity, versus the last column, where it's considered the sole owner solution, where the discount rates equal zero.

This discount rate has a really important effect on how fishermen behave, and it represents how they view the future, what their expectations are in the fishery, and, if we have a sole-owner-type fishery, that is operated according to the eight assumptions that we looked at briefly in the beginning of this, you get an entirely different set of solutions than if fishermen have no faith in the future, and they have no expectations of being able to access the fish, and so those equilibrium solutions are actually representing people wanting to harvest as much as they can right now.

That's really what drives a lot of the behavior that we see in this particular model, when you have an open-access fishery, but, in the real world, or the actual world, those assumptions don't hold. We don't have perfect information about the future, and so there is uncertainty and risk, as a result, and we don't have free mobility of inputs and outputs into the production process, and so nobody has to pay for the fish that they're harvesting.

To incorporate things into this model, just besides the biology and the economics, you want to look at how the ecosystem operates, and, of course, this is a very complicated and involved situation, but the part that I'm going to look at today deals with that lower-left-hand corner that deals with fishing, capture, processing, supply, demand, and competition, and markets and how they affect what's going on in that fishery, and that's where the efficiency comes into it.

This can be expressed a lot more simply by looking at how the ecological dimension impacts the human dimension, and we do this through a set of triangles that represent, on the bottom part, the different trophic levels in the environment, and, on the effort part, the human dimension that impacts it, and so we see commercial fishermen primarily going after the apex predator, but they also intersect tertiary, secondary, and primary consumers.

Commercial fishermen feed dealers, who feed processors, who are affected by aquaculture from outside this particular system, and that goes to the wholesale, retail, and final consumer, who impacts the fishery through recreational fishing and by pollution that affects the very basis of the ecological dimension.

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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,

actually, and so we have this term here that doesn't directly
impact the resource, but it represents the satisfaction that people
know that those marine resources actually exist.

They actually get dissatisfaction when the population of those
resources decline, and so this structural equation here is
constrained by biomass, and, of course, we know that weight, growth
rate, is constrained by natural mortality, plus we have fishing
mortality from two consumptive user groups and a third group that
does not affect that directly, which gets dissatisfaction from
knowing that harvests are increasing, and then we have some
terminal conditions, because it's a dynamic equation.

One additional problem was that, in the model, we displayed demand
as a relatively inelastic, slightly-downward-sloping linear
function, and, as has been demonstrated a number of times in the
literature, demand is really affected by certain attributes of the
fish being delivered to the marketplace, and this homogeneous
product assumption gets violated, because of that, and so what we
really should be looking at are separate equations for each one of
those attributes that uniquely describe a product moving into the
marketplace, and that's what these size class, the J, J-plus-1,
size class I, and I-plus-one, are representing.

If we don't have that information, and we went out and we estimated
what demand would look like, we get D prime, and that's what the
actual data that is available on the internet, when we estimate it
out, ignoring size class, actually comes up with, and the real
demand function is represented by that backward-bending curve,
because, at say price of Pi, we have landings, or yield, of Yi,
and that's many small fish with a low price, while Pj is the same
yield, but it's fewer fish, because they're larger at a higher
price.

This leads to a distortion, you know, D prime, instead of demand,
or SC, that has to be dealt with, and, while we don't have
information about size classes in the publicly-available data
through NMFS, there is information from other sources that gives
us information about size classes that can be used to correspond
to certain prices that can be added to the database.

Where that's not available, there are statistical methods, where,
once adjusting for non-stationarity of the data, we can go in and
group data into unique size classes that we can hypothesize
accurately represent the different market prices for these
species.

Once we've done all this, and we've worked through the data and

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been able to classify these different things, we can go back to
the original model, and we can actually come up with a
representation of what represents fishing effort, and what is
discovered, from this equation, is that it's not something that
you estimate directly, but it is the product of different
relationships in the data.

For example, in the numerator, F prime X is the derivative of the
growth function with respect to F minus delta is the discount rate
that is used to reflect the different type of management programs
that are in place and fishermen's expectations about the future,
who operate in those programs. Price, as a function of qEX, is a
demand curve, and it's the level of harvest, and minus-C is the
marginal cost of fishing, of applying fishing effort.

The denominator is made up of the discount rate, the derivative of
growth, the marginal revenue, P prime of qEX, and, as you go
through this, you see the last of P raised to the X, and that's
the derivative of demand relative to biomass, and so all these
things can be calculated separately and then used to calculate
effort as an algorithm in a computer program.

We go through all this stuff, and we develop, using this model,
for the recreational side, the household production function, and
we get a very strong result, statistically, a max rescaled R-
squared of 0.81, and we see that the probability greater than the
chi-squared is at the alpha equals 0.999 level, and so, for the
recreational data that we used, which comes out of the MRIP
program, and a household production function model developed by
Bockstael and McConnell, we get a fairly good model of what
recreational anglers use to get satisfaction from fishing.

For the demand system, this was named West Greenland Sea Kraken
versus Bluefin Tuna, where bluefin tuna is the predator, and the
kraken is the variable, and we see that we have a negative
relationship between the kraken landings and its own price, and we
see the effect of other prices on those level of landings, and
these estimates pretty much came out to be highly significant, and
of the proper sign, according to theory.

This is the supply curve for the same process, solved
simultaneously, and most of these coefficients for price, with
bluefin tuna at the top and other fish species at the bottom, and
these are the dependent variables, and then the prices across the
top represent the effect of ecosystem, predator-prey, and
competitor effects on these species.

When we take that information, and we load it into a computer

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1 simulation model, which is reminiscent of Wade Griffin's general
2 bioeconomic fisheries simulation model, which also incorporates
3 information about the social factors, as outlined in the previous
4 slides, and the ecosystem factors that were outlined in the
5 previous slides, we end up with these estimates for the different
6 relationships, depending on the initial conditions that are due to
7 the way the fishery is managed.
8
9 Under open access, the observed delta, the one we calculate from
10 the model, is relatively high, and we see the F is -- It best
11 represents the fishing mortality at that point, and we get an
12 estimate of abundance by calculating the price supply elasticity,
13 and then we can also, based on those equations, and, looking at
14 compensating variation and producer surplus measures of benefits,
15 we can get an estimate of rent.
16
17 That, of course, is a very small number, because it's assuming
18 that the fishery is open access, with very little control over it
19 by regulations, and then we can also look at placing an ACL in
20 that fishery, and we see that the observed delta has declined
21 substantially, and people have more faith, who are fishing in this
22 fishery, in the future. The fishing mortality -- I'm sorry. The
23 F factor there drops down slightly, and abundance stays about the
24 same, and rents don't really go up all that much.
25
26 If we add ITQs to that ACL, still assuming it's an open-access
27 fishery, we see the observed delta increases a great deal, and one
28 would expect that expectations about the future, with an ITQ, would
29 have improved, or an IFQ would have improved, but, because the ITQ
30 does not create a property right, and that the council actually
31 has the ability to go in and cancel the program, or change the
32 program, at will, which apparently has occurred in the past, we
33 see that people's expectations about the future degrade somewhat,
34 but our F, I would say, has pretty much improved, and the
35 abundance, again, has not changed much, and rents have improved,
36 but they're still substantially low.
37
38 The last row here in this table represents sort of a metric of
39 what constitutes the best result, based on all the assumptions of
40 the model holding and actually being in place, and we see the
41 observed delta is equal to the management delta of zero, and F has
42 gone down quite a bit, and abundance has not really changed all
43 that much, but it has improved, but what's really important here
44 is the rent, the net benefits that are being generated, and those
45 have gone from E to the minus-thirty-five and minus-thirty-two to
46 E to the 138th, and so that really represents a target, and are you
47 getting closer or farther away from that when you adopt fishery
48 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

a cost-benefit analysis, and they mentioned that three or four times in their decision.

Of course, they also said that it violated the 4th Amendment to the Constitution of the United States, which is a much more serious reason for not allowing the regulation to continue, but that database, obviously, supports being able to do these types of efficiency analysis, and, as National Standard 5 indicates, these things should, shall be, considered by the council, and that it is possible to do this kind of work, if that is required by the Magnuson Act, and the optimal yield definition also requires adjustment by economic factors, and this framework, as outlined here, brings in the ecological factors, and the social and cultural factors, that also need to be addressed there, and it brings it together in one framework that provides the interaction between all these different groups that results in this graph being able to determine what level of allocation represents a starting point for future discussions of the Gulf Council, in determining what the actual allocation should be.

I say that because it's been demonstrated, and I believe it was by Abbott, who said that you can't have an optimal allocation if you don't have an optimally-managed fishery, and, you know, one point I tried to bring out here, explicitly, was that most fisheries that we manage, in the National Marine Fisheries Service and council system, are not optimal, and they're all based on an open-access system, and some of these externalities, these market inefficiencies, or market failures, that violate those initial assumptions prevent optimality from being achieved, and so, even ITQs, if you can't grant a property right, if people don't have ownership to the resource, then they're going to generate further inefficiencies, and reduce potential benefits, and so they need to be carefully crafted as well. That's about it for me. If people have questions, I'm happy to try to answer them.

CHAIRMAN NANCE: John, thank you. I have a quick question, in the fact that -- So we had David Carter come, from the Center, and present ways to change allocations, and he gave us some different scenarios, like catch-based, lottery, auctions, intersector trading, and those types of things, and is what you're presenting here an initial look at how you would -- How you would look at a resource and then divide it between commercial and recreational, or is this a way to provide -- To look at the commercial pile and divide it among the different individuals?

DR. WARD: It depends how you set your regulation up. Each one, in that structural equation that I talked about briefly, where you're maximizing over different groups -- The first term that

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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.
48

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

price differentials, and so, you know, you can go to another
dataset online, which is what Gates did originally, and he went to
the -- I think they called them the green sheets, and it was for
the Fulton Fish Market, that showed what size fish were being sold
for what price, and he related those back to the landings data
prices and tried to divide the data up that way, and I think it
was for yellow flounder, and he was able to use that to get a much
better fit to the data, by accounting for these size classes
through proxy variables.

You can also do some statistical techniques, where you can sort
the price data into groups that are statistically similar, and you
can assign a variable to that and put that into the model as a
series of qualitative variables, and, you know, you can interpret
them, after you do the estimation procedure, but the whole idea,
really, is that you have to take these initial assumptions into
consideration, when you're building your mathematical model, and
figure out ways to get that model to reflect, as well as you can,
the actual world operations that are going on, and that's why you
need so many different types of sciences working together to come
up with this uniform set of results.

CHAIRMAN NANCE: Thank you. Harry, please.

MR. BLANCHET: Thank you. Going back to that Slide 16 that we
were just on a minute ago, one thing that struck me was, when you
went to the sole owner, what you ended up with was that your F
value decreased a lot, and your rent was remarkably increased, and
I don't know what that number is, but it's big, and that had no
influence on the abundance.

DR. WARD: Right.

MR. BLANCHET: That blows my mind.

DR. WARD: Well, the sole owner situation is where those
assumptions that we were discussing before all hold, for example,
perfect information about the past, present, and the future, and,
of course, we don't have perfect information about the future, and
so that number there is really just sort of a metric. Are you
getting closer to a delta equal to zero, the discount rate equal
to zero, or are you moving away from it, and, if you're getting
closer, then you're going to get larger rents.

Now, as to the actual magnitude of any of this stuff, it's really
going to depend on the estimated coefficients of the supply and
demand functions that are being generated, and so that's really
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

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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.
48

REVIEW: WENCHMAN AND MID-WATER SNAPPER HISTORICAL LANDINGS

MR. RINDONE: All right. John is here to review the historical wenchman landings in the Gulf, and these data required unique handling, due to many confidentiality issues, such as the raw annual data not being available for public review, due to the number of fishermen and dealers. John worked with Gulf States Marine Fisheries Commission, over a period of several weeks, to put all this information together. The SSC should evaluate these data and determine if they are sufficient for providing annual catch advice to the council, and the SSC should make any other recommendations regarding the management of wenchman, as appropriate.

MR. MARESKA: Well, hopefully we'll end the day like we started the day, and the presentation, the length of it, is proportion to the length of the title, and so I would like to thank Donna. She's online, and she is with the Gulf States Marine Fisheries Commission, and she worked with us in providing all the catch information, and so I've just got some slides that I'm going to go over briefly, kind of what we discussed at the previous meeting, to bring everybody back up to speed.

All right, and so we made a recommendation to remove wenchman from the mid-water snapper complex, but we weren't able to come up with an OFL, and so we were looking at a time period of stable catches which we could recommend an OFL, and so we had a second motion to request to get these landings from the Gulf States Marine Fisheries Commission, and we had other concerns about the abundance of fish, the sustainability, due to the age composition, and we really wanted to look at those harvest years.

I had the occasion to be digging through some old SEAMAP documents, and so, in 1984, the SEAMAP sub-committee had rumblings about developing a squid and butterfish fishery for Japanese markets, and so they implemented a squid and butterfish in 1985 and 1986, and so this is just a little snippet from a report to the TCC, and so we can see that the fishery was kind of well developed back in 1986.

There were eight boats that were working, and they got -- An estimated two-million pounds of butterfish were landed, and they said that catches were erratic, and catches were also erratic for the fishery-independent survey.

In 1987, the SEAMAP sub-committee sanctioned a couple of surveys to try and figure out why they were so erratic, and so we've got 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 butterfish
3 fishery and come at this whole thing in a more comprehensive way.
4
5 **CHAIRMAN NANCE:** Is the butterfish -- It sounds like the butterfish
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 butterfish.
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 butterfish. 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

433

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

435

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**
48

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MR. ERIC SCHMIDT: I am going to speak in absolute agreement that wenchman should be taken out of the mid-water and deepwater snapper complex. It probably shouldn't even be managed, period. It's really an irrelevant fishery, with a miniscule amount of fish, when you come to the grand scheme of things.

I do have a comment about something that's not on the agenda, and I won't take very much of your time, and I know this is day-three of an SSC meeting, and many of your heads are ready to explode, and so, last week, we had the court ruling on the VMS, and things have now changed in the charter industry.

The charter industry came before the Gulf Council and requested electronic logbooks, so that they could build a catch history, and now there is no more electronic logbooks, and there's no more reporting, no more hail-in and no more hail-out, and I am torn a little bit at this, because SEFHIER, I think, went a little too far from what the industry originally wanted, but, at the meeting in Baton Rouge, NMFS suggested that we're going to know, pretty soon, whether or not the red grouper is going to close.

Red grouper is a very valuable component to the charter industry, from Tampa to Key West, and it's probably the world's biggest population of red grouper live in that 180-mile stretch. There's a possibility that we could close in June, and southwest Florida was home to the second-largest-costliest hurricane in U.S. history on September 28.

The area is struggling financially, and now we're also contending with a really bad red tide. 1979 was bad, and 1983 was bad, and 2018 was the worst I've seen, and I hope I'm wrong, but I was on the water four days last week, and, from what I'm seeing, this is probably going to be worse.

Kingfish, cobia, tarpon, pelagic species, species that you normally do not see die in red tide, are on the beach, and it is going to be exceptionally bad, and so, at the next council meeting, I am going to request the council seriously look at sector separation. The recreational sector overfished their quota by 200 percent in the last two years, and has not been held accountable, and now the charter industry has suffered a closure, both on red grouper and lane snapper, early, two years in a row.

If they close this year, after the financial hit that southwest Florida suffered with Hurricane Ian, and we get a six-month fishery, I don't how many individuals are going to be allowed to even stay in the fishery. You just can't do it. You can't walk into a bank and say, hey, I want to borrow money year-round, but

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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