

GULF OF MEXICO FISHERY MANAGEMENT COUNCIL
MEETING OF THE STANDING & SPECIAL REEF FISH & SOCIOECONOMIC
SCIENTIFIC AND STATISTICAL COMMITTEES

WEBINAR

MARCH 30-APRIL 2, 2021

STANDING SSC VOTING MEMBERS

Joseph Powers.....
Lee Anderson.....
Luiz Barbieri.....
Harry Blanchet.....
David Chagaris.....
Benny Gallaway.....
Bob Gill.....
Douglas Gregory.....
Walter Keithly.....
Robert Leaf.....
Kai Lorenzen.....
Camp Matens.....
James Nance.....
Will Patterson.....
Sean Powers.....
Ken Roberts.....
Steven Scyphers.....
Jim Tolan.....

SPECIAL REEF FISH SSC VOTING MEMBERS

Jason Adriance.....
Judson Curtis.....
John Mareska.....

SPECIAL SOCIOECONOMIC SSC VOTING MEMBERS

Jack Isaacs.....
Kari MacLauchlin-Buck.....
Andrew Ropicki.....

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1 Emily Muehlstein.....Public Information Officer
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3 Bernadine Roy.....Office Manager
4 Charlotte Schiaffo.....Administrative & Human Resources Assistant
5 Carrie Simmons.....Executive Director
6 Carly Somerset.....Fisheries Outreach Specialist

7

8

9 **OTHER PARTICIPANTS**

10 Rob Ahrens.....HI
11 Jeff Angers.....Center for Sportfishing Policy
12 Leann Bosarge.....MS
13 Kevin Boswell.....FL
14 Steve Cadrin.....University of Massachusetts, MA
15 Liese Carlton.....AL
16 Mary Christman.....University of Florida, FL
17 LaTreease Denson.....SEFSC
18 Michael Drexler.....Ocean Conservancy
19 Dave Eggleston.....North Carolina State University, NC
20 John Hoenig.....AL
21 Steve Murawski.....FL
22 Adam Pollack.....SEFSC
23 Kellie Ralston.....American Sportfishing Association
24 Jay Rooker.....TX
25 Ashford Rosenberg.....Shareholders Alliance
26 Matt Smith.....SEFSC
27 Greg Stunz.....TX
28 Jessica Stephen.....NMFS
29 Ted Venker.....CCA
30 Bob Zales.....Panama City, FL

31

32

33

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TABLE OF MOTIONS

PAGE 304: Motion that the review team (external consultants and SSC) considers that the Great Red Snapper Count provides a representative estimate of abundance for the eastern Gulf and a highly uncertain estimate for the Western Gulf. However, the review team also considers that the true uncertainty in both estimates is substantially larger than implied by the 11 percent CV stated in the report, and that the estimate for uncharacterized bottom is particularly uncertain. The motion carried on page 317.

PAGE 390: Motion that the SSC defines the ABC for Gulf of Mexico red snapper for 2021 as 21.2 million pounds whole weight in CHTS units based on the GRSC interim analysis, using a three-year average at F 26 percent on the structured bottom representing the exploited fishery. The motion was withdrawn on page 420.

PAGE 421: Motion that the SSC defines the OFL for Gulf of Mexico red snapper for 2021 as 25.6 million pounds in CHTS units based on the GRSC interim analysis, using 13 percent of the UCB, and using a three-year average at F 26 percent on the structured bottom representing the exploited fishery. The motion carried on page 426.

PAGE 426: Motion that the SSC defines the ABC for Gulf of Mexico red snapper for 2021 as 15.4 million pounds in CHTS units based on the SEFSC interim analysis informed by the BLL survey (based on terminal year 2019, and the HCR five-year moving average. The motion carried on page 436.

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1 The Meeting of the Gulf of Mexico Fishery Management Council
2 Standing and Special Reef Fish and Socioeconomic Scientific and
3 Statistical Committees convened via webinar on Tuesday morning,
4 March 30, 2021, and was called to order by Chairman Joe Powers.

5
6 **INTRODUCTIONS AND ADOPTION OF AGENDA**
7

8 **CHAIRMAN JOE POWERS:** Good morning. My name is Joe Powers, and
9 I welcome all of you as the Chair of the Scientific and
10 Statistical Committee of the Gulf of Mexico Fishery Management
11 Council. We appreciate your attendance on this webinar and
12 input into this meeting. Representing the council is Tom
13 Frazer, and council staff in attendance are Ryan Rindone and
14 Jessica Matos.

15
16 Notice of this meeting was provided to the Federal Register,
17 sent via email to subscribers of the council's press release
18 email list, and was posted on the council's website.

19
20 Today's meeting will include the following topics: Adoption of
21 the Agenda, Review of the Great Red Snapper Count, Approval of
22 the January 5 through 7 Minutes, Scope of Work, Selection of SSC
23 Representative for the Next Council Meeting, Review of Great-
24 Red-Snapper-Count-Informed Catch Analysis, Review of Red Snapper
25 Interim Analysis, Public Comment, and Other Business.

26
27 The meeting, webinar, is open to the public and is being
28 streamed live and recorded. A summary of the meeting and
29 verbatim minutes will be produced and made available to the
30 public via the council's website.

31
32 For the purpose of voice identification and to ensure you are
33 able to mute and unmute your line, please identify yourself by
34 stating your full name when your name is called for attendance.
35 Once you have identified yourself, please re-mute your line. To
36 signal you wish to speak during the meeting, please use the
37 raise-your-hand function, and staff will display your name.
38 Please remember to identify yourself before speaking and to also
39 re-mute your line each time you finish speaking. Thank you. We
40 will begin with the attendance.

41
42 **MS. JESSICA MATOS:** Lee Anderson.

43
44 **DR. LEE ANDERSON:** Lee Anderson.

45
46 **MS. MATOS:** Luiz Barbieri.

47
48 **DR. LUIZ BARBIERI:** Luiz Barbieri.

1
2 **MS. MATOS:** Harry Blanchet.
3
4 **MR. HARRY BLANCHET:** Harry Blanchet.
5
6 **MS. MATOS:** Dave Chagaris.
7
8 **DR. DAVID CHAGARIS:** David Chagaris, here.
9
10 **MS. MATOS:** Benny Gallaway.
11
12 **DR. BENNY GALLAWAY:** Benny Gallaway, here.
13
14 **MS. MATOS:** Bob Gill.
15
16 **MR. BOB GILL:** Bob Gill.
17
18 **MS. MATOS:** Doug Gregory.
19
20 **MR. DOUGLAS GREGORY:** Douglas Gregory.
21
22 **MS. MATOS:** Walter Keithly.
23
24 **DR. WALTER KEITHLY:** Walter Keithly.
25
26 **MS. MATOS:** Robert Leaf.
27
28 **DR. ROBERT LEAF:** Robert here.
29
30 **MS. MATOS:** Kai Lorenzen.
31
32 **DR. KAI LORENZEN:** Kai Lorenzen.
33
34 **MS. MATOS:** Camp Matens.
35
36 **MR. CAMP MATENS:** Camp Matens, here.
37
38 **MS. MATOS:** Jim Nance.
39
40 **DR. JIM NANCE:** Jim Nance, here.
41
42 **MS. MATOS:** Will Patterson.
43
44 **DR. WILL PATTERSON:** Will Patterson.
45
46 **MS. MATOS:** Joe Powers.
47
48 **CHAIRMAN POWERS:** Joe Powers.

1
2 **MS. MATOS:** Sean Powers.
3
4 **DR. SEAN POWERS:** Sean Powers is here.
5
6 **MS. MATOS:** Ken Roberts.
7
8 **DR. KEN ROBERTS:** Ken Roberts is here.
9
10 **MS. MATOS:** Steven Scyphers.
11
12 **DR. STEVEN SCYPHERS:** Steven Scyphers is here.
13
14 **MS. MATOS:** Jim Tolan.
15
16 **DR. JIM TOLAN:** Jim Tolan.
17
18 **MS. MATOS:** Jason Adriance.
19
20 **MR. JASON ADRIANCE:** Jason Adriance.
21
22 **MS. MATOS:** Judd Curtis.
23
24 **DR. JUDSON CURTIS:** Judd Curtis.
25
26 **MS. MATOS:** John Mareska.
27
28 **MR. JOHN MARESKA:** John Mareska.
29
30 **MS. MATOS:** Kari Buck.
31
32 **DR. KARI MACLAUHLIN-BUCK:** Kari Buck.
33
34 **MS. MATOS:** Jack Isaacs.
35
36 **DR. JACK ISAACS:** Jack Isaacs is here.
37
38 **MS. MATOS:** Andrew Ropicki.
39
40 **DR. ANDREW ROPICKI:** Andrew Ropicki is here.
41
42 **MS. MATOS:** We have Tom Frazer, as our council liaison.
43
44 **DR. TOM FRAZER:** Tom Frazer.
45
46 **MS. MATOS:** Thank you. Also, I will call out for our three
47 consultants that are on the line. We have Steve Cadrin.
48

1 **DR. STEVE CADRIN:** Steve Cadrin.
2
3 **MS. MATOS:** Mary Christman.
4
5 **DR. MARY CHRISTMAN:** Mary Christman.
6
7 **MS. MATOS:** Dave Eggleston.
8
9 **DR. DAVE EGGLESTON:** Dave Eggleston is here.
10
11 **MS. MATOS:** Great. Thank you.
12
13 **CHAIRMAN POWERS:** All right. Thank you. The agenda that I just
14 read out, essentially, and listed there, is there any objections
15 to this agenda?
16
17 **MR. RYAN RINDONE:** Dr. Powers, one modification for timing, to
18 accommodate Dr. Ahrens early wakeup time in Hawaii, would be to
19 move Dr. Murawski's presentation up underneath Greg's summary
20 presentation.
21
22 **CHAIRMAN POWERS:** Okay. That's fine with me. Also, when we get
23 to that point, be sure and remind me about that. All right.
24 Thank you. Are there any other -- Not objections, but are there
25 any other adoptions or adaptations to this agenda? If not, then
26 since what we're talking about doing here, in terms of the
27 agenda, the first two days are, essentially, the review of the
28 Great Red Snapper Count.
29
30 The latter part is the council, or the SSC, being asked to
31 address certain issues, and, in particular, what it is we're
32 going to use the Red Snapper Count for, to adjust the catch
33 advice for the 2021 year, and perhaps later, and so,
34 essentially, the -- As I said, the first two days will be
35 focused on the Great Red Snapper Count.
36
37 The agenda for those first two days was given on the council
38 website, and we also have terms of reference for that, but,
39 before we get to the terms of reference, let me kind of remind
40 people how we got where we are.
41
42 At our last meeting, January 6, we were presented -- We, the
43 SSC, were presented the results of the Great Red Snapper Count,
44 in terms of the broad overview of the results, and we were also
45 being asked to utilize that information, as appropriate, to
46 perhaps modify the catch advice for 2021 and later, and this was
47 different than the previously-scheduled interim analysis that
48 was being provided to us at the SSC.

1
2 As we get to the last part of the meeting, the SSC has been
3 provided with a couple of analyses, and one of them is the
4 interim analysis, which does not use the Great Red Snapper
5 Count, which used the procedures agreed to prior to that, and
6 then also some advice about how to utilize the Great Red Snapper
7 Count, if it is appropriate to do that, and so the second part
8 of the meeting will be the point where we develop that catch
9 advice, but the first part of the meeting -- At the January 6
10 SSC meeting, the SSC recommended that we have a review.

11
12 It wasn't the council that recommended it, and it wasn't NMFS
13 that recommended it, and it was the SSC, and the first two days
14 of this meeting is essentially that review, and we recommended
15 that we have outside reviewers, and that has been set up, I
16 believe by the council, and these are independent of the SSC,
17 and the SSC was not involved in the selection of the members,
18 although we did give some advice about terms of reference.

19
20 That is kind of where we are, and we are utilizing this meeting
21 to take advantage of the independent experts and their review
22 and to further elucidate, from the principal investigators of
23 the study, details of that study, so that we can provide better
24 advice to the council, and so, in terms of the terms of
25 reference, Ryan Rindone will introduce the terms of reference,
26 and that will kind of give some guidance over how we proceed.
27 Ryan.

28 29 **TERMS OF REFERENCE**

30
31 **MR. RINDONE:** Thank you, Dr. Powers. On your screen, you should
32 be able to see the terms of reference, and these were developed
33 in consultation with the members of the Great Red Snapper Count
34 team, with the Southeast Fisheries Science Center, council
35 staff, and NMFS. A great many people definitely helped weigh-in
36 on these and helped hone these down to be as useful and directed
37 as possible for reviewing this large, unprecedented study.

38
39 The terms of reference are broken up into four main components:
40 study design and sampling approaches, statistics and data
41 analysis, results, and the deliverable. The independent
42 consultants have been asked to provide a preliminary individual
43 perspective on the terms of reference, as it relates to the
44 Great Red Snapper Count, and those are provided as background.

45
46 It's assumed that some of those initial findings by the
47 independent consultants may change, and so those perspectives
48 are all drafts, as considered by the consultants and by us, and

1 so please view them in that light. We expect lengthy
2 discussions to happen over the next few days surrounding these
3 terms of reference. I am not going to go through and read all
4 of them, but does anyone have any questions? Kai.

5
6 **DR. LORENZEN:** I just wanted to sort of clarify exactly what the
7 objective of that review is, and so we had a deadline for
8 materials, I think, on the 19th of March, and we received that
9 project report in good time, and that's what we've looked at so
10 far and what the consultants have reviewed, and we have not had
11 a chance to see any of the presentations that will be provided
12 today in advance.

13
14 I am presuming that those presentations are essentially a
15 mixture of information, additional information, about the report
16 that we have already seen, and possibly responses to the
17 independent reviews that were posted over the last days, and so
18 it's to clarify that -- My understanding is it's the document
19 that really contains the heart of what we're reviewing, and it's
20 that report, and that we would be treating any new information
21 that is provided today as essentially a response to reviewers.

22
23 If that is correct, I think it would be good for the presenters
24 today to clarify, in their presentations, what is information
25 that is identical with what was provided in the report and flag
26 any new or different analyses. Thanks.

27
28 **MR. RINDONE:** Thanks, Kai, and, Joe, just to that point, those
29 of you that have been involved in the SEDAR process probably can
30 see that the review of this estimate of absolute abundance
31 differs from how we typically review something that is going to
32 be used to inform abundance through the classical stock
33 assessment process.

34
35 Usually, the data are either being published, or are already
36 published, and they're presented at a data workshop, where they
37 are discussed with the data workshop panel, and they go through
38 the assessment process, and then they're reviewed again
39 independently during the review workshop portion of the stock
40 assessment process, and that process typically occurs over
41 anywhere from eight to fifteen months, depending on the amount
42 of work for a particular assessment.

43
44 In this case, the Great Red Snapper Count project was completed
45 not too long ago, in 2019, and so there hasn't been an
46 opportunity for a lot of the material that has been generated
47 that has ultimately resulted in this estimate of absolute
48 abundance to be published, and the red snapper research track

1 assessment, SEDAR 74, has, for all intents and purposes, just
2 got underway, and so we won't expect management advice to come
3 from that effort for quite some time.

4
5 This review of this information is, from a time standpoint,
6 being done in a more compact fashion, and most of that has been
7 driven by the SSC's request for the review and the council's
8 acknowledgement of the importance of red snapper to the region.

9
10 **CHAIRMAN POWERS:** I would also say that it's been driven by the
11 council asking for the estimate, Great Red Snapper Count
12 estimate, to be utilized, or evaluated, in terms of the catch
13 advice for 2021, and so there's some being driven by that as
14 well. Kai, did you have anything further?

15
16 **DR. LORENZEN:** No.

17
18 **CHAIRMAN POWERS:** Okay. Sean and then Will Patterson.

19
20 **DR. POWERS:** Thanks. I just wanted to respond to one thing that
21 Kai said. Realize that we, as presenters, just received the
22 review, and so the expectation that this will fully encompass
23 our response to the reviewers might be a little too much right
24 now.

25
26 I mean, we've had some time to discuss it, but, ideally, and I
27 think this is Greg's plan, we will write -- Any manuscript or
28 anything like that, we will consider the reviewers' comments and
29 respond to them in a final version of the report, and we'll deal
30 with some of those, but just the expectation that we haven't had
31 much time, and no time as a team, to sit down and look at the
32 review and comment. Some of us will address some points in the
33 presentation, but I wouldn't assume that this is our total
34 response to the reviewers.

35
36 **CHAIRMAN POWERS:** Thank you. Will Patterson.

37
38 **DR. PATTERSON:** I was going to mention similar comments as to
39 what Sean just said. I think we, as presenters, can clearly
40 point out any comments which are in response to the reviews that
41 we've seen, but we haven't spent a lot of time going over those,
42 and I don't know of any new analyses that have been done.

43
44 As far as the presentations, the SSC often receives
45 presentations as the speaker is approaching the podium, and so I
46 don't really understand the consternation about the timing of
47 PDF or PowerPoint files arriving for this, and I don't foresee
48 any departures from the report, but we were asked to explain

1 details and present methods and results, and that's what we aim
2 to do.

3
4 **CHAIRMAN POWERS:** Thank you. Kai.

5
6 **DR. LORENZEN:** I agree with all of those points, and it wasn't
7 consternation, but all I'm asking for that I think if speakers
8 could point out if there are additional analyses, or different
9 analyses, that they are presenting, so that we are aware of
10 where that might be the case, and that's all. Thank you.

11
12 To Sean's point, obviously, I wasn't suggesting that the
13 presentations would contain complete responses, but just
14 flagging that it's possible that there may be new or different
15 information, and if speakers could point that out, when that is
16 the case. Thanks.

17
18 **CHAIRMAN POWERS:** Thank you very much. As we get started, I
19 would like the consultants to introduce themselves, a little bit
20 about their background, and, if they wish to say something about
21 their preliminary findings, feel free to do so, but, obviously,
22 these are preliminary, and we're going through a process to --
23 Those findings may evolve. Let me begin by recognizing Dr.
24 Christman, Mary Christman.

25
26 **DR. CHRISTMAN:** Good morning, everyone. I am Mary Christman
27 from the University of Florida, and I'm a statistician who has
28 worked in fisheries statistics for quite a while. My particular
29 areas include sampling strategies, estimators, and modeling, but
30 I did have a question about the timing of all of this for the
31 rest of you.

32
33 What you're being -- What we're being presented with today, I
34 assume, is details, fill in the blanks, for areas, at least for
35 myself, where I did not see the information in order for me to
36 actually review it, and I'm not expecting any new analyses, or
37 at least I don't recall asking for any, although it wouldn't be
38 a bad idea, and sorry, and I'm getting into details now, but I
39 just wanted to remind everyone that we have final reports due by
40 April 10, and so we will be reviewing -- At least I will be
41 reviewing only what has been presented in the report, plus
42 what's presented today, and so I just wanted you to keep in mind
43 that any information that you can provide to me that could
44 update my review would be helpful. Thank you.

45
46 **CHAIRMAN POWERS:** Thank you. We'll keep that in mind. Dr.
47 Cadrin.

1 **DR. CADRIN:** Hello, all. As a quick introduction, I'm a stock
2 assessment scientist, and I'm with the University of
3 Massachusetts, but, previously, I was an assessment scientist
4 for the Northeast Fisheries Science Center and the Massachusetts
5 Division of Marine Fisheries.

6
7 Most relevant to this week, I have some experience in field-
8 based estimates of absolute abundance and integration into the
9 assessment, and, Mr. Chair, I don't know if you want me to wait
10 until it looks like later in the agenda that we'll be talking
11 about our review.

12
13 **CHAIRMAN POWERS:** Well, I don't want to get into very much
14 detail. If you wish to say something preliminarily, feel free.
15 Otherwise, we'll go on then.

16
17 **DR. CADRIN:** Just, generally, it's an impressive study, but the
18 challenge is going to be how best to use it for assessment and
19 management. Thanks.

20
21 **CHAIRMAN POWERS:** Thank you. All right. Dr. Eggleston.

22
23 **DR. EGGLESTON:** Good morning. My name is Dave Eggleston, and
24 I'm a marine ecologist and a professor at North Carolina State
25 University, and I'm not a statistician, and I'm not a stock
26 assessment scientist.

27
28 I have experience with animal behavior and habitat use and
29 restoration and recruitment processes, demographic rates, and
30 metapopulation dynamics, and so I do employ basic and advanced
31 statistics in my research, and some of our results are
32 integrated into stock assessments of exploited species. I guess
33 I would just echo Steve's comments, in terms of the breadth and
34 depth of this Great Red Snapper Count, and I look forward to
35 further discussions. Thank you.

36
37 **CHAIRMAN POWERS:** All right. Thank you. Ryan, do you have a
38 comment?

39
40 **MR. RINDONE:** Yes, Dr. Powers, and I just wanted to clarify
41 something procedurally, now that we've introduced everybody.
42 The independent consultants' involvement with the meeting is
43 focused on this first part, which is the review of the Great Red
44 Snapper Count, and they will be weighing-in equally with members
45 of the SSC, as far as any determinations about the Great Red
46 Snapper Count itself, as it pertains to it being a
47 representative estimate of absolute abundance of age-two-plus
48 red snapper in the U.S. Gulf of Mexico, and also about the

1 assessment itself and about its bearing on this.

2
3 When it comes to the SSC meeting portion of this four-day
4 extravaganza, the independent consultants will not be involved
5 in that portion of the meeting. However, since it's open to the
6 public, they're more than welcome to hang around for it, if they
7 choose to, but that part of the meeting, voting and whatnot,
8 will revert strictly back to the SSC.

9
10 In keeping with National Standard 2, we have asked that the SSC
11 members who are PIs on the Great Red Snapper Count project
12 abstain from voting on matters as it relates to the review of
13 the Great Red Snapper Count, since their research was directly
14 involved, and, if the SSC decides to make a determination about
15 which of the -- Which, or either, of the interim analyses, later
16 to be presented, constitutes best science and/or is appropriate
17 for use in management.

18
19 However, when it comes to actually determining the OFL and ABC
20 and application of the council's ABC control rule or other proxy
21 method, as the SSC determines appropriate, those co-PIs who are
22 also SSC members are encouraged to participate fully at that
23 point, and they have all been briefed on this. Mr. Chair.

24
25 **CHAIRMAN POWERS:** Thank you. I think we're ready to begin the
26 set of presentations. The actual location of the presentations
27 on the website, Ryan, can you kind of remind people where that
28 is?

29
30 **MR. RINDONE:** Sure, and so, if you're at the council's home
31 page, across the top, you're going to see a blue meeting bar,
32 and, among those -- Or a blue menu bar, and among those is
33 something that says "Meetings", and you mouse over that, and you
34 go to "SSC Meetings" and click on that, and that's going to take
35 you to a landing page for all of our current and pending SSC
36 meetings, and you will see the meeting for March 30 to April 2,
37 and that's this one, and there will be a link that says "Agenda
38 and Materials", and you will click on that, and that will bring
39 you to the landing page for all the materials. Jess is showing
40 you guys where to find all of that right now.

41
42 Some of these presentations are rather large, because they
43 contain embedded videos, and so we're working on getting some of
44 these things up there right now, and so some of them aren't
45 quite up yet, and they will be, and please just bear with us.
46 They are all up there. I stand corrected. They're all up there
47 now, and so be patient if you're trying to download them.

1 Some of them are rather large, and, for the presentations that
2 have embedded video, we'll be going back and forth between us
3 and the presenters, to make sure that that video can be
4 portrayed, especially it relates to things like the ROV work.
5 Showing a still image, because we can't play the video, isn't
6 very informative for you guys, and so just be patient with us as
7 we move presenting controls around and try our best to
8 accommodate everyone. Thank you.

9
10 **CHAIRMAN POWERS:** All right. Thank you. I believe we're ready
11 to start the nuts-and-bolts of this, and we will begin with Dr.
12 Greg Stunz, and he will be making an overview presentation, to
13 get us started. Greg.

14
15 **REVIEW OF THE GREAT RED SNAPPER COUNT PROJECT**
16 **REVIEW OF THE GREAT RED SNAPPER COUNT**
17 **PRESENTATIONS**
18 **SUMMARY PRESENTATION OF GRSC**
19

20 **DR. GREG STUNZ:** Thanks, everyone. It's really great to be here
21 with the team that did this monumental study to talk about where
22 we're at. We were very interested to get the reviews back from
23 the independent reviewers that had some very insightful comments
24 that we feel we can address.

25
26 As far as the format of getting through this section of the
27 agenda, the council staff had asked me to give an overall high-
28 level review, or presentation, so everybody is kind of on the
29 same footing, and I believe there's a lot of public joining in,
30 and there's probably that haven't heard it. Many of you have
31 heard it before, or maybe multiple times, but that will bring us
32 all up to speed of where we are, and then I have various key
33 investigators along the way to present certain sections that
34 relate to their area of expertise.

35
36 Dr. Powers, thanks for accommodating some of our schedules, and
37 it's monumental, trying to get this many people together at one
38 time to give these presentations, and so there may be just a
39 little bit of moving around and things, to accommodate time
40 zones and that sort of thing, and we really appreciate that.

41
42 I thought too that I would give a little history about where we
43 arrived where we are, because that also influences, ultimately,
44 the assessment and that sort of thing, and so I will go ahead
45 and begin with what were the main goals, and, I mean, obviously,
46 anyone tuning into this call realizes the magnitude and the
47 iconic nature of red snapper, and so part of an issue of having
48 the best-informed management was, obviously, having an absolute

1 abundance estimate, which could lead to more sophisticated
2 modeling as well as just general expansion of our knowledge base
3 about this really important fishery.

4
5 Because the management was very controversial, and it's a mixed-
6 use fishery, and a whole variety of things, leading to a lot of
7 issues in managing this fishery, it certainly has the attention
8 of Congress and many other people, and one of the main needs
9 recognized was this absolute abundance estimate that was needed,
10 and so Congress appropriated funds, at a really extraordinary
11 level, in terms of doing a study that was required of this
12 magnitude and broad coverage that the region spans.

13
14 The total price tag on the estimate was \$12 million. It was an
15 independent assessment, which I will explain a little more
16 later, but that means it was independent investigators and not
17 NOAA scientists directly involved in the study, and it was
18 really nine-and-a-half million in appropriations, and the
19 institutions were required to come up with the remaining match,
20 bringing it to a \$12-million total.

21
22 There is twenty-one leading scientists, and that numbers comes
23 and goes. Some joined late, and some left for other places and
24 that sort of thing, but roughly twenty-one, representing twelve
25 institutions. As we were putting together this report, we
26 really realized that, wow, there was over eighty scientists
27 involved, when you begin looking at graduate students and post-
28 docs and lead scientists and that sort of thing.

29
30 I will introduce that team, because I think that's very critical
31 for understanding where we're coming from and the expertise that
32 we brought to bear on this project, from beginning scientists
33 all the way to well-seasoned scientists.

34
35 We'll talk about that in just a minute, and how was it estimated
36 overall? Well, I wish we had a magic bullet, and we will talk
37 about that quite a bit, of how this phased-in approach occurred
38 and that kind of thing, but what it comes down to is there's
39 really not one overall sampling methodology that can cover the
40 vastness and diversity of the Gulf of Mexico in all habitats and
41 all regions, and certainly that creates some challenges that we
42 have to deal with.

43
44 The first task at-hand with this project was habitat
45 classification, and you will understand why that is as I begin
46 to explain that, but we are quite limited on the mapping that we
47 have available, and that just doesn't exist, but it was very
48 clear, in the appropriations, that money cannot be spent on

1 habitat mapping and only using and utilizing what was currently
2 available, and the money was to be directed at actual counting
3 components of this and a few other areas.

4
5 We relied heavily on direct visual counts, where we could. As
6 many of you know, snapper occur in low visibility and high
7 abundance, and that creates a problem for visual counts,
8 obviously. At those points, we relied on hydroacoustic surveys,
9 and, in many instances, depletion surveys were required, and I
10 will explain that better, particularly in areas of very high
11 abundance of red snapper, and then, also, while it wasn't in the
12 terms of reference, we were directed to spend a very large
13 portion of that money on a Gulf-wide tagging program, through
14 those congressional appropriations and through Sea Grant.

15
16 While we won't really talk about that too much today, although
17 we've asked Dr. Catalano to talk some, because, even though
18 you're not evaluating that, it is very important, in terms of
19 the scope of the whole study, particularly for the SSC members,
20 and as we move even beyond this project.

21
22 That was generally the scope of it, and so I will kind of get
23 into this broad overview, and then, just so everyone is aware,
24 the experts in each of these regions and sampling methodologies
25 is here, and we'll hear a lot more detail about how it was done,
26 what our approaches were, and that sort of thing.

27
28 I think it's really key to talk about who we have involved in
29 this project, and these folks are really quite a modest bunch,
30 and so I feel it's really my job to talk about them, in the
31 sense that they're the best in the business, and we spent a lot
32 of time putting this together and drawing who is the best person
33 in the Gulf, or really in the world, to address this project,
34 because we knew what the challenges were at-hand, and we needed
35 to have the best teams.

36
37 Of course, each one of these individuals have very robust teams
38 behind them of post-docs all the way down to undergraduate and
39 technicians and that sort of thing, but these that you see here
40 were the key lead investigators.

41
42 Dr. Rooker is from Texas A&M Galveston, and he, obviously,
43 handled the Texas region, particularly the uncharacterized
44 bottom, which I'm sure we'll spend a lot of time talking about
45 over the next two days. Dr. Cowan with LSU handled the
46 Louisiana components, and Dr. Powers from South Alabama handled
47 the Alabama and Mississippi regions, which were grouped
48 together, and Will Patterson handled the Florida region.

1
2 Dr. Murawski really integrated uncharacterized bottom Gulf-wide
3 across the entire region, using his C-BASS, which we'll hear a
4 lot more about this morning. Dr. Catalano from Auburn was in
5 charge of our tagging program, which he will discuss. Marcus
6 Drymon, while he's a red snapper ecologist in his own right, his
7 primary role here was to do the outreach and engagement, but he
8 spent a lot of time making significant contributions to the
9 abundance estimate.

10
11 We had an expert analytical team and design team, and that was
12 led by Dr. Ahrens, who at the time was at the University of
13 Florida, and he now has a NOAA position in Hawaii, and that's
14 one reason that we're adjusting the schedule, and so I didn't
15 want to get him out of bed at 3:00 a.m., and we're making him
16 get out of bed at 4:00 a.m., and so, anyway, he was willing to
17 do that, recognizing the importance of this project.

18
19 Lynne Stokes is at SMU, and she's a sampling expert, and she
20 will be contributing to this as well, and she was involved in
21 the alternate validation estimate that we did, and then John
22 Hoenig was also a key player in the analytical components,
23 particularly as it related to the initial design, but especially
24 the depletion surveys for the Mississippi/Alabama region.

25
26 In addition, and I know this is a lot of people, but I think
27 it's really important that you understand the level of expertise
28 and those minds that are on this project. Kevin Boswell, you'll
29 hear from him in a few minutes, and he's the acoustical expert.
30 He's world-renowned, and particularly in the Gulf of Mexico.

31
32 Liese Carlton at VIMS is also with John Hoenig and is key in
33 those design components. Judd Curtis is with our group, and I
34 guess you will probably recognize that part of the issue here is
35 that many of these folks are all SSC members, compounding some
36 of the evaluation problem, but it's good to have these kind of
37 folks in both places, for obvious reasons. Judd was critical in
38 the proposal and design and pulling it off in the report.

39
40 Robert Leaf at Southern Miss was important for some modeling
41 components of this, and Vince Lecours was a major backup to Will
42 out in Florida and dealing with those estimates. Will Liu at
43 A&M Galveston is a quantitative fisheries scientist that many of
44 you know. Both David Portnoy and Eric Saillant, while we could
45 not -- We were precluded from doing any type of genetic
46 analysis, but we put our hands on a lot of fish for this
47 project, across the entire region, and so we were able to
48 collect a lot of samples, and we were allowed to archive those

1 samples for future analyses, although we could not do the
2 current analysis with this, but, because of that opportunistic
3 component, those two led the genetic collections for the eastern
4 and western Gulf.

5
6 Matt Streich is a key person that was involved in the design,
7 particularly from the beginning, but the Texas estimates, as
8 well as David Wells from A&M Galveston was key for acoustics and
9 other components in Texas. Tara Topping was the one behind the
10 scenes, and I think the amount of administrative workload and
11 just coordinating this many folks and this variety of sub-
12 projects within the overall projects is just a massive task that
13 I greatly underestimated going into this, and Tara pretty much
14 helped keep this together, and still does, even today.

15
16 Steven Scyphers at Northeastern came in a little later in the
17 project, but he was responsible for some of the work in terms of
18 surveys and the major angler engagement piece of this, with
19 commercial and recreational fishermen. While that's not under
20 evaluation either for this component, it was an important
21 component, and we were directed to spend a lot of that money
22 engaging with constituents in the red snapper fishery.

23
24 Finally, while it was an independent study from NOAA, we did
25 involve two NOAA -- They were non-compensated collaborators,
26 and, I mean, obviously, it's important that we want to be
27 designing a study that has some utility, and these two folks
28 were key to make sure it gets integrated in what NOAA currently
29 has going on, or providing that advice, although they did not
30 contribute to the actual estimate and that sort of thing, in
31 terms of analytical procedures and that sort, but certainly John
32 Walter knows what is needed for the management process, and he
33 was really key and a really good advisor, as well as Matt
34 Campbell, who is probably one of the best scientists in the
35 Gulf, in terms of sampling with a variety of gear for red
36 snapper, and so they were instrumental components.

37
38 I'm sorry that took a little time to get through, but I think
39 it's important that you realize the team and the other eighty,
40 or seventy-ish, scientists that are behind these leaders pulling
41 it off. Of course, we're represented from key institutions
42 around the Gulf.

43
44 So how did we arrive where we are? Well, it was led by a well-
45 integrated steering committee that was formed from the
46 appropriations, and they heavily were involved in the process
47 the whole way, initially with many, many meetings and workshops
48 to define what this process would look like.

1
2 It was a Phase 2 process, and we're talking about Phase 2 at
3 this point, but we were really fortunate, in that we had a Phase
4 1, where we were able to compete -- Several groups competed for
5 a design proposal and what the best design would look like.
6 That steering committee took those designs and brought together
7 the best components of those designs, which was somewhat of an
8 unconventional task, but a very good planning component.

9
10 They then incorporated that into Phase 2, and then a separate
11 request for proposals, or what we're talking about today, for
12 actually following that design that was loosely proposed by the
13 steering committee, and, I mean, we certainly had some
14 flexibility to adapt with that, but they gave us the general
15 guidance.

16
17 What did that look like? It was specifically detailed, in terms
18 of what the scope would be and the goals and objectives and what
19 the general sampling methodology should be, based on those Phase
20 1 proposals of putting some of the best minds that have been
21 doing this in the Gulf to figure out how we needed to accomplish
22 this.

23
24 It specified a general statistical analyses, what our target CV
25 should be, and the geographic scope, in terms of the depth
26 ranges, where around the Gulf of Mexico, what habitat types they
27 would like assessed, and it also specified that tagging
28 component and a comprehensive stakeholder engagement and this
29 concept of no genetic methods, but only archiving of those
30 samples. We, obviously, stuck to those and encouraged those
31 guidance documents.

32
33 It was very clear and specified in the RFP. Because of the
34 unique difference of each region, we don't have this magic
35 bullet or this one-size-fits-all approach that is going to
36 handle all of those habitats and all of those differences in the
37 region, but it relied on the wealth and skills of all these
38 regional investigators to really develop the methods that were
39 proven and that were successful in those areas and utilize that
40 for a broader Gulf-wide estimate.

41
42 It encouraged the use of multiple sampling methods, but, as
43 we'll hear this week, that complicates things and presents some
44 challenges, but, in a perfect world, and maybe other groups
45 learning from this can come up with methods that can do that,
46 but, currently at-hand, we had to rely on these different
47 methods.

1 In addition, we were charged specifically with developing
2 advanced technology and gear that would be appropriate for these
3 study needs that could be done for future studies, and, as many
4 of you know, there is a similar study going on in the South
5 Atlantic, and there is another one out for request for proposals
6 now for a greater amberjack study, and so we're hoping that, as
7 being the first study, others can use our lessons learned to
8 adapt and do what they need to do to carry out the goals of
9 those projects.

10
11 We were very much hindered by surface bottom habitat mapping,
12 which was clearly well known, going into this, as not sufficient
13 or comprehensive, but to really do what we need, and the better
14 maps that we'll have in the future will improve the estimate,
15 but we knew that going in, but we utilized what we had, and
16 that, obviously, creates some challenges there as well.

17
18 Then, for areas in much of the Gulf, it's unmapped, and
19 typically now we call it "unclassified", but the RFP specified
20 it as uncharacterized bottom, was really a catch-all category,
21 and it did -- This is going to become very important in a
22 minute, and that's why I'm spending some time here. Although
23 it's a very high coverage throughout the Gulf, many people think
24 that it's just sand and mud, and that's not the case.

25
26 It is a lot of that, but in it is a lot of other stuff that is
27 structure-oriented, and being reef fish, that tend to be
28 utilized by red snapper, and so it's probably unmarked reef,
29 unknown natural habitat, debris, shipwrecks, unknown oil-and-gas
30 infrastructure that's not mapped, and it's really everything
31 that falls within that, and that will become important, for
32 reasons that you will see.

33
34 We spent a lot of time defining that sampling frame, and we've
35 got an entire presentation coming up in a little while on
36 exactly how we did that and defined that sampling frame by
37 regions, but it really fed into our overall design, and so I
38 won't spend much more time talking about that, since we'll have
39 a lot more details, and I'm sure questions, from that coming up.

40
41 The overall design looks something like this, feeding in from
42 the Phase 1 designs, and ultimately through Phase 2, and we
43 broke the Gulf into four regions that were generally ecoregions,
44 which lined up very nicely with state jurisdictions that we
45 further divided into state jurisdictions, so it would be
46 appropriate for management advice, but the ecology matches that,
47 as well as the geography.

1 With those regions, we had three depth strata, from shallow to
2 mid to deep, and we had artificial reef as a category that was
3 specified to be assessed, and we broke that, generally, into
4 large and small categories, but that presents a problem, in the
5 sense that the distribution and size of these reefs vary
6 greatly, even within a region, even within some strata, where,
7 generally, small structures are in the east and large, massive,
8 the size of three or four-story building kind of size, in the
9 west, in the oil and gas platforms, and everything in between.

10
11 That presents -- You know, how do you group and categorize
12 those, and we'll explain how we did that, the best we could,
13 with the sampling levels that we could allocate to that sort of
14 thing.

15
16 Those are well-known habitats that a high abundance of snapper
17 occur, as well as natural reefs, or what typically were called
18 snapper banks, in the fishery, and those are well-known natural
19 reefs, and they're very conspicuous, particularly in the western
20 Gulf of Mexico, where there are very few of them, but they're
21 very well-known, large features with high relief, and then,
22 finally, this uncharacterized, or probably a better term is
23 unclassified, bottom habitat, which is everything else.

24
25 That is important, because we suspected, for a long time, that
26 there was red snapper in this area, and, in fact, it was known.
27 I mean, if you knew where to go on a structured piece out there,
28 you could find snapper.

29
30 During NOAA bottom longline surveys, they periodically were,
31 obviously, characterized by a lot of zeroes for snapper, but
32 they would also periodically set on unstructured bottom and
33 catch a lot of snapper, but it had never been assessed, and it
34 had never been well developed or incorporated into the stock
35 assessment process, and so we were charged with defining what
36 that bottom more look like, more in terms of absolute abundance,
37 the areal coverage, of course, presents a sampling challenge
38 there as well.

39
40 Each region will talk in detail about all the sampling that
41 occurred, but, in general, it was a lot, and a lot of effort,
42 thousands of locations, and probably thousands, if not hundreds,
43 of hours of ROV video to work through, and not only did the team
44 spend days and days at sea, but they spent days and days behind
45 a computer processing ROV video transects and hydroacoustic
46 profiles and other types of output coming back from our
47 collections, as well as vertical longlines and this extensive
48 tagging.

1
2 When we could, looking at the fish is probably our preferred
3 method, but that isn't the case in many areas of the Gulf, and
4 you'll hear a lot more about that, but the technology that we
5 have at our hands today, even in the last few years, is quite
6 amazing, what we can put in the water and get instant video
7 feedback, and equipment can be outfitted with all types of sonar
8 and other scientific instrumentation, and you'll hear a lot more
9 about that, but visual was the primary means, where we actually
10 go down and look and see the fish. However, as we all know,
11 these fish move, and they're in areas where we can't see them,
12 and so that creates a problem and a need for alternate gear.

13
14 To give you some examples of what habitats might look like, reef
15 pyramids, where you typically can see the entire reef in a
16 single field of view, off of Florida in the top-right, and
17 there's some examples of smaller reefs that are put out
18 intentionally, in Alabama, for example, or in Mississippi, and
19 even in Texas.

20
21 Then, as you get out into the western Gulf, the bottom-right is
22 what you might imagine, and it's a large -- This is just a tiny
23 portion of an oil-and-gas platform that tend to have large
24 concentrations of red snapper, and, of course, the different and
25 interesting thing about these habitats is they have such a
26 vertical reef that the snapper are distributed throughout the
27 entire water column, typically, mainly near the bottom, and
28 they're demersal fish, but near the bottom. In general, we have
29 to account for them all throughout the upper water column, which
30 does not occur on the other reefs, where they're much more side
31 attached to the habitat.

32
33 To give you an idea of what that would look like, and we'll talk
34 about species composition coming up, but this is an example of
35 characterizing a species composition. As you're descending,
36 what might be eight piles of jacket, is what we call it, of the
37 oil-and-gas platform going down. Many times, these are cut off,
38 or toppled, or converted into artificial reefs, with still
39 substantial relief, and sometimes they are extending completely
40 up out of the surface of the water.

41
42 Our equipment is outfitted with lasers, so we can get a size
43 composition, and the way we did the visual surveys, to give you
44 an example, is this challenge we had with turbid and clear
45 water. If you look at the video on the right, typically, Dr.
46 Patterson was blessed with calm seas and great visibility, and
47 it would look generally something like this, although this
48 happens to be out in the western Gulf, in a good time when we

1 can do species composition. Unfortunately, that's a relatively
2 rare occurrence.

3
4 What you see hanging down is a means for us to zoom in and back
5 away to calibrate our visibility that we had, but, often, in the
6 Gulf -- This would be a pretty good day in the Gulf, and the
7 video you see on the left -- I mean, obviously, those are red
8 snapper.

9
10 Many times, we can't tell for sure if those are red snapper, or
11 are they gray snapper or vermilion snapper, and they get lumped
12 into a snapper category as unknown and were not counted as part
13 of the estimate, and that's a good example of how, typically, we
14 erred on the side of caution, at pretty much every fork in the
15 road like this with the estimates, and so probably our estimate
16 is underestimate, but we didn't want to call fish snapper that
17 we couldn't 100 percent confirm as red snapper.

18
19 As you saw in that video, clearly some of those are red snapper,
20 but that's a pretty good visibility, and so, many times, we've
21 got to develop other methods, when we can't see at all, and
22 that's where acoustics, or really hydroacoustics, comes into
23 play, and, in just a minute, Dr. Boswell will talk about the
24 details of how we performed hydroacoustics.

25
26 Dr. Murawski will be giving a presentation, but, to introduce
27 what he's got, oil-and-gas infrastructure is prevalent,
28 particularly throughout the western Gulf and a little bit into
29 the eastern Gulf of Mexico, that you can see here. Some of that
30 is pipeline, and it's exposed and unexposed, and there's about
31 42,000 miles, in fact, of pipeline, but Dr. Murawski was in
32 charge of the pipeline, but also the associated uncharacterized
33 bottom as well, and using his C-BASS, which he'll talk a lot
34 more about, and these are general examples of flying down a
35 pipeline, and we'll talk about his methodologies with counting
36 fish, either like this over uncharacterized bottom or perhaps
37 natural reefs, and Steve has a lot more to say about his C-BASS.

38
39 We used a similar methodology called TARAS, which is another
40 towed gear that's patterned off of the C-BASS, in some of the
41 regions, where we have to cover vast areas of bottom that aren't
42 appropriate for taking two hours to get your gear in the bottom
43 for an ROV survey when you have that vast amount of coverage of
44 bottom that you have to account for.

45
46 Kevin will spend a lot more time talking about hydroacoustics
47 and how we generated an abundance estimate of that in areas of
48 low visibility, but why do we need it? Typically, the Gulf has

1 a persistent nepheloid problem, and this is a toppled oil-and-
2 gas platform that is sticking up probably a hundred feet there,
3 but, as you can look down and see -- Obviously, you see a lot of
4 snapper, but, about ten meters below that, it goes to almost
5 zero visibility, kind of a fog layer, which is actually silty
6 sand and mud that we observed the snapper going in and out, and
7 so we don't know how many snapper are down there, visually.

8
9 Alternatively, it might look something like this on the right,
10 where, again, you see the snapper there on a natural bottom, but
11 how many snapper are behind those that we can't see, and that
12 certainly, obviously, creates a problem. Particularly, this
13 detectability issue that we're talking about here leads to
14 somewhat of an underestimate, when we can't count the fish.

15
16 Sometimes we have the opposite problem, and Dr. Hoenig and Dr.
17 Carlton, as well as Dr. Powers, will talk about depletion,
18 where, all of a sudden, it's clear enough that you have so many
19 fish in the field of view that you can't count them all without
20 the issue of double-counting, and they will talk a lot more
21 about the use of our depletion methodology and that here in just
22 a little while.

23
24 Then the last piece that Dr. Catalano will talk about, and I'm
25 not going to spend a lot of time talking about, was this tagging
26 program that we have that was tremendously successful, and he'll
27 talk a lot about that, in terms of angler buy-in and engagement
28 and a whole piece that's not under evaluation today, but I think
29 it's very important that the SSC understand that component, in
30 terms of this tagging thousands of fish Gulf-wide with an
31 astonishing 30 percent return rate, which has a lot of
32 implications for discard mortality, use of SeaQualizers, or
33 descending devices, and that sort of thing that's outside of our
34 terms of reference. It also allowed us to do genetic samples
35 for future analyses as well as this angler engagement piece that
36 I have been discussing.

37
38 While we won't talk about it today as much, or the next few
39 days, the stakeholder engagement was a major piece, a whole
40 series of videos that Dr. Drymon developed, as well as anglers
41 surveys, working with Dr. Scyphers, to get the word out about
42 this study, and that was a major charge coming from NOAA Sea
43 Grant, and well as those appropriations.

44
45 There's fact sheets and videos, and everything is housed in one
46 spot at snappercount.org, and this has become an extremely
47 popular way to get the information out, and so I would encourage
48 everyone to go there, if they want to learn more about the

1 project, and including the final report and executive summaries
2 and all that sort of thing are archived there as well.

3
4 Getting to the estimate and analysis, which we'll talk about in
5 much more detail, we had the primary analysis, which was led by
6 Dr. Ahrens, and we thought it was a good idea to have an
7 independent assessment, and they were different, particularly in
8 terms of post-stratification and that sort of thing, which I'm
9 sure we'll talk about.

10
11 What was interesting is both came back with relatively low CVs,
12 and I'm sure we'll spend more time talking about that. In
13 general, they converged, with only about a 4 percent difference,
14 which was roughly about five-million fish, and so we were very
15 happy about that, in terms of different ways of looking at the
16 data and partitioning that data and still arriving at a similar
17 estimate.

18
19 In terms of what that overall looks like, our estimate has come
20 back at 110 million red snapper in the Gulf, with a low, 11
21 percent, CV. I'm sure we talk more about that, and did we
22 capture all of the variability, and just certainly not, and we
23 know there's variability inherent that we can't even measure,
24 but, right now, the data is supporting our 11 percent CV.

25
26 We'll talk a lot about how it's broken down, in terms of
27 regional and habitat, and that's about thirty-six million,
28 compared to thirty-six million from the last SEDAR assessment,
29 and so, roughly, we're just about tripling that estimate, and
30 there's some very plausible reasons why that's the case.

31
32 I won't go through this, because each region is going to go
33 through this in much greater detail, but, in general, we have
34 broken this out by natural and artificial reef and
35 uncharacterized bottom. In our alternate analysis, we even
36 further characterized this into depth strata and others, and,
37 obviously, you sacrifice some of your CV as you begin to parse
38 this out more and more, in terms of losing sample size and that
39 sort of thing, but we'll talk a lot more about that coming up.

40
41 I wanted to put this -- This is sort of a challenge, and why
42 this has become so important, and maybe I should go back, and
43 what you see here, and it will become very apparent today, is
44 the lion's share of the fish are uncharacterized bottom, a
45 habitat that hadn't been sampled, and it doesn't get sampled by
46 the fishery, generally, because those fishery-dependent
47 information coming back are coming from artificial and natural
48 reefs.

1
2 Typically, it's somewhat of unknown areas out there that are
3 hard to fish, that are very far from port, and so you typically
4 have a population of fish that probably is not showing up in
5 fishery-dependent data, and, for that matter, probably fishery-
6 independent data, because not a lot of sampling has been
7 occurring out there, short of the bottom longline survey, until
8 we started going out there.

9
10 You wonder, well, why in the world are all these fish on the
11 uncharacterized bottom, and, literally, this just came across my
12 news feed this morning, and so I thought it was interesting to
13 put in there, about why haven't you received your shoes yet,
14 check the ocean floor.

15
16 Just this year, there's about four-times as many containers that
17 have hit the ocean floor, due to shipping issues, like traffic
18 and rough weather and that sort of thing, and so these are,
19 obviously, perfect habitat. We have no way of knowing how much
20 of that is out there, but, doing our surveys, through C-BASS and
21 TARAS, at least we're able to account for some of that, and so
22 that's a big challenge, of what's out there on the unclassified
23 bottom that we simply just don't know about.

24
25 Just to set the stage, what are our biases? What about our
26 assumptions? What are we uncertain about, because certainly no
27 study is perfect, by any means. We certainly have a lot of
28 hindsight, and we would most certainly do things different if we
29 knew then what we now know today, but, obviously, we're going
30 about this in a massive study with little information, and
31 sometimes no knowledge at all about your sampling frame, and so
32 that was quite the challenge.

33
34 When you begin to look at the biases overall of the estimate, it
35 is very conservative, and we knew that going in, and I think
36 that's clearly picked up on by the independent reviewers, and
37 it's likely an underestimate of abundance, and we certainly
38 would prefer an underestimate than an overabundance, from a
39 precautionary standpoint, but we tried to take these
40 conservative terms when we didn't have the information that we
41 needed.

42
43 Visual constraints lead to an underestimate, when we can't
44 positively identify fish that probably were red snapper, but are
45 grouped into an unknown category, and hydroacoustics that we
46 used in low visibility likely underestimates, and I'm sure we'll
47 talk a lot more about that, just by the nature of that gear, and
48 it excludes a portion of the fish.

1
2 We assume that habitat types are known with certainty, and we
3 certainly don't know that. Alabama has done surveys in areas
4 where they have put out reefs in generally unknown locations,
5 but in certain areas. In other areas of the Gulf, we generally
6 know where the artificial reefs are, but it's not certain, and
7 then, obviously, in the uncharacterized bottom, we don't know at
8 all what could be out there, in terms of the known mapping that
9 we have, and so improved mapping will certainly reduce those
10 biases, but that's well beyond the scope of this study.

11
12 The pipeline habitat availability and other visibility issues,
13 but, with that habitat, you could be considered somewhat
14 ephemeral. Sometimes it's exposed with currents and scouring,
15 and sometimes it's covered up, and so estimating that
16 availability is a difficult task.

17
18 Known populations do occur outside of our defined study area,
19 and there is salt domes and pinnacles that we know, from bottom
20 longline and other longline surveys, that snapper occur there,
21 but they were outside of our specified study area, and so those
22 are not accounted for.

23
24 We made some downward adjustments to our estimate for small fish
25 size, and we were required -- Just to be very clear, these are
26 not young-of-the-year fish and small juvenile fish, in terms of
27 red snapper, and these are age-two-plus fish, typically the size
28 that they recruit to the fishery and into the exploitable
29 population, but a fish is 364 days old, and then the day a one-
30 year-old turns into a two-year-old, and is that -- If they join
31 that population, are they really arbitrarily defined in this age
32 class?

33
34 That creates a problem, because smaller fish can be age-two,
35 but, also, bigger age-one can be age-two, and so we did some
36 calculations, and this is particularly a problem in Florida, and
37 somewhat in Alabama, where the population is recovering and
38 growing in areas that it traditionally occurred, but it has been
39 overfished, and that's not so much a problem in the western
40 Gulf, where there are much, much larger fish, and anything below
41 age-two on our habitats generally don't occur, and they're
42 extremely rare, if they do, but, nevertheless, we adjusted that
43 down, to make sure we weren't counting any age-one fish, but, in
44 general, these were fish that were large and recruited to the
45 fishery.

46
47 Then, just in general, the detectability, in a variety of
48 reasons, leads to underestimation, and just the nature of the

1 habitats and regions lead to some uncertainty in our estimate,
2 because we just can't detect the fish.

3
4 Obviously, we've got a need for a lot more calibrations, and I
5 put in there or perhaps not, and we -- As the study was
6 developing, we recognized that the regional differences are so
7 great, and even differences within a region, and even with
8 strata are so great sometimes, that it makes calibration a
9 really steep hill to climb, in the sense that, just because you
10 calibrate an area with great visibility in a particular type of
11 habitat, that visibility and habitat is so drastically different
12 in other areas that you pretty much have to calibrate in every
13 single area, and, many times, you can't do the calibration,
14 because there is not visibility, and so much of our estimate is
15 very much stand-alone, in a regional area where we had known
16 gear and that sort of thing, but that's definitely something
17 that I'm sure we will discuss more, in terms of how that
18 integrates into our assessment.

19
20 What are the key takeaways? Well, certainly science is working,
21 and this was never intended to be some type of competitive-type
22 of process, and it was to supplement our knowledge base and to
23 build on the current assessments and be able to refine and
24 improve those assessments, and I think it's doing that.

25
26 Our independent analyses have quite a bit of agreement, that we
27 talked about, and we won't talk about the tagging, but the
28 fishery exploitation pattern is very important, and the
29 exploitation happens to occur on the habitats with the lowest
30 abundance, and that certainly is outside the scope of the actual
31 abundance estimate, but it has clear management implications.

32
33 That high abundance on uncharacterized bottom may explain this
34 weak stock-recruit relationship, which has plagued us for many,
35 many years, and so that clearly needs to be explored, later down
36 the line. We're in the middle of an effort recalibration, and
37 the short story is we're seeing a lot more effort where we
38 didn't think there was in the past, and that, obviously,
39 influenced that earlier stock assessment. When those
40 calibrations come into play, those might change the differences
41 between our number and the last SEDAR 52 number.

42
43 That tagging return rate, which you'll hear more about, was just
44 very astonishing, and, in fact, it was a budget blower, but it
45 also is showing that, at least under the parameters that we
46 defined the study, the discard mortality -- These fish can be
47 caught and released, to at least some extent, which is good
48 news, in terms of regulatory discards.

1
2 Then, finally, tremendous angler buy-in, and this study just
3 became very, very popular, particularly with Dr. Drymon's work,
4 and it's just the tagging component and that sort of thing, and
5 that's always nice to have, just in general, in the sense that
6 we're working on a study that a lot of folks care about, and so
7 we're real proud about that, and we'll continue that engagement
8 plan throughout this process and beyond, as things begin to
9 develop.

10
11 I will go ahead and stop there. I mean, I want to say a few
12 closing remarks, but, maybe before I really do that, I just want
13 to talk about that we clearly recognize that there are some
14 issues in the assessment, things we could or could not deal
15 with, variants we could or could not capture, and no study is
16 perfect. I mean, no study is, and we don't pretend that this
17 one is.

18
19 We certainly feel as though we produced a very robust estimate,
20 and it's going to greatly advance the stock assessment, and, in
21 general, our knowledge base. We clearly have a lot of lessons
22 learned, a lot of lessons for the next great name-your-species
23 counts coming up that we highly recommend that those folks take
24 into consideration, and, in fact, we've already been involved in
25 that process, to build upon what we know, since this was really
26 the first study of its kind, and for sure in the Gulf of Mexico
27 on red snapper, particularly at this scale and magnitude.

28
29 Some of those things certainly don't devalue our estimate by any
30 means, and much of those concerns we tried to clearly capture in
31 the report and point out. Would we do things differently?
32 Certainly. For example, we would spend a lot more time on that
33 uncharacterized bottom, and we would spend a lot more time
34 trying to get any type of mapping, or request additional mapping
35 be performed through other avenues.

36
37 I want to point out that it's important to realize that there's
38 a lot more to this study than the terms of reference that we're
39 evaluating just here today, and the reason we are here, and it's
40 outside, and Ryan Rindone did a good job of summarizing this
41 early on, but, in terms of the compressed timeline, and not only
42 were we on a compressed timeline to do this study, but great
43 management needs have arisen recently, as this study was
44 ongoing, and so it became even more relevant, and so those
45 management needs became very important, and so our team has been
46 working closely and accommodating and trying to provide that
47 information, so we can deal with the management side of this,
48 but, typically, obviously, we would have preferred to go through

1 our normal data collection workshops and assessment workshops
2 and that sort of thing, build this in through peer review, but
3 we also want to be responsive to the management needs in that
4 fishery.

5
6 That's how we arrived where we're at today. In terms of
7 acknowledging, and I will do that now, so each group doesn't
8 have to do that, but we're certainly very appreciative for the
9 appropriations from Congress that NOAA facilitated through their
10 Sea Grant Program.

11
12 To do a study like this -- I mean, \$12 million is a lot of
13 money, but, when you start looking at \$10,000-a-day ship time,
14 you can spend the money fairly quickly, but we were appreciative
15 of that, to be able to do, certainly -- We are appreciative that
16 they recognized the value of what was needed.

17
18 We recognize NOAA Fisheries, and particularly Clay Porch was
19 instrumental from really day-one, making this happen, as well as
20 his whole leadership team and other scientists, and LaDon Swann,
21 who leads Mississippi-Alabama Sea Grant, was really key in this,
22 and he led the Steering Committee, and he guided us all along
23 the way.

24
25 The administrative workload behind the scenes, as any of you
26 that administer grants knows, it was astronomical, and he
27 allowed us to focus on the science, and he really dealt with all
28 of that, and he was really responsive to any of our needs, and
29 particularly his staff, Loretta and Devaney. I guess, as a
30 caution for other studies to take that into account, in terms of
31 there's a lot more just beyond the science, and so LaDon really
32 came through in a big way with helping with that.

33
34 Dr. Powers, that's the general overview. To get through the
35 general overview took a while, and it's, obviously, going to
36 take a little more time to go through each piece, but I will go
37 ahead and stop there. Dr. Powers, I don't know if you want to
38 handle questions, because that could get tricky, because we've
39 got a lot to get through, in terms of all the specifics, and so
40 I will kind of defer to your guidance on that.

41
42 **CHAIRMAN POWERS:** Thank you, Greg. You are actually on the next
43 agenda item, the project goals and objectives, and, Greg, you
44 were going to address that as well?

45
46 **DR. STUNZ:** Well, I did that. Sorry, Joe, and I should have
47 pointed that out, and I addressed the goals and objectives
48 within the study that I just gave, broadly, and each individual

1 will be giving specific goals and objectives for their
2 particular component, and so I just addressed that in a much
3 broader --

4
5 **CHAIRMAN POWERS:** Okay. That's fine. One of the things that
6 strikes me, from this presentation, having read the report, is
7 that, in a sense, this is not an estimation, and it's a bunch of
8 coordinated little projects, and so, once we get to the point of
9 actually estimating abundance, the actual estimations are being
10 made at individual strata, and so decisions that are made about
11 sampling, the actual methods of sampling and things like that,
12 really vary depending on what region you're in, what depth
13 you're in, and so on and so forth, and so people should keep
14 that in mind, and also the presenters keep that in mind, is
15 that, when they're talking about sampling, which one of the
16 strata are they referring to, artificial reef versus UCB, UCB
17 being uncharacterized bottom, versus natural reef, and also
18 depth zone, things like that, and region.

19
20 In my mind, these are independent studies that have been
21 coordinated to provide some overall estimates, and so, as we go
22 through these discussions, I would like both the listeners and
23 the presenters to not gloss over those sorts of differences, so
24 we are clear what we're referring to. Thank you.

25
26 **DR. STUNZ:** Dr. Powers, might I make one comment that I think
27 might affect the agenda, or just the flow, so everyone is aware?

28
29 **CHAIRMAN POWERS:** Yes.

30
31 **DR. STUNZ:** So we've asked Dr. Boswell and Dr. Murawski to go
32 before we get into the regional frameworks, because their
33 methods cross the regional network, and so we don't have to be
34 repetitive within each -- Florida doesn't have to talk about
35 acoustics, and Alabama and so on, and we can sort of address
36 that broadly. That way, I think it will make for a more
37 streamlined process, and it also gives a little bit of time for
38 Dr. Ahrens to join us at a reasonable hour for him, when we can
39 really get into the design framework and that sort of thing.

40
41 **CHAIRMAN POWERS:** All right. Thank you. With that then, I
42 believe, in terms of the agenda that I have, Dr. Boswell, Kevin,
43 will be talking about some of the acoustic methods. Then, after
44 that, this is where I'm unsure about the -- Is Dr. Ahrens
45 following after that, or that being delayed?

46
47 **DR. STUNZ:** It be would be Dr. Murawski after Dr. Boswell and
48 then Dr. Ahrens.

1
2 **CHAIRMAN POWERS:** Okay. Thank you. All right. With that then,
3 Dr. Boswell, Kevin.
4

5 **GENERAL ACOUSTICS METHODS ACROSS REGIONS**
6

7 **DR. KEVIN BOSWELL:** Like Greg had indicated, we were asked to
8 generally provide a broad overview of acoustics and sort of walk
9 through the process that we used to ultimately get to an
10 estimate of density.
11

12 In all of the regions, acoustics was used, and I will just throw
13 the caveat out there now that in each region it was used
14 slightly differently, but, for the most part, the methods that I
15 will present this morning are pretty consistent across all the
16 regions.
17

18 Just for those unfamiliar, I'll give a quick primer on acoustics
19 and why. Clearly, it's useful, because it can see through
20 waters, where visual, or optical, methods don't really work, and
21 so there's a lot of benefit to having it as a tool, and, across
22 the world, it's used in many assessments, and so it's a tool
23 that we can rely on derive quantitative estimates, but I will
24 point out --
25

26 I will make it clear that this requires independent information
27 to help validate backscatter. In other words, we need
28 additional information to identify -- What you see on the
29 bottom-right panel is an echogram, or a fish finder, if you
30 will, and that provides a full water column view, where you can
31 see that hard red reflector on the bottom, and that is the
32 substrate, and you can see fish, as well as some other smaller
33 scatterings, and so this is generally what we're working with
34 and what we're attempting to -- Then, on the left, is another
35 type of acoustical instrument that was used as some level in
36 this project. It's an imaging sonar, and it still uses sound,
37 but it provides a different perspective, which provides
38 additional context, and I think we'll get into more detail on
39 that a little later on.
40

41 It's, of course, got large potential when conditions aren't
42 really suitable for optics, and you saw this comparison earlier,
43 in Greg's talk, between the east and west Gulf, and, of course,
44 this is where the utility of acoustics comes into play, and, as
45 we move more westward from the Mississippi River, this becomes
46 more apparent, for the need to rely on another method beyond
47 just optics, and so they can work together in tandem, and that's
48 how we've used it in this project, is the acoustics are

1 effectively informed by what the video saw for helping to
2 identify proportions.

3
4 In the majority of the studies, we relied on some information
5 from optics, as they were available and based on the quality.
6 There's been some new developments in acoustics that provides
7 additional species context, and I will just touch briefly on
8 that at the very end of the talk, and so, absent of that, we
9 need additional information, and understanding the backscatter
10 is really important, particularly in a challenging condition
11 like the Gulf of Mexico, where we have relatively speciose
12 systems, and there is numerous species that occupy similar
13 habitat, and so our challenge, of course, is not only to detect
14 the fish, but then to try to isolate, or separate, them, and
15 then, of course, becomes challenging.

16
17 **MR. RINDONE:** Dr. Boswell, I would like to interrupt you. Your
18 sound quality, for a presentation where sound is key, is
19 actually kind of poor right now, and I don't know if it's the
20 same for everybody else, but we're having some trouble hearing
21 you, and I would like to take a pause here to see if we can get
22 you to connect using your cell phone, and see if that improves
23 your audio quality, and then a second presentation point is we
24 are seeing your staging screen and not your main presentation
25 screen, and so if it's possible to --

26
27 **CHAIRMAN POWERS:** Let's take a ten-minute break now. We've been
28 in for ninety minutes anyway, and so let's take a ten-minute
29 break and see if we can get this resolved. We'll be back in ten
30 minutes.

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

33
34 **CHAIRMAN POWERS:** Let's reconvene, and, Kevin, if you will
35 continue on then.

36
37 **DR. BOSWELL:** Okay. We were just going through the final
38 details here, and one of the other elements that is provided
39 with additional information or ground-truthing methods and
40 optics is -- The primary one here is understanding distribution
41 of organisms near the substrate, and, of course, acoustics is
42 challenged by its ability to detect targets near substrates or
43 hard reflectors, and so the seafloor, of course, is a challenge
44 that we just always have to deal with.

45
46 The primary objective here, of course, was to quantify red
47 snapper across all the regions and then use the video data to
48 inform the composition estimates. The role that we played

1 specifically at FIU, in my lab, was to data collection across
2 the whole Florida region, participate in a calibration study,
3 which I think Dr. Patterson will go over, and then also serve as
4 a -- Serve to provide guidance for all of the other groups that
5 were using acoustics, and so to develop a consistent and broadly
6 applicable workflow, which I will walk through today, and make
7 sure that everyone was essentially doing the same thing with the
8 acoustic data, so that we had comparable results, and that was
9 our take-home message.

10
11 Specifically, in Florida, and I think Will will talk about this
12 a little bit as well, but we had a substantial field effort,
13 which encompassed the use of acoustics across the broad West
14 Florida Shelf, across each year, and so a point that I want to
15 make clear is that all groups used a seventy-kilohertz
16 echosounder, and we were able to incorporate additional
17 frequencies, and so that means that there is one consistent
18 among all of them, and then, in Florida, we added a bit of
19 additional frequencies, which helped us to provide some more
20 refined information, acoustically-derived information.

21
22 Then, finally, survey designs are going to vary, and you will
23 see this in the next slide, and these were developed as
24 appropriate to the habitat that was being surveyed, and so
25 you're going to find that, in just reading the report, there's
26 different approaches for the ways to conduct the acoustic
27 surveys, and those were done because of the habitat context that
28 is important.

29
30 The process for deriving our estimates were, first of all, to
31 perform echosounder calibrations, and so, using the standard
32 sphere method, all regions applied this, and they did this
33 routinely, and so all of the echosounders were continuously
34 calibrated, so that we could ensure that the backscatter
35 received was comparable and quantitative, not only to understand
36 the intensity of the target, or the sphere, but also to ensure
37 that the system was operational.

38
39 Like I mentioned, the survey designs were somewhat variable, and
40 this was a regional and habitat-specific context, and so, in
41 some places in the report, you will see that there was this
42 transect design, shown here with the artificial reefs, and, in
43 others, it's the sort of flower-pattern design, and then there
44 are even still some others, like, for example, some of the
45 unconsolidated habitat and pipelines, and those were straight-
46 line transects.

47
48 After that was done, there was the task of post-processing the

1 acoustic data, and it encompassed a suite of different sub-
2 processes, which are identified here, and then this process to
3 identify targets, delineate them, classify or categorize them,
4 and then perform echo counting and echo integration approaches.

5
6 Here's just a quick walk-through of what that looks like. I'm
7 not going to spend a lot of time on it, but this is generally
8 the process that all of the different regions performed, and so,
9 on the bottom-left, you'll see that there's this Echoview
10 workflow, and so Echoview is the software that we use to process
11 the acoustic data, and it allows for not only a very complex
12 process, but you can also scrutinize, at every single step, the
13 effects, or the changes, that are made and the assumptions that
14 underlie that approach, and so the benefit of this is that
15 everyone can share this workflow, and that means that you have
16 the ability to understand how there may be variance in the
17 approach and also understand where things may have gone wrong,
18 and so it helps to troubleshoot as well, which is quite helpful.

19
20 I will just walk through this little cascade of echograms, and
21 so, in the upper-left, we see the raw data, and the raw data is,
22 of course, what we measure with the echosounder, and our goal is
23 to get from that fuzzy-looking mess to the final stage that is
24 identified as extraction, where we actually pull out the pieces
25 within the water column that represent the targets that we're
26 interested in, which, in our case, is red snapper.

27
28 We go through a filtering process to clean out noise and to try
29 to eliminate scatters that don't represent fish, identify,
30 through the detection process, where the fish exist in the water
31 column, segment that, and then search for surrounding targets,
32 and so, in the report, you will notice there is mention of a
33 Sawada index, and that's used to determine where we can look at
34 individual targets around groups, to help scale what ultimately
35 will derive two important parameters, and those derived as
36 targets strength and SV within each of these cells.

37
38 If you look at this image, you will see that there's this grid
39 that's applied to the echogram, and so, in the report, those are
40 described as cells, and those represent a spatial domain, and
41 so, within each of those small domains, we get an estimate of
42 the target strength and the SV, which allows us to derive
43 density.

44
45 This is how those are derived, and so the first is target
46 strength, and so, for those unfamiliar, target strength is an
47 acoustic representation of the cross-section we're in, and so it
48 scales in length, which is nice, and, based on some recent work,

1 which, of course, wasn't published by the time the study was
2 done, but we used it to try to inform what we thought was a
3 reality, and so this represents, on the right side, a target
4 strength to length relationship for red snapper that we derived
5 from some models that my lab has developed.

6
7 We understand, generally, the relationship between this acoustic
8 backscatter intensity and the size of the fish, and so that
9 provides us this development called target strength, and then
10 the next one is volume backscatter, and volume backscatter
11 represents a summation of all of the scatters in a volume, and
12 so, basically, all of those little target strengths for each
13 individual within a volume is summed up, and we can scale those
14 two and derive an estimate of density.

15
16 What that's going to provide is an estimate of the number of
17 fish per square meter within each of these cells, and that
18 allows us to then go and take all of those cells and put them
19 into the analytical framework to derive an overall estimate of
20 density, including the estimate of variance that will go along
21 with that.

22
23 That's the process. That's what happens, and now I'm going to
24 sort of wrap up this piece by identifying some of the challenges
25 that we have and talk about some things that are going forward,
26 and not that it necessarily helps to inform this particular
27 project, but it provides some guidance on where we think things
28 may be improved.

29
30 Inherent challenges, as I mentioned, are the dead zone, and that
31 is something that we're not going to get away from, and so we
32 have to just recognize that that's a bias, and we're going to do
33 the best we can, or we have done the best we can, to mitigate
34 that, but, ultimately, we're likely underestimating, with
35 acoustics, the distribution of fish associated, within about a
36 meter or so, of the bottom, and that's why we can, at least in
37 some cases, rely on the use of optics or video data to try to
38 inform that and understand what we might be missing.

39
40 Next is species allocation, and so, as I mentioned before, this
41 is a complex system, and it's quite speciose, and so picking out
42 red snapper exclusively from the mix of species is challenging,
43 and so we can make some progress with that, based on
44 understanding the acoustic properties of any type of scatter and
45 organism, and try to narrow that down a bit, but also using the
46 video data to help understand the proportional abundance of our
47 target, red snapper, versus other things helps to scale those
48 estimates as well, which is what we did.

1
2 Then, lastly, there was some comments in the report about our
3 direct comparison, at least in Florida, with the ROV and the
4 acoustics and the distinct differences between the estimates
5 abundance, with the acoustics being far less, and so we think
6 that there's some ways to improve that relationship, and I will
7 we'll touch on that just a little bit later on, but recognizing
8 there is some differences in the sampling domain of these, and
9 the acoustics -- That estimate of density was diluted a bit by a
10 more expansive survey area, and, like I said, I think he'll
11 touch on that a little bit later on.

12
13 This is a challenge that we really have to deal with when
14 thinking about acoustics, and so ways to improve this, and, of
15 course, there are possibilities of improving or changing survey
16 designs for particular areas, and we're hoping to have
17 additional ground-truthing information, and then also relying on
18 acoustic modeling, where acoustic modeling informs us on what we
19 should expect an organism to look like acoustically.

20
21 This is the one where I think we really have an opportunity to
22 improve on in our region, because, for the most part, millions
23 of scatters, outside of just a very small body of work, are
24 really not well described, and so this offers opportunities,
25 like I stated, to understand how these different organisms, and
26 so, for example, a complex of species, can be identified
27 acoustically, and we recognize that there is morphological and
28 species-specific variability, and we can use those differences
29 to help identify, potentially help identify, how to separate
30 these, and this is where using multiple frequencies comes in,
31 and so you can see here the thirty-eight kilohertz, the seventy,
32 and the 120-kilohertz system.

33
34 They're all looking at the same thing, but they provide slightly
35 different pieces of information, and, if we look at the graph on
36 the left side, we recognize that, for some organisms, those
37 differences are dramatically different across those endpoints,
38 and so this is the thirty-eight kilohertz, seventy kilohertz,
39 and 120 kilohertz, for example, and this is where those
40 endpoints would lapse.

41
42 At minimum, it allows us to remove noise, or remove information
43 from scatters that we're really not interested in, to really
44 allow us to drill down and focus more on the fish, and then
45 there's some potential for using some of these newer approaches
46 to look specifically at patterns in fish, and so I don't want to
47 dwell on this, but just recognize that, with these new broadband
48 techniques, there is some potential, and we're continuing to

1 explore this, of ways to try to really drill down, if you will,
2 into the species-specific patterns of backscatter that might
3 help us to inform our taxonomic classifications down the road.

4
5 We provide that with some additional information that we can
6 get, or derive, from additional methods, like optics, and it
7 might help us to, through a suite of new analytical approaches,
8 really improve our ability to classify and discriminate among a
9 community that's relatively complex, and that's about all I
10 have.

11
12 Again, the goal was to provide a broad overview of what was done
13 acoustically, for all the reasons that we're broadly adopting,
14 and then I think there's going to be some slight differences
15 that are described later on in the remainder of the talks, and
16 I'm happy to talk through this, if anyone has additional
17 questions, and so I will leave it at that, Dr. Powers.

18
19 **CHAIRMAN POWERS:** Thank you. Let me then open the floor to
20 questions. Again, this is more an overview, and we'll get into
21 other detail, I'm sure. Dr. Christman.

22
23 **DR. CHRISTMAN:** This question probably shows my ignorance of
24 hydroacoustics, but are hydroacoustics, or at least some of the
25 frequencies that you used, sensitive to flocculant or sediment
26 loads or things like that, that would make it more difficult to
27 interpret the results?

28
29 **DR. BOSWELL:** Generally, the response from those types of
30 materials would be observed at higher frequencies, and so, the
31 lower frequency that we are using, we tend to not have issues
32 with them, and it's not that they can't be detected,
33 necessarily, but getting rid of it is pretty straightforward.

34
35 **DR. CHRISTMAN:** Thank you.

36
37 **CHAIRMAN POWERS:** Thank you. All right. Any other questions at
38 this point? Luiz Barbieri.

39
40 **DR. BARBIERI:** Thank you, Mr. Chairman. Kevin, a quick question
41 that might be actually more appropriate for Will, when we get to
42 his presentation, but I was wondering about the decision, in
43 terms of study design, the decision of sampling allocation of
44 different methods, but the report says that about 6 percent of
45 the total sites sampled in Florida used the acoustics
46 methodology as well, besides the ROV, and so can you explain
47 that and how that decision was made? How was that arrived at,
48 or is this something that I should ask Will later?

1
2 **DR. BOSWELL:** I'm not sure that is accurate, but I think Will
3 would be probably the best one to respond to that question.

4
5 **DR. BARBIERI:** Okay. Got it. Thank you, Kevin.

6
7 **CHAIRMAN POWERS:** Will can respond to that in the context of his
8 presentation, unless he wants to deal with it now. Okay. Any
9 other questions?

10
11 **DR. EGGLESTON:** Dr. Powers, can I ask Kevin a couple of
12 questions?

13
14 **CHAIRMAN POWERS:** Sure. Please do.

15
16 **DR. EGGLESTON:** Kevin, that was a very clear presentation.
17 Thank you. One concern I have, for the discrepancy between the
18 hydroacoustics and the ROV, for the calibration studies in
19 Florida, was the algorithm that was used to convert the target
20 strengths to volume, and so what I got from your presentation
21 was basically it was the exact same software and algorithms that
22 were used across all regions and strata, and is that correct?

23
24 **DR. BOSWELL:** Yes, sir. That's correct.

25
26 **DR. EGGLESTON:** Then, also, what you mentioned is that the
27 discrepancy may be due to the fact that the hydroacoustics is
28 simply sampling a larger area, and so you're just diluting the
29 estimates of fish aggregation, and is that correct?

30
31 **DR. BOSWELL:** Yes, and so we spent substantial time yesterday
32 actually trying to dig a little more into that, and I think --
33 Like I said, I think Will will touch on this a little bit later
34 on, but, in restricting -- I can't remember which review
35 requested this, but, in restricting the analysis of the acoustic
36 data to the direct overlap of the ROV surveys, we got down to a
37 nearly four-fold difference, versus nine, which is actually much
38 more believable, and, again, I think the dilution effect is
39 important, but, also, we have to keep in mind the limitations of
40 the acoustics itself with respect to the dead zone, or our
41 seafloor interaction, if you will. That's particularly
42 important in complex habitats, because that can be greater.

43
44 **DR. EGGLESTON:** Kevin, can you repeat how you were able to
45 refine it from a four -- Basically nine-times to four-times
46 difference?

47
48 **DR. BOSWELL:** Sure. We, effectively, took the footprint of the

1 ROV and constrained our analysis and the acoustic data to just
2 that area, and so, effectively, it was eliminating the much more
3 extensive survey area.

4
5 **DR. EGGLESTON:** All right. Great. Thank you very much.

6
7 **DR. BOSWELL:** Yes, sir.

8
9 **CHAIRMAN POWERS:** Thank you. Benny Gallaway.

10
11 **DR. GALLAWAY:** In some of our studies, where we're studying red
12 snapper on platforms, we have run companion mark-recapture
13 studies along with our hydroacoustics, and we found them in very
14 close agreement, and so I'm cognizant of the dead zone and the
15 impacts that there can be, but we've had pretty good success
16 with it, in terms of agreement with mark-recapture studies.
17 Thank you.

18
19 **CHAIRMAN POWERS:** Thank you. All right. If there are no other
20 questions at this point, I believe -- Dave Eggleston.

21
22 **DR. EGGLESTON:** I think that's just a delay, where I keep
23 clicking on the hands-up, and it's finally showing my name, and
24 so Kevin already answered my questions. Thank you.

25
26 **CHAIRMAN POWERS:** Just for future reference, when you click on
27 it, your name doesn't automatically show up, and it's actually
28 transcribed by somebody, and so keep that in mind, for all of
29 us. All right. Thank you then. I believe, at this point, we
30 are going to have Dr. Murawski present information about the
31 uncharacterized bottom and pipeline. Am I correct?

32
33 **DR. MURAWSKI:** I think you are, Joe. Thanks.

34
35 **CHAIRMAN POWERS:** Okay. Great. Steve.

36
37 **GULF-WIDE UNCHARACTERIZED BOTTOM AND PIPELINES**

38
39 **DR. MURAWSKI:** Thanks very much, and I want to give a shoutout
40 to Dr. Stunz. You know, he's been the ringleader of all of
41 this, and I know what a full-time job is, and apparently he has
42 three now, and it gives a new meaning to the whole term "herding
43 cats", and I think Greg has done an outstanding job, and we all
44 owe him a debt of gratitude, at least those of us on the
45 project.

46
47 My role in this project, and our team, has been to use a towed
48 video imaging system that we have called C-BASS to specifically

1 count red snapper over the pipeline network in the Gulf of
2 Mexico and also to do more work on the so-called unconsolidated
3 bottom habitats.

4
5 We also did some work on some of the natural habitats,
6 particularly in the western Gulf of Mexico, which we actually
7 have a lot of experience with in the eastern Gulf, and so we
8 have a large team, and I'm mentioning Sara Grasty; Chad Lembke,
9 who is the chief engineer; Matt Hommeyer, who is our acoustics
10 expert; Alex Silverman, who is our software engineer; and
11 others. There were lots of people involved in this particular
12 aspect of it.

13
14 In terms of an overview of the presentation this morning, I want
15 to give sort of a description and document the development of
16 the C-BASS towed video imaging system, just because it's
17 probably not familiar to most people. I'll talk a little bit
18 about its operating characteristics and its capabilities, and I
19 will talk a bit about sampling effort and the image counts
20 during the Great Red Snapper Count, in particular the pipeline
21 work that we undertook.

22
23 I want to talk about the calculations required to expand our
24 images during the transect surveys to actual density estimates,
25 and ultimately population estimates, and then expanding the
26 density estimates to the sampling universe. Then I want to also
27 make some comments on the use of randomized transect results and
28 their interpretation, and a number of the independent reviewers
29 discussed the issues of things like serial autocorrelation in
30 transect surveys and others, and so kind of an overview not only
31 of this system, but a little bit of the interpretation of the
32 data.

33
34 I would say that Dr. Ahrens, when he comes on, he's going to
35 talk in more depth about merging some of the data and some of
36 the statistical methods that were used throughout the series,
37 and so what is C-BASS?

38
39 It's an acronym for Camera-Based Assessment Survey System, and
40 it was originally developed by the College of Marine Science and
41 its Center of Ocean Technology from a 2012 grant that we had
42 from the NMFS Advanced Sampling Technology Working Group, and
43 then we also got later funding from the NMFS Untrawlable Habitat
44 Strategic Initiative, the so-called UHSI.

45
46 After we developed the engineering on the system, we applied it
47 in several subsequent studies, which included a very extensive
48 set of testing that Dave Somerton, who used to be at NMFS in

1 Seattle, ran as the UHSI team lead, where we amassed different
2 technologies to try to evaluate not only C-BASS, but other towed
3 imaging systems and ROVs, relative to what we thought was the
4 underlying population of animals in the viewing area.

5
6 After that, we used this extensively in a NFWF-funded -- This is
7 a post-Deepwater-Horizon-funded project to map benthic habitats
8 on the West Florida Shelf, and, in particular, do habitat-
9 stratified population estimates of both reef fishes and sea
10 turtles, and so sort of a mini Great Red Snapper Count, and
11 we've got a number of publications that are out and pending on
12 this one.

13
14 Then we specifically used this technology to count red snapper
15 over the pipelines, of which we have some extensive experience
16 on the one pipeline on the West Florida Shelf, and, in
17 particular, over mud and sand bottoms and natural hardbottom
18 habitats.

19
20 In using towed cameras, there are a number of challenges, as any
21 group that has tried to do this can attest. We have this issue
22 of attraction versus avoidance of fish to the camera system, and
23 it's a difficult one to evaluate, and this is sort of the analog
24 to the catchability problem for most fishing gears that we're
25 familiar with. We've done some analyses internal to the system,
26 and we've also looked at comparisons with acoustics and other
27 things, and I will talk about that in a minute.

28
29 Visibility, the so-called detection probability, is not an
30 overarching issue in the eastern Gulf, generally, and I will
31 show you some videos that are generally clear enough to get by,
32 and, around the Mississippi River outfall, it becomes a major
33 issue, and so, to the extent that we've made counts in those
34 areas, we have not adjusted them for detection probability, and
35 so, as Greg said, we have a potential underestimate, due to
36 that.

37
38 The calibration of the view to estimate density, clearly we can
39 show you videos, but we have to actually estimate the area that
40 is being swept, and I will talk a little bit about that.
41 Obviously, as Greg said before, if we had a great habitat map,
42 this would be a snap, but trying to infer habitat-stratified
43 abundance, using any of these technologies, is difficult, and
44 this so-called stacking of particularly red snapper, where
45 you've got not only the near-bottom abundance that we can image
46 with a camera, and this particular system flies generally
47 between three and four meters above the bottom, but we have --
48 With red snapper, you have stacking over the height of the

1 camera, and so this emphasizes the importance of using the video
2 and camera at the same time.

3
4 There are species identification issues, particularly in murky
5 water. Red snapper is somewhat easy to identify, relative to
6 other species identification problems, but, again, it's not
7 perfect, and then our concept of operations, and that is scaling
8 up use of a technology like this to population levels, is one
9 that we spent a lot of time and effort looking at.

10
11 In terms of design features, this is a schematic of what the
12 system looks like, and it's configured with six video cameras,
13 four of them facing front and two of them to the side. We have
14 two HD cameras, basically with overlapping fields of view, and
15 so we can actually do stereo, which is really cool when you put
16 the stereo glasses on and look at things, because they really
17 pop out at you.

18
19 The system also has an altimeter, which is incredibly important,
20 not only for trying to avoid smacking into the bottom, but also
21 there are a series of measurements that we take in order to
22 determine the field of view from the cameras, and so the
23 altimeter, when we're flying the system, allows us to maintain
24 our height above the bottom that is optimal.

25
26 It has a CTD, and so we can get some coincident environmental
27 data, as well as a fluorometer and a turbidity meter. We have
28 played around with a DIDSON forward-looking sonar, and,
29 honestly, it hasn't proved its worth, in terms of, originally,
30 we wanted to see if we were imaging animals that we didn't
31 detect on the cameras, and, in most cases, we see the animals
32 when they're in the field, and there was very few times, when we
33 see the animals avoid the system, that we didn't image them.

34
35 It has an onboard computer and a high-capacity solid-state hard
36 drive, so we can basically archive, in HD, all of the images
37 from all six cameras, as well as all of the other sampling
38 instruments that are onboard. It has a lead-detection system,
39 and it tells us if we've got a problem.

40
41 One cool thing about this is it has a video relay to the
42 surface, and so it uses the CTD towing cable, which includes
43 basically a paired inside plus the steel jacket, and so we send
44 the power down the CTD cable at 750 volts, and there's a power
45 conversion inside the system, and it also will send up low-
46 resolution images from any of the six cameras that we want, and
47 so literally we can fly the system and see what the camera
48 system is seeing in real time, and that really helps us for

1 collision avoidance and other things.

2
3 It has full-spectrum lights and dual green lasers, which are
4 somewhat superfluous when you have stereo, but they've been
5 helpful in trying to gauge the view window, and we have a
6 disaster recovery system, which, if you look at the float on
7 top, and we've lost it a couple of times, but we've recovered it
8 both times. Then the system development includes a dashboard
9 that integrates all of the video feeds and the environmental
10 data and ship location, and I will show you that in a minute.

11
12 This is what the observer sees, and so the image you see here is
13 one of the camera images, and, again, it's a low-resolution
14 camera, but it also gives you all of the data on where the
15 system is, and so, in particular, the depth of the water and the
16 altimeter are really important, but it also gives you other
17 environmental measurements, and then it has a false horizon, and
18 so you get yaw, pitch, and roll, and a compass, so you
19 understand what direction it's going. That Dunkin Donuts coffee
20 is probably the most attribute of the system, particularly when
21 we've got long transects that we're doing.

22
23 This is what the system looks like in operation, and so we
24 paired this with mapping sonars. One of the things that we
25 don't want to do is fly this system very close to the bottom in
26 areas where we've never looked for obstructions, and so the
27 concept of operations that we had for this particular study was
28 we randomized the transects over existing pipelines in the
29 western Gulf, and then what we would do is actually image those
30 pipeline segments at night, using the mapping sonar, and so we
31 actually had, in the morning, a multibeam map of the area, and
32 so, if there was like a toppled oil rig, or some other
33 obstruction, that we would know how to avoid it.

34
35 We can also see the water column sonar at the same time. In
36 this case, it's an EK-60, and so, a lot of times, in the lower-
37 left-hand corner, we would have to hop an obstruction like this,
38 and so, if we're running a simultaneous map in ArcGIS, we can
39 plot where the ship is and know that, for example, in another
40 quarter-mile, we're going to have to hop over a fairly
41 significant obstruction.

42
43 The control in this system is basically wire out, and so, if
44 you're going at a standard speed, which is generally four knots,
45 you have quite a bit of depth control on the thing, but you need
46 to basically -- In order to hop an obstruction like this, you
47 have to reel in enough wire to get over the top of it, and that
48 has taken a little practice.

1
2 The two ships that we've used in this study are the Weatherbird
3 II, which is a 115-foot research vessel, and the new William
4 Hogarth, which is a seventy-eight-foot vessel, primarily used
5 for the mapping-related work at this point.

6
7 I wanted to show you a little bit of the deployment of this
8 system, and so you can see that -- This is sped up a little bit,
9 but it handles pretty well on deck, particularly if the weather
10 conditions are okay, and this is just some stuff on the West
11 Florida carbonate reef shelf, and you can see these are some
12 low-resolution analog cameras.

13
14 One of the things you will note is a lot of the fish really
15 don't care, and, going into this, we weren't really sure whether
16 we would see any fish at all, and most of the fish don't seem to
17 have a strong negative reaction to the presence of the camera,
18 which is important. This is a school of vermilion snapper, and
19 it's probably one of the more reactive species that we actually
20 imaged with the system.

21
22 One of the things that we seem to attract a lot of are dolphins,
23 and it's probably because of the pinging of the altimeter, but,
24 nevertheless, we seem to always have some pals, which can be a
25 nuisance at some point, and this is the recovery of the system.

26
27 In terms of using the system, one of the issues we have, of
28 course, is where is C-BASS relative to the ship, and that
29 doesn't represent a problem as long as we're just imagining a
30 linear feature and trying to figure out what the density of
31 animals are, but, if we actually want to register both the water
32 column sonar and the images together, then we need to figure the
33 layback and then calculate the time delay, in order to sync up
34 the multibeam sonar image, the water column sonar image, and the
35 actual video image that we have, and the layback can be
36 calculated by this equation that you see at the bottom here, and
37 it's in the report as well.

38
39 I wanted to actually show you what it takes to actually link up
40 the water column acoustics and the towed video, and so this
41 video was shot over the -- This is the Gulf Stream pipeline off
42 of Tampa, and so you see us going along. If you see this dotted
43 line, that's where the camera actually is relative to the
44 sonogram that you see, and so you can see that we're approaching
45 something on the bottom that's a big structure and a whole lot
46 of animals, and so, if you do the layback and synchronize the
47 clocks, you can actually do this, and so you will see that, and
48 this particular image is synced-up pretty well.

1
2 This is sort of the best of all worlds, because we're looking
3 downward, and, if you look at the scale on the side, it's four
4 meters above the bottom, and so it's at fifty-six meters, and so
5 you can see this, and this is a valve cover along the pipeline,
6 and then, all of a sudden, you see just an enormous number of
7 fish. Most of those fish are actually above the pipeline, and
8 so this emphasizes the importance of synchronizing the
9 technologies.

10
11 This is a typical image of what red snapper might actually do,
12 and Kevin has already interpreted some of the sonograms here.
13 In this case, this was a school of barracuda that we were
14 looking at, and they were sufficiently out of the dead zone that
15 they didn't represent a particular problem, but animals that are
16 in the dead zone, and that is the meter closest to the bottom,
17 are going to represent a problem, but, nevertheless, by using
18 the technologies together, we can sort this out.

19
20 One of the experiments that we did was with -- This is Matt
21 Campbell of National Marine Fisheries Service and the UHSI group
22 put down some cameras that were imaging on the bottom, basically
23 high-resolution video cameras, along a transect, and we roped
24 the transect together with this yellow poly line, so we could
25 try to follow it with the towed video, and what you got were
26 some really great images of how the orientation of the system is
27 and then what the surrounding fish community was when the camera
28 systems passed by.

29
30 One of the things that I wanted to note was the orientation of
31 the C-BASS, and you can see it's a little stern heavy, and
32 that's by design, because, if we're touching the bottom, all the
33 expensive stuff is upfront, and so, if we're touching bottom,
34 it's going to touch stern first, and so that means that the
35 cameras have to be tilted at a greater angle in order to image
36 downward and forward, and so that's sort of the design of the
37 system.

38
39 Here's just some pictures of different animals. Again, if
40 you've got good visibility, red snapper are relatively easy to
41 discern, particularly by experienced video readers, but there
42 are, of course, a number of species, and this is a source of
43 uncertainty.

44
45 In terms of quantifying how fish react to the system, Sarah
46 Grasty who was my graduate student and now works in this
47 program, in her thesis, took those video images that you saw and
48 characterized the reactions of various species as both strongly

1 and weakly positive, and that is they seem to be swimming
2 towards the system, or as strongly or weakly negative, and that
3 is there was a strong negative reaction, in terms of their
4 flight, and then sort of neutral, where they seem to be actually
5 transiting across, perpendicular, to the camera system, and so
6 there's -- Of course, there's this issue about the unobserved
7 reactors.

8
9 In particular, a lot of the imaging systems have difficulty with
10 species like gag grouper, which seem to be particularly shy. We
11 didn't image a lot of gag grouper, but we've seen them in there,
12 but I would suspect that that's going to be a problem.

13
14 In terms of the various species, this is Sarah's work, in terms
15 of her thesis, and the snapper species generally showed like a
16 weak negative reaction, and that is, when they were in the field
17 of image, eventually, if you got closer, they would sort of swim
18 away. Some other species, like for example amberjack, they
19 would have more of a strong positive reaction, and so amberjack
20 are pretty easy to image. Other species, like lionfish, they
21 were totally neutral to our camera systems. This generally
22 supports, I think, what Will Patterson is going to talk about,
23 in terms of his calibration studies with looking at attraction
24 and repulsion.

25
26 The visibility spectrum is incredibly important for us, in terms
27 of imaging animals with this system, and these are actual video
28 snips from various places where we've tried to image, and they
29 go from zero. Everything marginal and greater, we can actually
30 count the fish, and you can see -- For example, in that marginal
31 frame, you see the pipeline going through there, and then
32 there's a whole spectrum of good to optimal. This needs to be
33 counted for in terms of the potential biases of the method.

34
35 Estimating the area swept, this is why we employ engineers, and
36 our engineers figured this out. I said before that the C-BASS
37 is tilted to the stern, and so you have a number of measurements
38 that you can take, and you know that the camera has an angle to
39 the bottom, and we also used the green lasers to try to
40 calibrate this, you know how many laser widths across you were
41 actually looking at.

42
43 The altimeter is also above the bottom, et cetera, et cetera,
44 and so you see a bunch of different angles and vectors. These
45 equations are specified in the report. The bottom line is the
46 Equation 5 gives you the width of the transect, based on all
47 these measurements, and, of course, they assume that the animals
48 are 100 percent detectable and that the range is not

1 significantly degraded by the turbidity of the water. We have
2 tried to think about how to test that, and nobody wants us to
3 pollute their swimming pool, and so that's kind of an unresolved
4 issue for us.

5
6 I wanted to give you a short treatise on actual counting fish on
7 pipelines. This is optimal, and this is a lot of vermilion
8 snapper, and a few grouper, Goliath grouper and other things.
9 This is why there is so much fishing effort on the Gulf Stream
10 pipeline off of Tampa, and there's a lot of vermilion snapper in
11 this particular scene, and so these are all countable. It takes
12 a lot of work to count a particular scene, but one of the nice
13 things you can see is that they are clearly visible.

14
15 Now, this is a much more challenging pipeline segment, and you
16 can see the red flashes, and those are red snapper, and so, even
17 in this particular scene, we know we're following a pipeline,
18 and there's some amberjack mixed in with red snapper in this
19 particular scene.

20
21 Again, you can see that they're somewhat reactive, but not
22 really, and certainly not repulsed by the system, and this is
23 more like what is on the West Florida Shelf, and then we'll get
24 into a little bit more of what's it like in Mississippi.

25
26 You can see that the pipelines in the northern Gulf have these
27 armored jackets on some of them, and, in particular, the armored
28 jackets are there when you have one pipeline crossing another,
29 and I suspect that this is to try to prevent damage to the
30 pipelines when you've got the issue of trawling for shrimp, and
31 you also see that not all pipelines are created equal, and you
32 saw the six-inch pipeline that was there, versus the normal
33 thirty-inch pipelines that we are used to, and pipeline width is
34 an issue.

35
36 In terms of the actual work that we did, in terms of the target
37 areas that we stratified, in order to do both the pipeline and
38 the uncharacterized bottom, one of the datasets that we used was
39 the combination of VMS and logbook datasets, which gave us some
40 site-specific CPUE data, and so we had two major strata, depth
41 strata, that we worked in, the thirty to 100-meter strata and
42 the 100 to 200-meter strata.

43
44 The areas inside of thirty meters, by regulation from BOEM, all
45 pipelines are supposed to be buried. Now, they aren't
46 necessarily always buried, because of shifting sand or whatnot,
47 but that was our initial assumption, in terms of the
48 stratification that we're using. Also, inside of thirty meters

1 becomes incredibly murky water in there, and so it's difficult
2 for us to work, and not always, but certainly, during some times
3 of the year, it becomes very challenging, and we also used some
4 longline data from another project that we had, and so you can
5 see that some of the areas that we were targeting -- The
6 relative abundance of red snapper there, based on using this
7 consistent gear, is very high.

8
9 I just note to you the incredible disparity in relative
10 abundance across the U.S. and Mexico border, and, using the same
11 technology, it's very apparent, which actually is another issue,
12 in terms of the unit stock hypothesis for the Gulf.

13
14 This is a subset of the pipelines that were within the thirty-
15 meter to 200-meter strata, and so these are all the pipelines
16 that are there, and there is something like -- Well, I think
17 there's about 67,000 kilometers of pipeline that are available,
18 and so the idea would be to select a subset of these for random
19 transects and direction. Again, this is sort of the
20 stratification scheme, and it also highlights the reef bank
21 HAPCs, where we have the natural hardbottom reefs there as well.

22
23 This also adds the other dimension of the areas that actually
24 have been imaged with multibeam, and you can see they are very
25 scarce on the continental shelf areas, particularly in the
26 western Gulf, and even in the eastern Gulf, and, ironically, the
27 deep water is where we actually have some of the best multibeam
28 data, and that's because BOEM did a project with the oil
29 companies to utilize their information.

30
31 Our towed video survey methods are basically selecting transects
32 and then off transects, and, for the unconsolidated bottom, we
33 generally tried to do them in pairs, and so we would take a
34 randomized start point, particularly for the unconsolidated
35 bottom, and do the directional work there, and so we did a
36 series of three cruises, one in April and May of 2018, and this
37 is mostly in the eastern Gulf and off of Alabama and
38 Mississippi.

39
40 We did a cruise in July of 2018, which is more up around the
41 river and then to the western part of Louisiana, and then a
42 third cruise in January of 2020, in order to complete the work.

43
44 Just in terms of densities, these are pipeline densities, and
45 you can see these are the numbers of animals per square meter,
46 and so there is quite a few on some of the pipelines, and these
47 are a series of pipeline segments that were imaged off of
48 Alabama, and here is some off of western Louisiana, and then the

1 last thing I want to emphasize is the C-BASS density estimates
2 in the mud versus pipeline samples off of Texas.

3
4 Just as kind of a summary of the effort, we did 635 kilometers
5 of pipeline, and we observed a total of 10,099 red snapper, and
6 the average number of red snapper per square kilometer, and so
7 we can do a square kilometer calculation, was about 3,000 on the
8 pipelines, and, if you just used the number of red snapper per
9 linear meter, it's about 0.017, and, again, the sampling
10 universe for pipelines is about 67,000 kilometers.

11
12 If you compare that to the mud habitats that we observed, mostly
13 simultaneously or near the pipelines, we observed about 150
14 kilometers of mud habitat. The total number of red snapper we
15 imaged over those habitats was 255, and so the average red
16 snapper density in the mud habitats, the unconsolidated
17 habitats, versus the pipeline, is about a factor of ten, and
18 that's carried over in the per-linear-meter calculations.

19
20 The sampling universe is what really blows up the total
21 population size, and you've got nearly 160,000 square kilometers
22 of mud habitat, and the way we actually analyzed these data were
23 in fifteen-second bins, and so, basically, you have a count for
24 every fifteen seconds, which is on the order of 100 meters, and
25 so we had nearly 16,000 of those fifteen-second bins that we
26 could resample for estimates of the standard deviation and CVs.

27
28 The pipeline analysis methods, this is explained in the report,
29 and I think that Dr. Ahrens will maybe talk about this as well,
30 but we had to stratify the population estimates on the pipeline
31 for the different pipeline width categories, and we did an
32 analysis there, and we used the georeference polyline data from
33 BOEM to get the sampling universe.

34
35 We did some randomization of the transect data, in order to try
36 to minimize the effect of spatial autocorrelation in the
37 observed counts, and I know some of the independent reviewers
38 had some ideas about the adequacy of that, and then, of course,
39 the total population is an expansion from the density estimates
40 to the total.

41
42 Just in terms of the red snapper abundance estimates for
43 pipelines, obviously, Texas leads the -- Everything is bigger in
44 Texas, I guess, and most of the pipeline fish were there, and
45 the overall CVs, by state, are arranged from 22 to about 5
46 percent in Florida, and there's not a lot of red snapper on the
47 pipeline in Florida, relative to the other areas, and the counts
48 are very consistent.

1
2 In terms of some considerations in using the C-BASS data, we set
3 the siting probability to one, despite some of these visibility
4 challenges in some areas, and I suspect that, in some of those
5 areas, we undercounted the number of red snapper that were
6 there, although you can see that, even in murky water, you get
7 that flash of red when they get close to the camera, but,
8 nevertheless, I suspect we're underestimating there.

9
10 You have the issue of stacking above the height of the camera,
11 which acoustics can help us resolve, and, the serial
12 autocorrelation, we've dealt with that in an ad hoc way, and we
13 can talk about that, and then, for red snapper, we set the
14 attraction and repulsion to null, and that basically we're
15 counting what was there and there was no cryptic biomass.

16
17 I wanted to just give you some sense of the notion of serial
18 autocorrelation as it relates to these kinds of transect data,
19 and so this is a place called the Southwest Florida Middle
20 Grounds, and so it's a natural-bottom habitat, and so you can
21 see the counts across the fifteen-second intervals, and so they
22 show sort of a random distribution. Sometimes you'll get a few
23 together, and so this is the autocorrelation function as it
24 relates to lags of one, two, three, four fifteen-second
25 intervals.

26
27 The critical thing is that it does not exceed statistical bounds
28 of -- All of these are non-significant, right, and so this is a
29 natural-bottom habitat, and this is another natural-bottom
30 habitat, which is the Madison-Swanson area. Here, you can see
31 that you have a series of correlations between things, and the
32 one and two certainly make sense, that we are on a habitat,
33 particularly in a fifteen-second clip, and you're likely to be
34 having the next fifteen-second clip be similar.

35
36 With a lot of these kinds of data, you see these sort of
37 harmonics that evolve here, and a lot of them are not
38 significant, but, every once in a while, one of these will pop
39 up, and there's no reason to believe that some of these are
40 actually real, as opposed to just sampling variability, but then
41 you see the pipeline data, right, and so these are the number of
42 -- In this case, it's the number of species that we saw, and
43 this is the sort of species richness along the pipeline, but so
44 this is the total number of animals that we see along the
45 pipeline, and this is the autocorrelation profile.

46
47 Basically, it means that, when you get into these long runs of
48 animals, because it's basically a -- It's basically an oil-and-

1 gas rig on its side, right, and you're going to get these areas
2 where you just have long runs of correlated things, and so I do
3 think that we have some issues to resolve, in terms of
4 understanding the effects of autocorrelation. In natural
5 habitats, I don't think they're a very big problem. With that,
6 I want to just recognize our team and then give back control to
7 you all, and so I appreciate the time.

8
9 **CHAIRMAN POWERS:** Thank you. Let me open it up to questions.
10 Let me start off then, or let me defer to Dr. Christman.

11
12 **DR. CHRISTMAN:** Thank you for the presentation. I just have a
13 question about the bootstrapping. Could you describe in a
14 little more detail how you did the bootstrapping?

15
16 **DR. MURAWSKI:** Tell you what. If Rob is next up, we'll let him
17 discuss that, because he did it.

18
19 **DR. CHRISTMAN:** Okay. Thank you.

20
21 **CHAIRMAN POWERS:** All right. Kai.

22
23 **DR. LORENZEN:** I just had a question about the size selectivity
24 of the C-BASS counting, and it was in the report that the
25 average size of the fish on the uncharacterized bottom is a lot
26 larger than anywhere else, and I was wondering to what extent
27 that reflects sampling or whether your sense is that they
28 actually are, on average, much larger. Thanks.

29
30 **DR. MURAWSKI:** You know, with a mobile system like this, we're
31 somewhat challenged to measure things, and so we need a good
32 imagine of them. Generally speaking, we don't try to image
33 things much below like fifteen centimeters, and my recollection
34 is that it's probably true that the average size of these
35 animals on the unconsolidated sediment seems to be higher than
36 the other areas, and perhaps this is related to the life history
37 of the animals, but I would defer to others, like Jay Rooker,
38 who have done more work on the unconsolidated substrates.

39
40 **CHAIRMAN POWERS:** Thank you. Luiz.

41
42 **DR. BARBIERI:** Thank you. Steve, thank you for the great
43 introductory presentation. As you know, I am very familiar with
44 the C-BASS, and I have been following this, and I think it's --
45 The development of this piece of equipment and program that
46 you're putting in place is an impressive piece of equipment that
47 can, obviously, accomplish a lot, in terms of improving our
48 survey capabilities, regarding reef fishes, but I have a few

1 concerns with its application to this project that I would like
2 to ask you a few questions about.

3
4 First of all is sample size, how you guys arrived at the sample
5 sizes that were used, in particular like the sampling fraction
6 that was used here, when you consider the area that's covered by
7 the cruises and the total area of unconsolidated or
8 uncharacterized habitat that you have out there and that that
9 entire area is going to be used as an expansion factor for that
10 total absolute abundance estimate.

11
12 My concern is that the sampling fraction is very, very low, like
13 the proportion of areas sampled of the Gulf are miniscule
14 compared to the total area that we're going to be expanding that
15 number towards. Can you talk a little bit how you arrived at
16 the sampling sizes and the sampling allocation for each one of
17 the strata sampled?

18
19 **DR. MURAWSKI:** Thanks, Luiz, and I appreciate the comments and
20 that particular question, and it's one, in retrospect, given the
21 counts that we had on the pipelines over there, we probably
22 should have actually flipped the allocation to much higher
23 allocation on the unconsolidated bottom, at least for my piece
24 of this, because of the expansion factor, as you said, and so a
25 lot of this was sort of range finding, in terms of, originally,
26 we thought, given our experience with the pipelines in the
27 eastern Gulf, that, given the network over there, that there
28 must be a lot more fish on pipelines, if you total them up, and
29 so, in retrospect, I would say that we probably would want to
30 reallocate -- If we have a fixed amount of time, that we
31 reallocate to that.

32
33 Any time you do a swept area estimate, particularly a habitat-
34 stratified one, the amount of sampling effort you're going to
35 have, or in this case the amount of area swept versus the total
36 area, is going to be a small fraction, and that's true for trawl
37 surveys and anything else.

38
39 Again, the average width of the vision area is about ten meters,
40 and so those are long, thin transects that you're going to do,
41 and so what we did was we actually combined the unconsolidated
42 density estimates from this survey with others, in terms of
43 Jay's work as well, to try to inflate that sampling fraction a
44 bit, but you're correct that there's a big leap of faith from
45 the samples that you've got to a large area, and so that needs
46 to be considered as kind of a cautionary adjustment to the data.

47
48 **DR. BARBIERI:** Thank you, Steve, and if I might follow-up with

1 one more, Mr. Chairman?

2
3 **CHAIRMAN POWERS:** Yes.
4

5 **DR. BARBIERI:** Steve, when you go from there, from the sampling
6 fraction issue, the area coverage of the survey, I'm also
7 concerned about how the estimation, actually, of the numbers was
8 obtained, because you had a slide there, and I don't remember
9 what slide number, but it talks -- It shows that the density of
10 red snapper along the pipelines is about ten-times higher than
11 over muddy, completely uncharacterized habitats, right, but the
12 pipelines were sampled, actually, four-times more often than
13 mud.
14

15 Did the estimation procedure take this into account? I'm
16 thinking about the fact that this is really sort of like a
17 cluster sampling, multistage, and then there would be some level
18 of weighting of the estimate.
19

20 **DR. MURAWSKI:** To a certain extent, it was cluster sampling.
21 You've got the transect itself, but, also, we more or less
22 paired the unconsolidated transect with an adjacent pipeline
23 segment, and so a more refined analysis could actually take that
24 into account, but, again, we have sort of limited information,
25 when you put it all together.
26

27 One of our limiting factors, of course, is that the cost to do
28 this, on a daily sampling, is very high, and the ship alone
29 costs \$10,000 a day, and so we were only -- As I said before, we
30 were only able to do three cruises in order to do this, and,
31 particularly, when we're coming from the eastern part of the
32 Gulf over to the west, I mean, that's a three-and-a-half-day
33 sail just to get there, and so there's a lot of logistic
34 problems that we probably could mitigate if we had a more
35 distributed access to the technologies kinds of things, but
36 that's sort of lessons learned from this project as well.
37

38 I suspect that, if in fact these are going to be more routine,
39 that these are the kinds of things that would go into sort of a
40 revised plan of operations and kinds of operations to do this.
41

42 **DR. BARBIERI:** Right. Thank you, Steve. Just to try and
43 explain my concern here, I mean, I understand all the
44 constraints, and, like other folks have mentioned, I applaud the
45 team, and, I mean, this is an unprecedented level of work, and,
46 of course, we are learning a lot about red snapper and about
47 sampling reef fishes in the Gulf, and so all of this is moving
48 the science forward, but, when I think about interpreting this

1 in the context of using that number, the estimated total number
2 of red snapper, for management, I really have to take into
3 account a lot of these sort of details and how I interpret that
4 big number.

5
6 For example, looking at the proportion of the total numbers of
7 red snapper estimated for each one of the four regions, and, if
8 I run a regression, and I did, looking at the proportion of the
9 total number of red snapper against -- As a function of the
10 proportion of uncharacterized bottom in the area, I end up with
11 a significant regression, with a R square of 0.96.

12
13 Basically, because those numbers, from those transects, were
14 really expanded to those large areas of the Gulf, regions, like
15 Florida, that had a much larger area of UCB ended up
16 proportional, really, to the total number of red snapper that
17 was estimated by the project, and it's hard for me to really
18 understand how that would be, considering that we don't really
19 have that much information about the amount of structure that we
20 have in all those different areas.

21
22 **DR. MURAWSKI:** Luiz, it's one of the great ironies of all this
23 work, is that there's so much emphasis, particularly with reef
24 fish, on hardbottom habitat, because the work we did in the
25 Elbow, for example, indicated that half the fish were on 4
26 percent of the area, and that's where the high densities are,
27 but it's just a large fraction of area that is containing low
28 densities, and so it almost argues that we ought to be counting
29 the fish where they mostly aren't, in order to close that gap.
30 I completely empathize with the point you're trying to make, and
31 there is no free lunch here.

32
33 **DR. BARBIERI:** Right. Thank you, Steve.

34
35 **CHAIRMAN POWERS:** Thank you. Ryan, did you have an
36 interjection?

37
38 **MR. RINDONE:** Yes, Dr. Powers, and I just wanted to ask Dr.
39 Murawski to send his presentation.

40
41 **DR. MURAWSKI:** Yes, and my boss has already reminded me of that.

42
43 **MR. RINDONE:** Thank you, Sarah.

44
45 **CHAIRMAN POWERS:** Jason Adriance.

46
47 **MR. ADRIANCE:** Thank you, and thanks for the presentation,
48 Steve, and I'm glad that Luiz segued into pipelines, and I just

1 had a question on the area, or the amount of pipeline, used in
2 the table, and I apologize if I missed this in the report, but
3 were there any pipelines of a certain size that were dropped
4 from that, or does that include everything you all were aware
5 of?
6

7 **DR. MURAWSKI:** I will have to double-check, but I think we
8 dropped the smallest of the pipelines, the six-inch pipe and
9 that kind of thing, and so we tried to trim that a little bit.

10
11 **CHAIRMAN POWERS:** Okay. Thank you. Kai Lorenzen.

12
13 **DR. LORENZEN:** Thank you. I'm just trying to sort of confirm a
14 number, and I think, in your table, you have a number, of I
15 think 225 red snapper observed on the uncharacterized bottom
16 away from pipelines, and I can't remember whether that was the
17 total or it was per mile, or if you could just clarify that.

18
19 **DR. MURAWSKI:** That was just the uncalibrated total, just to
20 give you some sense of scale. We saw nearly 11,000 on the
21 pipelines, and 255 of these animals on the unconsolidated, which
22 it's an important observation, because, as you all well know
23 better than I, there was this innate, long-term debate about
24 whether there was any cryptic biomass on the unconsolidated
25 sediments, and we were able to document that, and we have
26 photographs of it, and so, from that point of view, the exercise
27 generated some information, but, of course, very low density.

28
29 **DR. LORENZEN:** So is those 225 fish that were then expanded to
30 seventy-million?

31
32 **CHAIRMAN POWERS:** Can you actually show that slide?

33
34 **DR. MURAWSKI:** Sure. I mean, again, this is just the total
35 number of red snapper imaged over this, and so the important
36 numbers are the red snapper per square kilometer over these
37 habitats, and this is assuming the pipeline sample width of
38 about ten meters, because you get animals on the pipeline and
39 associated with it, as opposed to the mud habitats, which are
40 basically the calculations that I explained to you, in terms of
41 the geometry, and so there's a factor of ten difference in both
42 of those metrics.

43
44 **CHAIRMAN POWERS:** Let me interject. I have a question. When
45 you say mud habitats, you're referring to uncharacterized
46 bottom?

47
48 **DR. MURAWSKI:** Correct.

1
2 **CHAIRMAN POWERS:** So you're using those terms equivalently?

3
4 **DR. MURAWSKI:** Yes, and a lot of this work was done over in the
5 western Gulf, and the majority of it that we imaged was mud,
6 but, yes, I mean, there's always other things in the habitat.

7
8 **CHAIRMAN POWERS:** No, and I'm just trying to make sure we're
9 clear what we're talking about, because sometimes --

10
11 **DR. MURAWSKI:** That's the unconsolidated habitat, right.

12
13 **CHAIRMAN POWERS:** Which is the same thing as uncharacterized
14 bottom?

15
16 **DR. MURAWSKI:** Yes.

17
18 **CHAIRMAN POWERS:** Okay. Thank you. Go ahead, Kai.

19
20 **DR. MURAWSKI:** There is some definition things in the report, as
21 Greg said.

22
23 **DR. LORENZEN:** Right, but so it is -- I mean, it's those 255
24 fish, at very low density, that basically then is expanded to
25 seventy-million in the total habitat, and is that right?

26
27 **DR. MURAWSKI:** Again, the uncharacterized or unconsolidated mud
28 habitats, these data were combined with more extensive data that
29 Jay and others pulled together as well, and so it wasn't just
30 these 255 fish.

31
32 **DR. LORENZEN:** Thank you, Steve, for clarifying that.

33
34 **CHAIRMAN POWERS:** All right. For the uncharacterized bottom
35 estimates, for example for Texas, the data that were used were
36 C-BASS data exclusively, or did it include information from the
37 Texas surveys?

38
39 **DR. MURAWSKI:** It included both.

40
41 **CHAIRMAN POWERS:** Okay. So, for --

42
43 **DR. STUNZ:** Can I jump in, when you get a minute? I'm having
44 trouble, and I lost the icon to raise my hand, but I think I can
45 shed some light on this portion of the discussion.

46
47 **CHAIRMAN POWERS:** Well, please do.

1 **DR. STUNZ:** We asked Kevin Boswell and Steve to go first because
2 their method is integrated across the Gulf. In a few minutes,
3 Rob Ahrens is going to talk about the design, and then we're
4 going to get into what each region did, because that would
5 answer some of the questions that are coming up about, well,
6 yes, there is more additional data on uncharacterized bottom
7 than just Steve collected, and it was collected in each region.

8
9 I think we're kind of getting ahead of ourselves a little bit.
10 I mean, I'm certainly going to follow your lead of what you want
11 to do, but, if we heard the design, and then the regional
12 sampling, a lot of these questions, I think, would come out as
13 we get through those presentations.

14
15 **CHAIRMAN POWERS:** Thank you, and that was some of my point early
16 on, where I made the comment that there's a lot of individual
17 strata that different things are going on, and we should be made
18 clear what we're talking about. All right. Thank you. Next up
19 is Dave Chagaris.

20
21 **DR. CHAGARIS:** I am curious what proportion of the C-BASS
22 samples had low visibility, and how were they treated in the
23 analysis and estimation?

24
25 **DR. MURAWSKI:** I would have to go back and actually look at
26 that. I mean, each of the bins is scored, all 15,000, but I
27 don't have that number. They were a very high proportion off of
28 Louisiana, a low proportion off of Florida, and a modest
29 proportion off of Texas, and I don't have any statistics. I can
30 go back and get it for you, if you want, Dave.

31
32 **DR. CHAGARIS:** Okay. Well, then, when you did encounter a low-
33 visibility site, how did you treat that sample? Was it tossed,
34 or was it included, or was it imputed?

35
36 **DR. MURAWSKI:** Unless the visibility was zero, we included it,
37 if we could recognize fish in the scene, and so that's one of
38 the reasons why I listed, in one of the final slides, that, all
39 things being equal, the estimates we have for pipelines are
40 probably an underestimate.

41
42 **DR. CHAGARIS:** Thank you.

43
44 **CHAIRMAN POWERS:** Thank you. Clay Porch.

45
46 **DR. PORCH:** Thank you. Dr. Murawski, I am getting chatted by a
47 few folks that are indicating they sent me a snapshot of the MMS
48 regulations, and it says that pipelines installed -- Basically,

1 eight inch and over pipelines installed in depths less than 200
2 feet have to be buried, and I think I heard you say --

3
4 **DR. MURAWSKI:** I said thirty meters, which is -- You know, I
5 mean, it's 180 feet.

6
7 **DR. PORCH:** Well, thirty meters is less than 100 feet, and so
8 I'm wondering, if it's actually you have to bury it less than
9 200 feet, and that may change the expansion.

10
11 **CHAIRMAN POWERS:** I'm unclear about that one. I will have to
12 get back to you on that.

13
14 **DR. PORCH:** All right. Thanks.

15
16 **CHAIRMAN POWERS:** I would remind people basically what Kai said,
17 that the bigger issue is uncharacterized bottom, and that's 70
18 percent or 80 percent of the total estimate.

19
20 **DR. EGGLESTON:** Chairman Powers, apparently I'm struggling with
21 the hands-up icon, and I've got it on the green arrow this whole
22 time, and I'm not showing up, and so I'm going to jump in, if
23 it's okay.

24
25 **CHAIRMAN POWERS:** If you're having trouble, then interrupt me
26 whenever you feel the need. Go ahead.

27
28 **DR. EGGLESTON:** All right. Steve, thanks. I wish I had a C-
29 BASS system in the Carolinas.

30
31 **DR. MURAWSKI:** We'll sell you one.

32
33 **DR. EGGLESTON:** But I have four questions, and one is just more
34 of an operational question, and that is what is the -- I realize
35 this might be vessel-dependent, but what was the sea state at
36 which you basically had to call off a C-BASS tow operation
37 because of inability to compare across time?

38
39 **DR. MURAWSKI:** Actually, the sea state limitation is really the
40 deployment and recovery phase, and it's not so much actually
41 when it's on the bottom, because you get a long catenary in the
42 wire, and so it will surge a little bit, but, generally
43 speaking, as long as the wave height is six feet and less, you
44 can utilize the system.

45
46 **DR. EGGLESTON:** Okay. The next question is I had a lot of the
47 same questions that Luiz Barbieri asked, and, yes, I mean, it
48 looks like the sample effort in the uncharacterized bottom was

1 an order of magnitude lower than on the pipeline, and so,
2 obviously, hindsight is 20/20, but it would have been great to
3 flip that, now that we know how important that habitat is, and
4 so that was some of my concerns, in terms of scaling up to
5 absolute abundance, just because of, again, sort of the under-
6 sampling relative to other strata.

7
8 **DR. MURAWSKI:** Certainly, if we knew then what we know now,
9 certainly we would do that, but, remember, you have to wait
10 until Rob's presentation about that area, because we did combine
11 it with other estimates as well.

12
13 **DR. EGGLESTON:** Right. Then I was one of the reviewers, I
14 guess, harping on the serial spatial autocorrelation, and so it
15 was -- I know that you anticipated that, with respect to the
16 pipelines, in terms of some of the post-processing, but I don't
17 recall seeing the serial autocorrelation plots in the report for
18 the hardbottom habitat, and so I think it would be helpful to
19 include that in the revised version of the report.

20
21 **DR. MURAWSKI:** Yes, that's a good idea. We certainly should do
22 that.

23
24 **DR. EGGLESTON:** The last comment is I was really intrigued with
25 the fact that you can couple the multibeam sonar with the C-BASS
26 video feed, and, in particular, when you showed that -- I guess
27 you hit that pipeline that had some kind of valve cover on it,
28 and you showed a lot of fish above that, and can you talk a
29 little bit about how you -- If that was handled at all, with
30 respect to the sort of fish aggregations that you know are
31 there, but not picked up by the camera?

32
33 **DR. MURAWSKI:** So we didn't -- We collected EK-60 data along
34 with the information that we collected on the pipelines from the
35 video data, but, for this project, we didn't actually merge the
36 two results, and it's just because of the logistics of doing all
37 this relative to the project, but we also didn't see a lot of
38 stacking up, particularly on the pipelines, except for places
39 where you had some other structure, and so it was an issue, and
40 it will be an issue, in terms of actually doing that, and I do
41 think that some additional analysis of that would allow us to
42 actually figure that out.

43
44 **DR. EGGLESTON:** Okay. Thank you.

45
46 **CHAIRMAN POWERS:** Thank you. Lee Anderson.

47
48 **DR. ANDERSON:** I hit the button by mistake.

1
2 **CHAIRMAN POWERS:** All right. Thank you. One other comment, and
3 we're about ready to break for lunch, and I think this would be
4 a convenient time, but one other comment/question/thought
5 process, and, at the very beginning, when Greg made the
6 presentation, there were a number of issues that would indicate
7 that the red snapper estimate is an underestimate and that
8 decisions were made to consciously accept that, but, as I looked
9 at that, almost all, if not all, the issues were related to
10 actually estimating the density, the actual sampling density,
11 and I'm not so sure that one can say that in terms of how the
12 actual sampling process goes, whether it's definitely -- Because
13 of how the sampling is allocated and that sort of thing, whether
14 it's definitely underestimated or overestimated or whatever.
15 That is something that I think we should think about as we go
16 along.

17
18 Again, this is lunchtime, for those of you in Eastern Daylight
19 Time, and we are scheduled to have an hour's break for lunch,
20 and I think we should do that then, and so, if there's no other
21 comments, then we'll come back at 1:00 p.m. Eastern. Thank you.

22
23 (Whereupon, the meeting recessed for lunch on March 30, 2021.)

24
25 - - -

26
27 March 30, 2021

28
29 TUESDAY AFTERNOON SESSION

30
31 - - -

32
33 The Meeting of the Gulf of Mexico Fishery Management Council
34 Standing and Special Reef Fish and Socioeconomic Scientific and
35 Statistical Committees reconvened via webinar on Tuesday
36 afternoon, March 30, 2021, and was called to order by Chairman
37 Joe Powers.

38
39 **CHAIRMAN POWERS:** Good afternoon. I think we're ready to start
40 again. Good afternoon for some of us anyway. On the agenda, we
41 have Dr. Ahrens, who will be presenting the design framework.
42 When he is ready, we can proceed with it.

43
44 **OVERALL DESIGN FRAMEWORK**

45
46 **DR. ROB AHRENS:** Good morning, Chair. Good morning, council,
47 and good morning, reviewers. I will attempt to share my screen.
48 I was asked to, in this part of the presentation, to talk about

1 the initial sampling design, and I think this was mainly to
2 answer questions as to the nature of the random forest model and
3 how it was used. I would like to acknowledge Dr. Zack Siders,
4 who was integral in the development of the random forest model
5 and some of this work.

6
7 For the initial strata determination, I will be talking about
8 developing the sampling design for the uncharacterized bottom as
9 well as the artificial structures, in terms of the determination
10 of the strata for the random stratified sampling, allocation, as
11 well as the preliminary estimates of the sample sizes required
12 for the known hardbottom, and you will see the individual
13 presentations, and Dr. Murawski informed us as to how the
14 pipelines have been sampled, and so I will not -- I was not
15 involved in the development of those.

16
17 For the uncharacterized bottom, as well as the artificial
18 structures, strata were developed on a region, depth, and the
19 probability of red snapper presence used as a surrogate for
20 expected red snapper density, and this was -- The probability of
21 presence was estimated using a random forest model that was
22 trained on fishery-dependent and fishery-independent data
23 sources, as well as some physical structure.

24
25 The basic sampling unit was derived from the BOEM bathymetry
26 maps at three arc seconds, and so approximately ninety-meters-
27 by-ninety-meters, and the strata location was determined to be
28 the centroid of those three-arc-second areas. We combined,
29 again, the fishery-dependent data and the physical
30 characteristics into the random forest model, to classify the
31 presence and the absence, and we developed a probability of
32 presence map for the regions, and then that probability of
33 presence was then classified as low, medium, or high, based on
34 thresholds.

35
36 Here is the coverage of the data that went in, in terms of the
37 fishery-independent and dependent data, and we had camera
38 surveys, longlines, and vertical lines, and some of these were
39 presence only, the details of which are in the report, and most
40 were presence and absence data, and we utilized all the time
41 periods of the datasets, which is in the table as well in the
42 report.

43
44 In addition to that, some work by a former PhD student of mine,
45 Nicholas Duchon-Barth, was utilized, where he developed a finer-
46 scale catch per unit of effort, using VMS data, and that was
47 also used as an information layer going into the analysis. Then
48 we had these physical characteristics, and the distance to

1 vegetation and distance to hardbottom were derived from the USGS
2 data, and then the mean salinity and the bottom temperatures
3 were pulled from NOAA datasets.

4
5 When this information was combined into the random forest, we
6 had a map of the probability of presence, with distance to
7 hardbottom or distance to most structures as the most important
8 variables for determining the probability of presence.

9
10 We had a very good model fit on the test and the training data,
11 and then that was chunked up here, and I think, if we look at
12 the specificity and sensitivity plot for the area under the
13 curve, you can see the low, medium, and high, and that's how
14 things were chunked up, and these weren't the thresholds that
15 were used, and we used roughly 0.53 to define the low and 0.86
16 to define the high, and these were in order to maximize
17 sensitivity and specificity in the datasets.

18
19 The result was the production of low, medium, and high
20 classified habitat that could then be chunked up into depth
21 strata, as well as by region, and then, to move on to the sample
22 size requirements and allocation to there, we basically assumed
23 we were going to approach this with a random stratified sample
24 by region by depth.

25
26 In the classifications, we assumed that 90 percent of the forty-
27 three million estimated red snapper from the stock assessment
28 were going to be located within 10 percent of the habitat, and
29 that gave us an estimated mean density to be expected. From
30 that, we assumed a variance, and that variance was going to --
31 In the data, we were going to try and achieve it so that two-
32 times the standard error was going to be 30 percent of the mean
33 density for the confidence interval, and so not the percent
34 standard error calculations that was decided on later in the
35 work, but the basic numbers, or total number of samples
36 required, then required estimates of variances from the various
37 strata, and these variances were estimated from scientific
38 research.

39
40 That's some preliminary work that was done, and I will get into
41 a little bit of the details, where we can take a look at that,
42 if people want.

43
44 We assumed uniform costs across the areas, and the weights, of
45 course, were dependent upon the actual physical size of each of
46 the stratum, and, once we had the total number of samples to be
47 allocated, those were divided to the various strata based on the
48 expected variances up there.

1
2 In order to get estimates of the variances, using the historic
3 scientific data, density estimates from the studies, as well as
4 the associated coefficients of variation, were assumed to have
5 been derived from fairly high quality bottom habitat and that
6 those density estimates were likely in the 95th percentile, and
7 those were assigned to the highest habitat quality from the
8 random forest model. We then assumed 50 percent of those
9 observed mean densities for the medium habitat, and 5 percent of
10 those were assumed in the low-quality habitat, and we used the
11 coefficient of variation of 150 percent on those means to
12 develop the variances.

13
14 We will see that, given the samples that were collected, this
15 was an underestimate of the coefficient of variation amongst the
16 samples, and that certainly would come into play if we were to
17 redesign this study.

18
19 The mean density estimates that came are region and depth
20 specific, and, if none of that information was available, they
21 were imputed from the nearest region-level estimates, and then,
22 at a minimum, we allocated ten samples to each strata, because,
23 given the size of the number of the strata out there, certainly
24 the allocation routine would indicate that no samples were
25 necessary from some of those areas, and so a minimum of ten
26 samples were placed.

27
28 For artificial reefs, we took the unit of a reef as the sampling
29 unit, and those were divided into five different categories,
30 small, medium, large, extra-large, and a few jumbos out there,
31 based on the weight of the material that was recorded in a
32 database or the physical description, and then samples were,
33 again, allocated assuming a stratified random sampling was going
34 to be taken.

35
36 We used, again, previous scientific sampling programs to
37 estimate the density of numbers that we would expect per
38 structure and the associated coefficient of variation with that,
39 and we assumed that 10 percent of the stock-assessment-estimated
40 population was going to occur on the artificial structures, and,
41 again, the allocation algorithm that we used was the same for
42 the uncharacterized bottom, and, again, we set a minimum
43 threshold of ten samples on the structures.

44
45 The final result that came out of that for each region was a map
46 of sampling locations, and so here we have an example of Texas
47 and the West Florida Shelf, where we had the circles indicating
48 the location of sample sites in the low, medium, and high

1 habitats stratified by those qualities, as well as the depth for
2 each region, as well as the associated artificial reefs that
3 would need to be sampled in those regions.

4
5 Then those, of course, were selected at random from the full
6 list of available ninety-meter-by-ninety-meter habitats, and
7 then each region was provided a list of the centroids of those
8 locations for sampling. That covers the sampling design, and
9 I'm happy to take questions on that at this point.

10
11 **CHAIRMAN POWERS:** Thank you. Are there questions? Dr.
12 Christman.

13
14 **DR. CHRISTMAN:** Thank you. I have a few questions. First, your
15 random forest results are interesting. Did you do any
16 comparison to your previous GAM modeling? I'm wondering if they
17 tended to provide the same results, since you used different
18 results in the GAM modeling.

19
20 **DR. AHRENS:** Thanks, Mary. The GAM modeling produced very
21 different results, and that was -- Not a lot of time was spent
22 on the GAM modeling to deal with some of the spatial issues, but
23 there were some pretty strong biases that showed up in the
24 predicted distributions from that in the southern extremes of
25 both the Florida shelf and in Texas, and we, at the time -- In
26 my lab, we were playing with random forest models, and we
27 decided to give that a go, and it seemed to produce results that
28 were much more in line with what was seen in the fishery-
29 dependent and independent data, and, also, when we ran the
30 random forest, we had that work that Nicholas Duchon-Barth --
31 That also was available at that time, to help inform that
32 dataset.

33
34 **DR. CHRISTMAN:** My next question was you said that you used
35 previous data for densities and then turned that into
36 probability of presence, and is that correct? Not probability
37 of presence, but presence/absence?

38
39 **DR. AHRENS:** Yes, and so we took -- For all the datasets,
40 whether they were a presence-only dataset or a presence/absence
41 data or an actual count dataset, we turned those into just
42 zeroes and ones.

43
44 **DR. CHRISTMAN:** So I'm just curious. Not being a biologist,
45 does density actually predict a higher probability of
46 occurrence, given how patchy red snapper might be, since there
47 was only -- Like, in the case of Florida, for example, only 6
48 percent of the observations even had red snapper in them, and so

1 I'm just curious whether the use of density, in and of itself --
2 I don't really know, and that's why I'm asking. I need a
3 biologist to answer this.
4
5 **DR. AHRENS:** So my gut in that is that there are more snapper
6 there, and only a certain portion of that snapper population are
7 going to be responsive to any gear that's in the water,
8 particularly hook gear, and a higher number of fish would result
9 in a higher probability of having an encounter, because they are
10 reactive to the gear.
11
12 **DR. CHRISTMAN:** That's for longlines, but not necessarily some
13 of the other gear? That's just a question.
14
15 **DR. AHRENS:** Yes, it is certainly a question-mark.
16
17 **DR. CHRISTMAN:** I am just curious as to whether probability of
18 presence is wrapped up with detectability issues.
19
20 **DR. AHRENS:** Yes, it would be. I can't see how you would tease
21 those out.
22
23 **DR. CHRISTMAN:** Okay, and then, to discuss the sampling design
24 that was proposed, although not actually implemented, there
25 isn't a table anywhere, except in your report, in the appendix,
26 that shows proposed sample sizes, but they don't appear to have
27 been implemented, one, and, two, what I really want to know is,
28 when you came up with a sample size, you had a population, a
29 statistical population, for UCB, which was the grid cells, so
30 that, when you were referring to N, you were referring to,
31 little n, you were referring to how many grid cells should be
32 selected for sampling, correct?
33
34 **DR. AHRENS:** That is correct, yes.
35
36 **DR. CHRISTMAN:** You were assuming, on top of it, that everything
37 was going to be completely at random, which it wasn't. I mean,
38 the different gears drive non-random data collection.
39
40 **DR. AHRENS:** Yes, that is correct, and certainly the realities
41 of implementing the sampling design and the challenges at region
42 levels were taken into consideration after the sampling design
43 was initially proposed.
44
45 **DR. CHRISTMAN:** So what were the constraints then? Like those
46 two figures that you showed for Texas and Florida, basically,
47 and maybe it's just the size of the point, but it looked like
48 the Texas shelf was going to be completely covered, and so I'm

1 just a little curious as to how many observations were you
2 recommending, say for the UCB off of Texas?
3
4 **DR. AHRENS:** This was the initial kind of allocation for -- This
5 is Texas up here, and -- I think I have them all there.
6
7 **DR. CHRISTMAN:** That's close enough. They're very low sample
8 sizes.
9
10 **DR. AHRENS:** Yes. 624 would be the proposed number of samples
11 for the Texas shelf area.
12
13 **DR. CHRISTMAN:** That's specifically for UCB, or does that
14 include the artificial reef?
15
16 **DR. AHRENS:** No, and that's just --
17
18 **DR. CHRISTMAN:** You say natural habitat here on your figure, and
19 it says natural habitat, and I thought you were referring to --
20
21 **DR. AHRENS:** Right, and so the language that was used has
22 evolved, and so I -- When I am talking about natural bottom, I
23 am talking about the unclassified, or unconsolidated, bottom,
24 and so this is not the known hardbottom habitats, which were
25 removed and treated differently, and so I am talking about the
26 unclassified bottom.
27
28 **DR. CHRISTMAN:** You allocated -- Just out of curiosity, you said
29 that you used estimated means and variances in your allocation
30 scheme.
31
32 **DR. AHRENS:** Yes.
33
34 **DR. CHRISTMAN:** Did you feel comfortable those values were based
35 on sufficient data that you actually had a good sense of what
36 the average density was for the variance associated? You did
37 say that the CV you proposed was too low.
38
39 **DR. AHRENS:** The CV that I proposed was actually on the high end
40 of the observed CV for the data we had.
41
42 **DR. CHRISTMAN:** Was that based on standard deviation or standard
43 arithmetic mean?
44
45 **DR. AHRENS:** That was standard deviation of the sample.
46
47 **DR. CHRISTMAN:** Of individual samples?
48

1 **DR. AHRENS:** Of individual samples that were taken. Now, the
2 assumption was that these were probably cherry-picked sites with
3 high density, and probably not a great deal of variation among
4 them, which is why we chose the higher CV, but the reality, when
5 you look at the actual data, is that CVs range from 200 to 1,000
6 percent, in some cases, depending on the strata, and so
7 certainly this allocation and these sample sizes did not reflect
8 the realities of the true variability that would exist in the
9 data.

10
11 **DR. CHRISTMAN:** Okay, and then my final question relates to the
12 artificial reefs. This is just a really basic question. Every
13 single artificial reef was considered a sampling unit? I am
14 thinking, for example, Bill Lindberg's artificial reefs up in
15 the Bend there, and every single one of those set of four
16 structures would be considered -- They were lined up along an
17 isobath, and they would be considered as an individual
18 artificial reef, or would the entire set of twenty be?

19
20 **DR. AHRENS:** No, and each unit would be considered a reef in
21 this, though I will say the sampling frame evolved over time,
22 and so, in the initial design, we really only used, or had
23 access to, I should say, the artificial reefs that existed
24 within a publicly-available NOAA database and some of Bill
25 Lindberg's work and a few others here and there, and we didn't
26 have the lock-and-keyed state-specific artificial reef dataset
27 to use as a sampling frame, in this case.

28
29 **DR. CHRISTMAN:** So, when you provided this list to the different
30 regions, it wasn't necessarily sampling from what they knew as
31 the sampling frame.

32
33 **DR. AHRENS:** That is correct, yes.

34
35 **DR. CHRISTMAN:** They were sampling from a subset of it. Okay.
36 I mean, I don't know that you could have done anything else, but
37 I was just curious. Sorry that I took up too much time.

38
39 **DR. AHRENS:** No. Thank you for the questions. I expect that I
40 will hear more from you.

41
42 **DR. CHRISTMAN:** You probably will.

43
44 **CHAIRMAN POWERS:** All right. Thank you. Kai.

45
46 **DR. LORENZEN:** Just a general question, and I wondered whether
47 the fact that these were sampled with a wide range of different
48 methodologies and whether there was, at the design stage,

1 consideration of the need to intercalibrate and to also perhaps
2 estimate the variances associated with individual samples for
3 those different methods. Thanks.

4
5 **DR. AHRENS:** Thanks, Kai. There was certainly discussion, and I
6 think, at this stage of the development, the realities of what
7 people were faced I don't think had reared its head quite as
8 much, and I think there was much more optimism at the
9 tractability of achieving this at the time. There was certainly
10 also discussion, at the beginning, and throughout, about how one
11 would quantify the measurement error that would exist on any
12 given observation.

13
14 **DR. LORENZEN:** That's what I meant, and it's sort of
15 interesting, and I think you can see how you would have done the
16 design, and then people go away and do their studies and sort of
17 lose track of those issues in the course of a big project.
18 Thank you.

19
20 **DR. AHRENS:** Thanks.

21
22 **CHAIRMAN POWERS:** Thank you. Luiz Barbieri.

23
24 **DR. BARBIERI:** Thank you, Mr. Chairman. Thank you for this
25 overview presentation, and it was very helpful, and I will be
26 brief, because Mary already covered a lot of the questions that
27 I had, but, just to confirm, I was looking at -- I'm sure that
28 you don't have that in front of you, but there is a table, Table
29 6, on page 84 of the report, that is basically the bottom-line
30 table, where all the numbers that were estimated -- The standard
31 errors and the CVs are presented for each one of the regions by
32 habitat, and then the bottom line number at the bottom, with a
33 CV of 11 percent.

34
35 A couple of questions there, and one is, when I look at that
36 table, I see a lot of the same pattern that I saw with the
37 uncharacterized bottom sampling, where sampling was focused on
38 high-density habitats, where the density of red snapper, in some
39 cases, can be ten or fifteen or twenty-times the density in
40 other habitats, but those habitats of high density can
41 sometimes, when you look at that table, be sampled two, five, or
42 up to twenty-times, more frequently than in the lower-density
43 habitats, but I don't see there, in that table, anything that
44 applies to the weighting factors that you mentioned to
45 compensate for that sampling scheme.

46
47 To be aware of costs, you go to the sites where you know you're
48 going to find them, but then, in your estimation procedure, you

1 downweight those areas, right, those sites, so you can generate
2 a more realistic number for the whole frame that you have
3 sampled. Do you know of any kind of weighting procedure that
4 was applied in the estimation procedures for each one of the
5 regions to generate those number?
6

7 **DR. AHRENS:** I can speak to the initial design, where the
8 unconsolidated bottom, or unclassified bottom, the artificial
9 structures, the sample sizes that were originally allocated --
10 They were treated as separate, and so, for the unclassified
11 bottom, the goal was to achieve the estimate, plus or minus 30
12 percent at the time, which evolved to a PSE later, but the
13 design was -- If you can still see my screen that I showed Dr.
14 Christman, this design, in terms of these sample sizes, was
15 intended to achieve that objective.
16

17 In terms of the known hardbottom habitats and the pipelines,
18 those surveys weren't actually factored into this original
19 design, in terms of the sample sizes that were required, and you
20 can see, from this initial assignment, that the majority of the
21 samples -- In fact, wherever you see a ten, it suggested that
22 you did not need to take a sample, because of the magnitude, if
23 you would like, of the specific strata in the unclassified
24 bottom habitat. It required the majority of the samples to
25 achieve the variance estimates that were specified, and so, in
26 this case, the majority of the samples were going into that
27 unconsolidated bottom habitat.
28

29 The samples that occurred on the known hardbottom habitat
30 evolved as the study went on, and there were stakeholder needs
31 that needed to be met, and then the pipeline habitat also
32 evolved out of the work that Dr. Murawski and his team had been
33 doing as a potentially important habitat for red snapper, and so
34 those sample sizes happened as a result of those programs and
35 weren't part of the original design. I don't know if that
36 answered your question.
37

38 **DR. BARBIERI:** It did. Thank you so much, Rob.
39

40 **CHAIRMAN POWERS:** Dr. Eggleston.
41

42 **DR. EGGLESTON:** Kai asked it, and he asked it more eloquently
43 than I, and I was curious about any design that would
44 incorporate potential gear detectability, and so you've already
45 answered that question, and so I'm just kind of curious then.
46 Given what we know, how would you redesign the survey, and, in
47 particular, I was interested in how you would reevaluate,
48 potentially, the random forest model and the probability of

1 occurrences.

2
3 **DR. AHRENS:** Those are fantastic questions. Would I revisit the
4 random forest model as a way of classifying the habitat? I
5 think the -- Certainly, given the samples that have been
6 collected, it gives us an opportunity to ground-truth the random
7 forest model and its ability to classify the habitat, and we've
8 done some poking around here and there, but nothing -- Dr.
9 Siders is potentially going to look at that more in detail.

10
11 There is a general pattern that the classification of higher to
12 lower probability in the random forest model does line up with
13 the densities that were observed, with variation around it, and
14 so it did a somewhat okay job of helping to define strata when
15 no information, or very little information, was available to do
16 that.

17
18 I think there's some work that could be done there to ground-
19 truth and improve the model, but it certainly was a convenient
20 way to come up with that third layer of stratification, to try
21 and reel in the variance of the estimate, and so, given what we
22 know now, how would I redesign the sampling program?

23
24 I think we still are uncertain as to the measurement error that
25 exists as a function of the gears used, and more work needs to
26 be done in that area to more fully understand the added variance
27 that needs to exist on the individual samples. We could guess
28 at this point, and certainly we could develop a simulation where
29 those observations were fuzzy, and look at how that affected the
30 overall estimate and how additional samples would be required to
31 rein-in the variance of the final estimate.

32
33 Then, given the nature of the gears and how they are utilized,
34 we're not randomly sampling, particularly with the towed gears,
35 and it's probably more appropriate to take a look at a
36 systematic cluster-type approach, where we take a closer look at
37 the potential autocorrelation that exists, although, admittedly,
38 it does not seem to be statistically strong in the unclassified
39 bottom habitats, but to recognize that, in a number of the
40 locations, in the Texas and Louisiana area in particular, that
41 we would be dealing with more of a systematic clustered approach
42 than a random stratified approach, which really was -- The West
43 Florida Shelf and the north Florida area, it could be
44 successfully implemented there.

45
46 I would also say that certainly, particularly for Florida, given
47 the variation that existed in the samples, a much larger sample
48 size would be needed for that region, and so I think, given the

1 realities of the gear that exist, you would have to incorporate
2 those into a redevelopment of a sampling program.

3
4 **DR. EGGLESTON:** That's great. Thank you very much.

5
6 **CHAIRMAN POWERS:** Thank you. Dr. Christman.

7
8 **DR. CHRISTMAN:** Actually, I realized -- When you were talking to
9 Luiz, you were commenting about the sample sizes having to be
10 large in some areas, and what I am curious about is, as we all
11 know, count data, generally higher counts mean higher variances,
12 Poisson or negative binomial or whatever you want to call it,
13 which would imply that you would be oversampling high-density
14 areas at the dearth of low-density areas. Do you think that the
15 habitat and general stratification structure was sufficient to
16 remove that, or is there still some artifact of that showing up
17 in the sample sizes?

18
19 The whole idea behind stratification is to put like with like,
20 and so, if you can get everybody who is high density together,
21 then you remove some of that natural variation, and it's the UCB
22 that's such a problem, I think.

23
24 **DR. AHRENS:** Yes, and that was the hope of using the random
25 forest model, to try and assist with that. You know, the medium
26 and low-probability classified random forest habitats are the
27 majority of the area out there, and those certainly would come
28 out in the weights in the allocation.

29
30 So there would be an order of magnitude difference in the mean
31 densities that were assigned in the original design, and so that
32 would result in certainly an order of magnitude difference in
33 the variances, and then you would have an order of magnitude
34 difference in the weights, and so my guess is they kind of
35 cancelled each other out, to some degree, but I would have to,
36 certainly, do more digging to look at the actual relative effect
37 of each of those.

38
39 **DR. CHRISTMAN:** Then another question I had related to the
40 document that you provided in the appendix is your very last
41 statement says that you did a validation by checking the Florida
42 boundaries for low, medium, and high, and the boundaries went
43 from 0.33 and 0.77 to like 0.93 and 0.99, or 0.98, which
44 implies, to me, that there's either regional effects, and it
45 shouldn't have been assumed that red snapper respond to these
46 variables in the same way everywhere, or there is something else
47 going on that the random forest model is not catching, and can
48 you address that?

1
2 **DR. AHRENS:** I think the random forest model is certainly not
3 catching the possibility that any given sampling point is going
4 to have high densities on it, and we saw that in some of the
5 Florida data, as you pointed out, where you could, by chance,
6 land on a habitat that had just a lot of red snapper in it, and
7 so you're really probably looking at a negative binomial-type
8 distribution, in terms of the expected counts that you would
9 get.

10
11 I don't know how random forest classifications relate well to
12 assumed probability distributions within the data, and I haven't
13 done a lot of work in that area, nor a lot of reading in that
14 area, and so my guess is you could potentially turn it to --
15 Instead of a classifying presence-absence, you could turn it
16 into a classification of category, and I don't know if that
17 would -- If the variation that we saw occasionally in Florida
18 would show itself in some of the data that's available, if that
19 makes sense, and so I don't quite know the relationship to the
20 random forest and the output and the underlying true
21 distribution of the data.

22
23 **DR. CHRISTMAN:** All right. Thank you.

24
25 **CHAIRMAN POWERS:** Thank you. Harry Blanchet.

26
27 **MR. BLANCHET:** Thank you. I have a very simple question. You
28 have a column in this table that we're looking at of number of
29 samples, and the numbers of samples on the uncharacterized
30 bottom seems to be very big. Can you explain what that number
31 actually represents?

32
33 **DR. AHRENS:** For Texas and Louisiana, that's where those numbers
34 are big, and that is a function of the towed systems and the
35 chunking of that data. Those data come from the C-BASS work
36 that was done, as well as the acoustic systems that Jay Rooker
37 put out, and, the data that I received, at the time, the PIs
38 were comfortable with having it assumed as a -- That what I was
39 getting was a random sample, and so I'm not sure -- In the case
40 of the C-BASS data, it's the raw data.

41
42 The other data was subsetted, to some degree, and it's not 100
43 percent clear to me exactly how it was subsetted, but that is
44 why those counts in those regions are so high. Whether that is
45 a true reflection of the sample size, given the nature, or how
46 that would play out if you took and accounted for across-trawl,
47 or across-tow, variance, as well as within-two variance, in
48 terms of the actual variance estimate, would have to be

1 reassessed, assuming a different sampling design, like a
2 systematic cluster or just even a basic cluster, where you had
3 some sub-sampling at the two level.

4
5 **MR. BLANCHET:** So for Texas, for instance, the 6,400, that is
6 the number of ten-second, or whatever the duration was, of those
7 video clips that they looked at?

8
9 **DR. AHRENS:** It's about 3,000 C-BASS, and those would be
10 fifteen-second chunks that exist in there, and Dr. Murawski
11 showed that, for the unconsolidated bottom, there certainly
12 wasn't a great deal or a lot of correlation in there, and one
13 would argue there is certainly, very likely, a pseudoreplication
14 issue, and then it's still not 100 percent clear to me exactly
15 how the other Texas samples were sub-sampled under the broader
16 dataset.

17
18 **CHAIRMAN POWERS:** This maybe is a question for Steve Murawski,
19 but, those fifteen-second chunks, are they considered random
20 observations?

21
22 **DR. AHRENS:** They were certainly treated as random observations.

23
24 **CHAIRMAN POWERS:** So, if you used thirty-second chunks, then the
25 sample size would be half of that? That seems like an arbitrary
26 decision, if you're considering it as a weighting, in terms of
27 defining the precision of the standard deviation.

28
29 **DR. AHRENS:** It certainly has a noticeable impact on the 11
30 percent PSE that is shown at the end, yes.

31
32 **CHAIRMAN POWERS:** Thank you. Dave Eggleston.

33
34 **DR. EGGLESTON:** Thank you. Rob, obviously, a lot of interest in
35 your design, and we're learning a lot from it. I wanted to go
36 back, and I thought Luiz Barbieri made a really good comment, in
37 terms of I also used Table 6 quite a bit in my external review,
38 and Luiz made the comment about potentially weighting those
39 values, and I didn't hear everything you said, because I was
40 writing things down, but I thought it was based on the
41 proportion of an area sampled, and so I've got two questions.
42 Is that -- Would that be an appropriate thing to do, is weight
43 these estimates based on the proportion of the area sampled?

44
45 **DR. AHRENS:** Are you talking just for the unconsolidated bottom,
46 or are you talking across --

47
48 **DR. EGGLESTON:** I'm talking about all. Like, for example, when

1 I look at Table 6, I could almost envision another, at least
2 maybe three columns, that would be weighted values of number of
3 fish, variance, and coefficient of variation.

4
5 **DR. AHRENS:** So, for the pipelines, the artificial structures,
6 the known hardbottom, and the unconsolidated bottom, they were
7 all treated separately, and so it wasn't one kind of unified
8 sampling program, in some big stratified sense, across all those
9 habitat types, and they were literally -- The estimate that
10 you're getting for pipelines is -- Given the way the data was
11 treated for pipelines, that is the estimate that exists on
12 pipelines.

13
14 If you wanted to come across -- I guess, if you wanted to come
15 up with considering all habitat types, and come up with some
16 grand mean density estimate per unit area, then you could weight
17 those by the variance of each of those estimates, if you wanted,
18 and their habitat size, but, the way this was conducted, they
19 were considered separately, and so the estimate was done
20 separately.

21
22 **DR. EGGLESTON:** Rob, one reason I bring that up is, in Steve's
23 presentation, he -- Basically, with the pipelines, they sampled
24 635 square kilometers, and the pipeline sort of footprint, if
25 you will, was 67,422 square kilometers, and then he indicated
26 that the uncharacterized bottom that was sampled was 151 square
27 kilometers, and, according to Table 6, the uncharacterized
28 bottom area in Texas shows 57,535, but I thought Steve showed
29 159,915.

30
31 When I calculated out the sort of proportional area sampled, it
32 was an order of magnitude lower in the uncharacterized bottom,
33 and so that's why I thought, when you have such a large
34 difference in proportion of an area sampled, that comment by
35 Luiz made a lot of sense to me, in terms of allowing sort of
36 another sort of independent perspective on these values.

37
38 **DR. AHRENS:** Yes, and, again, I think, if you were going to
39 treat those habitats on a per-area basis, you could do that, and
40 then you would get into arguments of, well, how wide should the
41 swath around pipelines be considered the habitat unit, and that
42 is the pipeline, and I'm not sure that I would do that in a
43 sampling program, and I think I would still leave them as
44 separate entities and get estimates separately for them.

45
46 By virtue of the magnitude of habitat that exists in the
47 unconsolidated bottom, and what we know now about the
48 variability that exists between the samples, certainly a larger

1 sample size would be required, and here we have a much larger
2 sample size than what was prescribed, based on the initial
3 design for -- As a result of the towed systems, and there are
4 certainly further discussions that will be needed on how to more
5 appropriately treat that data, in terms of estimating the
6 overall variance in the final estimate, and so it really becomes
7 the variance weighting.

8
9 **DR. EGGLESTON:** Exactly, and it just seems like there is this --
10 I don't know if it's a typo or what on Table 6 for the Texas
11 uncharacterized bottom, and so it might be a good idea to kind
12 of go back through and maybe double or triple-check the values
13 on that table. Thank you.

14
15 **DR. AHRENS:** Yes. That will be done. Thank you.

16
17 **CHAIRMAN POWERS:** Thank you. Mary.

18
19 **DR. CHRISTMAN:** Where do I start? I totally agree with Rob
20 that, in fact, the number of samples on the uncharacterized
21 bottom is an egregious overestimate, and they should not have
22 been treated as independent observations, but, secondarily to
23 that, I agree with Rob as well that they should not have
24 combined the C-BASS and the hydroacoustics data, but instead it
25 should have been two separate estimates for the same area that
26 could then be combined. In other words, they are two
27 independent observations on the same stratum, and they should
28 not have been combined a priori and treated as though they are
29 the same information, because they are very different systems
30 for sampling. Then there was one more point, which, of course,
31 I can't remember. Okay. That's enough for now.

32
33 **DR. AHRENS:** Mary, in case it pops back into your head, I will
34 say that, for the Texas area, the deeper habitat was sampled
35 mainly by C-BASS, and the shallow and intermediate depths --
36 There is a bit of overlap there in the intermediate depths, but
37 it was the other, the hydroacoustic system, for those.

38
39 **DR. CHRISTMAN:** But they didn't have the same stratification,
40 right? C-BASS had thirty to 100 and then 100 to 200, I think.

41
42 **DR. AHRENS:** Yes, but those -- Again, all samples were, given
43 their geolocation, where then dropped onto the random forest
44 classification.

45
46 **DR. CHRISTMAN:** Right. There was further stratification. I'm
47 sorry.

1 **DR. AHRENS:** Post hoc. We ignored -- They were dropped back
2 onto the original stratification post-hoc.
3
4 **DR. CHRISTMAN:** So is that true for everything or just for C-
5 BASS?
6
7 **DR. AHRENS:** That's true for all unconsolidated bottom habitats.
8
9 **DR. CHRISTMAN:** So are the random forest strata -- Were post hoc
10 applied, and so these are a posteriori post-strata?
11
12 **DR. AHRENS:** Yes.
13
14 **DR. CHRISTMAN:** Okay. They were not applied based on what
15 people were seeing, I hope.
16
17 **DR. AHRENS:** Not at all, no. They were not. Given the habitat
18 rankings that people observed and classified, those were not
19 used, and it was dropped back onto the original design, in terms
20 of the strata.
21
22 **DR. CHRISTMAN:** Okay. All right. Thanks.
23
24 **CHAIRMAN POWERS:** Thank you. Dave Chagaris.
25
26 **DR. CHAGARIS:** Thank you. I have a question about -- My
27 question is about the area estimates for the different habitat
28 types, specifically the natural bottom, and I'm thinking mostly
29 off of Florida, where you used a dbSEABED database and estimated
30 the hardbottom area based off of 1 percent rock classification,
31 and that seemed to result in this big, continuous expanse of
32 hardbottom off of the southwest coast of Florida.
33
34 For the purposes of determining the area of natural bottom, was
35 that treated as a continuous expanse, because I'm wondering if,
36 in reality, that natural hardbottom is actually a patchwork of
37 natural hardbottom and uncharacterized bottom, and, if so, it
38 could potentially inflate the area of hardbottom that goes into
39 the expansion of the estimate.
40
41 **DR. AHRENS:** Right. For the dbSEABED information, that was only
42 used to calculate the distance to hardbottom that went into the
43 random forest model. We made the assumption that the high-
44 probability habitat in the random forest classification was, or
45 could be, called hardbottom, if you would, in terms of coming up
46 with an estimate of the numbers of individuals essentially on
47 hardbottom in west Florida, and so we didn't use that hardbottom
48 dbSEABED information to say this is the known hardbottom in

1 Florida, and we didn't do that calculation for Florida. That
2 was only done for Texas, Louisiana, and Mississippi/Alabama,
3 where they have other programs that have defined the actual
4 physical expanse of known hardbottom.

5
6 **DR. CHAGARIS:** Okay, and so that area of 22,858 is --

7
8 **DR. AHRENS:** It's based on random forest classification of high
9 probability, and it may have not -- That validation hasn't been
10 done.

11
12 **DR. CHAGARIS:** Okay. All right. Thank you.

13
14 **CHAIRMAN POWERS:** Thank you. Jay Rooker.

15
16 **DR. JAY ROOKER:** Just quickly, to clarify, and I see Steve on
17 here as well, and so he may attempt to chime in as well, but the
18 6,435 for the uncharacterized bottom in Texas -- Just to let you
19 know, ours was done a little bit different than Steve's.
20 Steve's may have been fifteen-second pieces, and we had
21 approximately 3,500 sampling units, or cells, in Texas, and all
22 of those were from the ten to 100 meters, and Steve's group, in
23 Texas, I think primarily did the deeper zone, beyond 100 meters.
24 What we did is we provided those 3,500 cells to Rob and Lynne,
25 again, with that heads-up on spatial autocorrelation, but we
26 gave them all 3,500 cells to work from. I will turn it back
27 over to you, Rob.

28
29 **DR. AHRENS:** Thanks, Jay. I appreciate that.

30
31 **CHAIRMAN POWERS:** Thank you. Bob Gill.

32
33 **MR. GILL:** Thank you, Mr. Chairman. In terms of the number of
34 samples discussion we're having, and clearly Texas has the bulk,
35 but, if you look down at the pipeline section, there is only
36 twenty-seven samples, and yet, if my memory is correct, the
37 Steve Murawski presentation showed a lot of pipeline samples,
38 for example in Texas, but, looking at the fifteen-second
39 sampling rate, why just twenty-seven samples, and are the Texas
40 ones, for example, incorporated in the UCB section of the 6,435
41 number?

42
43 **DR. AHRENS:** Great, and so, for the pipelines, that is -- The
44 unit there, in terms of the sample size, is the pipeline and not
45 the individual video count. The densities for those were
46 calculated by subsetting the data with the random -- The first
47 100 samples, a random starting point was taken, and then every
48 fortieth sample was used to calculate the mean, and then that

1 was bootstrapped to get an estimate of the standard error, or
2 the variance, of the mean, and the sample size that was chosen
3 for the degrees of freedom was the pipeline.

4
5 **MR. GILL:** So the 6,435 does not include any pipeline sampling
6 at all?

7
8 **DR. AHRENS:** No. Those were the 3,000 C-BASS samples, the
9 roughly 3,000 C-BASS samples, that occurred in Texas, were the
10 mud bottom, as designated, and not pipeline.

11
12 **MR. GILL:** Thank you.

13
14 **CHAIRMAN POWERS:** Thank you. Steve Murawski.

15
16 **DR. MURAWSKI:** Thanks. So a lot of back-and-forth there, and I
17 think mostly we got it cleared up. We did supply the 15,618
18 fifteen-second bins, and I think Rob has described the
19 calculations based on the bootstrapping method that was used to
20 basically calculate the means and the densities from that.

21
22 A couple of other small items, and there was a back-and-forth
23 about the margin of the sampling, and it's true, actually, that
24 the MMS regulations, early on, specified a 200-foot and
25 shallower burying of the pipelines, and it's not universal. The
26 reason we cut our sampling regime off at thirty meters was
27 primarily because other parts of the sampling procedures were
28 doing more of the inshore work, as Jay just said, and so there
29 was no reason to overlap those, and so it was a combination of
30 where is the pipeline buried and also minimizing the overlap
31 between sampling procedures that we're doing, and so it's a
32 combination of both.

33
34 There was also a little bit of confusion, I think, about that
35 short table that I put together, in terms of the sampling
36 universes. The pipeline universe, I mean, you can do it two
37 ways, and the universe of 67,000 is linear kilometers, right,
38 and, if you multiply that by ten meters, and then you've got a
39 square kilometer metric, whereas the mud habitats are based on
40 the sampling universe of 160,000 square kilometers, and so
41 there's a unit difference there to take account of. Thanks.

42
43 **CHAIRMAN POWERS:** Thank you.

44
45 **DR. CHRISTMAN:** Rob, one last question. You were provided with
46 the pipeline data to do the bootstrapping?

47
48 **DR. AHRENS:** Yes.

1
2 **DR. CHRISTMAN:** Is what Steve just said? So you bootstrapped
3 the pipeline samples and not individual observations within the
4 pipeline transects.

5
6 **DR. AHRENS:** I subsetted each transect every fortieth and then
7 calculated the mean from that and then randomly assigned a start
8 point, again subsetted every fortieth, and calculated a mean
9 from that.

10
11 **DR. MURAWSKI:** So he used the entire 15,000 fifteen-second bins
12 and subsetted from that.

13
14 **DR. CHRISTMAN:** But what I'm asking is this is a two-stage
15 cluster sample, and so you got the second-stage variance, and
16 what about the first-stage variance, which is the selection of
17 pipelines, the sample size of twenty-seven pipelines? Did you
18 randomly select those and then randomly sub-select?

19
20 **DR. AHRENS:** Yes, and that first-stage clustering across-
21 pipeline variance was not factored in, and it was not treated as
22 a two-stage cluster.

23
24 **DR. CHRISTMAN:** Okay. Thank you.

25
26 **CHAIRMAN POWERS:** Thank you. I think we'll probably have -- As
27 the day and tomorrow goes on, we may be revisiting some of these
28 things, but, at this stage, I think it would be good to move on
29 and get into some of the details about the regional information,
30 and next on the agenda is Dr. Patterson, who will be talking
31 about Florida and the Florida methods and so on, and so let me
32 transfer the floor to Will.

33
34 **REGIONAL SAMPLING FRAMEWORK**
35 **FLORIDA**
36

37 **DR. PATTERSON:** Thanks, Joe. I'm going to talk about the
38 Florida sampling and attempts to assess various biases,
39 potential biases, in our approach, and then I will talk briefly
40 about some results, saving the bulk of that for Rob's wrap-up,
41 as far as the estimation.

42
43 Our group in Florida included myself; Rob, who just spoke; Steve
44 Garner, who was a post-doc; and Joe Tarnecki, who is a research
45 biologist working with my group. Steve and Joe led the sampling
46 teams in the field and spent lots of time on the back of boats
47 in the summer and fall of 2018 and then the late spring and
48 early summer of 2019.

1
2 Miaya Glabach is my lab manager, and she coordinated a lot of
3 trips, as well as sampling supplies, et cetera. Vince Lecours
4 is a geospatial scientist who is in our department, and he was
5 instrumental in some of the early mapping exercises to do with
6 the sampling, and then Rob introduced Zach Siders at the
7 beginning of his talk. Zach was a post-doc working with Rob on
8 spatial analysis and sample design.

9
10 My talk is divided into three sections, and we can either take
11 breaks between each of these and have questions or make it all
12 the way to the end, and, Joe, I will, obviously, leave that up
13 to you. I can pause after I finish the first section, and, if
14 you want me to continue, I can, or I can stop there, and we can
15 have some Q&A before moving on.

16
17 These three sections involve, first, the mobile gears utilized
18 in the study and some commentary about that, and then talking
19 about some behavioral experiments we did to estimate red snapper
20 reaction to our various gears, and a real focus on the ROV gear
21 that we used in the eastern Gulf. Next, I'm going to talk about
22 ROV and hydroacoustic sampling on the Florida Gulf shelf, and
23 Kevin Boswell talked a bit about the hydroacoustics methodology,
24 but I will talk about the spatial distribution samples and the
25 degree of overlap between ROV and the sonar work.

26
27 Lastly, a bit of other information about how we attempted to
28 examine other potential sources of bias in the red snapper
29 counts, and so everything I'm going to cover today is actually
30 included in the report, either as text or as an appendix.

31
32 I do have a couple of additional figures that I will point out,
33 things that Kevin Boswell and I have been kicking back and forth
34 the last couple of days, things that we had considered before,
35 but the early reports that we got from Dr. Cadrin and Dr.
36 Christman sort of sparked some ideas, and so I'll talk about
37 some of that, with respect to ROV and hydroacoustic comparison.

38
39 Rob just showed the initial design from the random forest model,
40 and you can see, in Florida, quite a distribution of samples.
41 There were 749 stations selected for what's been referred to as
42 uncharacterized bottom, and our sampling team has referred to
43 this simply as just natural bottom.

44
45 We don't have great maps in Florida, and we know where some
46 natural hardbottom exist, in certain particularly high-relief
47 areas, and FWC has done a nice job in recent years of adding to
48 the universe of mapping there, and so has Steve Murawski's

1 group, with their NFWF funding, but, because we couldn't
2 stratify based on habitat, we just considered this to be all
3 unclassified bottom.

4
5 In Florida, we followed this design explicitly, as far as the
6 natural reefs, and the yellow stars that you see here, relative
7 to the size of the structures, these were selected in the random
8 forest model, and you can see there's only a handful of those in
9 Florida waters. With other work we were doing in the Panhandle,
10 in particular, but also into the Big Bend, we subsidized this
11 quite a bit with some more artificial reef samples, and so we
12 ended up having sixty-five artificial reef samples in our work.

13
14 Among the various groups in the study, we have ROVS that were
15 used for different approaches to sampling, and that's in the
16 top-left, and this is the small video array ROV that we utilize
17 in my laboratory, and you can see, on the front of it, two GoPro
18 camera cases, and this is a stereo camera rig that we developed
19 for this project, and I will talk about that toward the end.

20
21 These ROVs are quite small, and there are some larger ROVs used
22 in different regions, and these ROVs are basically twenty
23 centimeters high and thirty centimeters wide and forty
24 centimeters long, and they weigh about six kilograms, and so
25 they're quite nimble, and there's a tether that goes to the
26 surface to control them.

27
28 On the bottom-left, this is the sonar rig from Kevin Boswell's
29 group that we had on many of our cruises, and then, on the
30 right-hand side, we have the two towed camera vehicles that were
31 used by members of the team, and so, in Texas, the TERAS sled,
32 and then, on the bottom-right, the C-BASS that Steve spent some
33 time talking about this morning.

34
35 With all of these gears, there have been questions and
36 discussion about different levels of bias, whether it's
37 detectability or avoidance or attraction or selectivity issues,
38 and, in Florida, having done quite a bit of sampling there
39 through the years, we perceived the visibility was going to be
40 pretty high in this study, and we didn't foresee there was going
41 to be much of an issue with visibility, and, also, we knew that
42 red snapper that would be on the habitat sampled were going to
43 be age-two-plus fish, and they start recruiting to a hardbottom
44 habitat and away from more low-profile structures, like oyster
45 reefs and sponge and soft coral habitats, when they're about 250
46 millimeters.

47
48 We thought there would be a low incidence of younger fish where

1 we were, and the bigger fish are quite conspicuous, and they
2 don't tend to hide under ledges, like some species do, and
3 they're not skittish, like Steve Murawski was describing of gag
4 earlier, nor do they have a reputation of chasing the camera,
5 like an amberjack, or perhaps a gray triggerfish, does.

6
7 We weren't too concerned, at least in Florida, about
8 detectability, and, in fact, we assumed it was 100 percent, and
9 I will show you some images to form sort of a basis of that
10 assumption. However, we had never really looked at the issue of
11 attraction or avoidance.

12
13 Steve presented some information from Sarah Grasty's work with
14 the C-BASS, where, obviously, they had paid attention to those
15 issues and tried to quantify it, but we took the opportunity
16 here, because we knew in this study it was going to be
17 particularly important, since we weren't after a relative
18 measure of abundance, but a true measure of abundance, to
19 actually examine that.

20
21 Because we were working with the ROV, in that respect, we also
22 used the acoustic sled from Kevin Boswell's group, and we also
23 borrowed a TERAS from Jim Cowan's group at LSU, to tow that
24 through our system as well.

25
26 The objective of this work was to test the behavioral reaction
27 of red snapper to mobile sampling gears utilized in the Great
28 Red Snapper Count and to assess the potential, we should say
29 biases -- To test the potential for biased fish counts in
30 density estimates, and so, on the bottom-right, you can see two
31 stainless-steel stands, or aluminum stands. On the left, this
32 is a sonar that Kevin Boswell's group worked with, and you can
33 see a computer and battery pack beneath the sonar, and the sonar
34 we shot sideways at artificial reefs.

35
36 You can see the sediment here is open, sandy substrate, but both
37 of these gears are aimed toward a concrete module artificial
38 reef. The rig on the right is a stereo camera system, actually
39 a paired stereo camera system, one aimed slightly upward and one
40 aimed parallel to the plain of the reef, and the distance
41 between the cameras here is 750 millimeters.

42
43 We worked quite a bit with Matt Campbell and other folks at the
44 NMFS Laboratory in Pascagoula, who had quite a bit of work done
45 with the stereo camera rigs and the large study, multiregional
46 study, that Steve Murawski mentioned earlier, to examine how
47 fish react to these mobile fishing gears. Matt was a key
48 component of those studies, and they published a paper, Somerton

1 et al., for vermillion snapper in the Gulf, and so we worked with
2 Matt and his team on this research, and we definitely took
3 advantage of their expertise.

4
5 On the left-hand side of this figure, you can see, at the top,
6 there's a map that shows the northeastern Gulf of Mexico, and
7 then the inset at the bottom is -- This was an artificial reef
8 permit zone, and the numbered circles that you see -- These were
9 seventy Vemco VR2Tx receivers that we deployed in the system,
10 and so this basically encapsulates about a twenty-square-
11 kilometer area where we could track fish three-dimensionally
12 with acoustic tags, and these were Vemco VAP, and so
13 accelerometer and pressure. There were thirteen tags that we
14 attached to fish externally.

15
16 In the fall of 2019, late summer of 2019, we went out, and we
17 knew -- We had done some work in this area before, and so we
18 knew where the reefs existed, both the reported and unreported
19 reefs in the system, and the red triangles that you can see
20 there are reefs where we tagged fish, and the black triangles
21 were other reefs that we knew existed in the system, and the
22 reason we worked on artificial reefs is because, at least in the
23 northeastern Gulf of Mexico, the probability of occurrence of
24 red snapper on artificial reefs is basically -- It's about 97 or
25 98 percent of the reefs have red snapper, and they usually occur
26 in some abundance, and so we could reliably capture and tag, and
27 our goal was to get ten fish tagged with our fish tags on each
28 of these five reefs, for a total of fifty, and we were able to
29 do that.

30
31 The reefs themselves were small-scale modules, or paired
32 modules, typically about three cubic meters apiece, and so quite
33 small, prefabricated concrete modules, and I'll show you some
34 images of those in later slides, so that you can see them.

35
36 The tags themselves were programmed, for the first three weeks,
37 to ping every thirty seconds, and we realized that that would
38 cause some tag collisions, because of the density of tags in the
39 system, but we wanted to have a high ping rate, and so these
40 were randomized, to try to avoid tag collisions. We wanted to
41 have a high ping rate, because our goal was to tag fish and then
42 come back ten days later, after they had a chance to acclimate
43 to their external tags, and then do the series of experiments
44 that we had in mind.

45
46 This worked out quite well. We weren't able to get back out for
47 about ten days, and then, two days later, we finished this work,
48 and so, the high-tag frequency period, we were well within that

1 to examine fish movement and reaction to the gears.

2
3 On a given site, when we went back to do the research, the first
4 thing we did was the boat circled up on the site, and they got
5 over the top of the reef, and the captain found is referred to
6 as the hold-up, what the current and wind are doing and how the
7 captain can live float it, so we don't have to set an anchor,
8 which is usually a lot more trouble than it's worth.

9
10 Once the charter boat captain, in this case Johnny Greene out of
11 Orange Beach, Alabama, found the hold-up, then we dropped the
12 gear in the water, and you can see, on the left-hand side, we
13 have sonar, as I mentioned, and then a camera rig. After the
14 gear was dropped in the water, we had a second vessel, with a
15 crew out of Destin, Florida, Josh Livingston and his brother and
16 some other folks, that they would send a diver down and then
17 position the rig so it faced the reef.

18
19 We gave it an hour after the gear was initially deployed for the
20 fish to kind of settle down. When the gear hits the bottom, it
21 stirs up sediment, and the fish get excited, and they come check
22 it out, and so we gave it an hour for fish to acclimate, and
23 then we sent divers down to position the gear, and the divers
24 spent fifteen minutes around the reef structure, and we wanted
25 to estimate the red snapper reaction to the divers.

26
27 Once the diver left the water, we waited fifteen minutes, and
28 then we randomized which of the three gears we sent down next,
29 and so, if it was the ROV, then we did standard ROV surveys
30 around the reef. It was the towed vehicle, or the towed
31 acoustics sled, we just tried to maintain fairly tight turns and
32 tow the gear back and forth across structure. Again, each time
33 we took a gear out, we allowed fifteen minutes for the fish to
34 reacclimate to having gear not be present.

35
36 The figure on the left here, you can see, on the Y-axis, we have
37 red snapper counts, and on the X-axis is minute, and so this is
38 the, more or less, sixty minutes of time, and the count that you
39 see here, and this is after we put the camera and/or acoustic
40 platform into the water, and we allowed this sixty minutes, and
41 so what you're looking at here is the acclimation of fish over
42 time, and, by about minute-forty, you can see a leveling off,
43 and so we pretty good that our sixty minutes allowed fish to
44 sort of settle down after the initial deployment of the two
45 stands, the acoustic stand and the camera stand.

46
47 The snapper count here is just from the stereo camera rig, and
48 it's important to remember that this wasn't yet aimed at the

1 structure, and so there's a lot of variance in the data, because
2 sometimes it was aimed right at the reef, and sometimes it was
3 aimed away from the reef, but these are the red snapper that
4 came to check it out and moved around.

5
6 On the right-hand side, you can see three panels, and the top is
7 distance to reef, the middle is height off the bottom, and the
8 bottom is acceleration, in meters per second, and so these tags
9 had accelerometers in them, and so they sent accelerometer data
10 to the receivers on the seabed, and so not only could we
11 estimate the position of fish three-dimensionally, because the
12 receivers were set close enough to triangulate position, on the
13 X and Y, and then the tags had pressure sensors that allowed us
14 to estimate the Z.

15
16 We also had these acceleration sensors in the tags, so we could
17 measure that as well, and so what you see here are means, plus
18 or minus standard errors, and all the measures of dispersion
19 here in this component of my talk, these behavioral experiments,
20 the measures of dispersion here are always standard error, and
21 so quite a bit of variability in the data.

22
23 The vertical line in each of these plots is when the camera rig
24 was deployed, and so, because we had these acoustic tags already
25 in the system for ten days before we did this experiment, we
26 were able to look at the one-hour pre-deployment period and the
27 one-hour post-deployment period, and so, consistent with the
28 higher counts of fish early on after deployment, you can see a
29 bit of reaction, where the distance to reef maybe gets a little
30 bit smaller, and clearly the height off the bottom gets a little
31 lower, and the acceleration in particular, and so fish are kind
32 of closer to the reef, or not so much closer to the reef, but
33 they're closer to the bottom, and they're not moving quite as
34 fast. They're kind of checking things out.

35
36 By about fifteen or twenty minutes after deployment, you can see
37 they have settled down, and we have a return to activity
38 patterns that existed before we put the two stands in the water.

39
40 The data you're looking at here are compilations of the stereo
41 camera data, and so, with the stereo camera, we were able to
42 track individual fish, and it took Steve Garner about six months
43 of pretty intensive work to track all the fish that are on these
44 figures, and a considerable amount of effort.

45
46 The arrows that you see are color-coded from the first minute up
47 to the fifteenth minute, and so this is during deployment.
48 Diver in the water, and the top-right is the ROV, and the

1 bottom-left is the towed camera vehicle, and the bottom-right is
2 the towed acoustic sled. This color scheme that you see here is
3 one that will be used for all of the panels of the four
4 different gears.

5
6 The numbers that occur on the arrows, and so these arrows are
7 vectors, which is the mean movement that was observed in
8 direction and distance of fish during the course of that minute
9 of observation, and so, among the five different artificial
10 reefs and the different gears, we have lots of different fish
11 that are being observed, and the number that you see at each
12 arrow is actually the sample size, and so the color of the
13 arrow, the shading, tells you the minute, and then the number
14 tells you the number of fish that are represented by that mean
15 vector.

16
17 What you can see here is that most of the fish, in all of the
18 systems, were pretty close to the reef, and perhaps this isn't
19 surprising, because the stereo camera rig only had a certain
20 field of view, and it was a few meters left and right of the
21 reef, and we positioned the stereo camera and the acoustic stand
22 five meters from the reef, and the acoustics spread out in a
23 cone, as they do, and so there is not a whole lot of difference
24 that we see here in the stereo camera data among the various
25 components.

26
27 We do see, perhaps, a little bit more distance from reef for the
28 towed camera vehicle, and then even a little bit higher in the
29 water column for the towed acoustic sled, but it's important to
30 recognize the scale that we see here, especially on the Z-axis,
31 and height off bottom is a maximum of only two-and-a-half
32 meters, and so the height off bottom ranged from about half a
33 meter to about a meter-and-a-half, in most cases, and so not a
34 whole lot of difference that you see there. Again, we could
35 probably measure, effectively, about three meters into the water
36 column above the reefs with this gear.

37
38 Next, the telemetry data, and so, on the left-hand side --
39 Actually, these are the raw counts from the stereo camera, and
40 the right-hand side are the telemetry data, but so, the first
41 column, we have raw counts of number of red snapper observed,
42 and this is once the stereo camera system was pointed at the
43 reef, and then, on the right-hand side, we have the scaled
44 counts, and so the scaled counts are the individual counts, the
45 mean counts per minute, minus the mean count from the fifteen
46 minutes before, that acclimation period before we put gear in
47 the water, and so before the diver went in, before we put over
48 the ROV, et cetera.

1
2 Again, the error bars for all of these are standard errors, and
3 so you can see that the diver has the most pronounced effect,
4 and there is an increase, a significant increase, in the count
5 of fish that were observed when the diver was milling about the
6 artificial reef, and the fish came in closer, and they were
7 quite curious, maintaining a distance of a meter or two from the
8 diver, but they would circle around the diver.

9
10 For the ROV and the towed camera vehicle, there are some
11 positive deviations here. However, with the standard errors,
12 you can see the error bars are all capturing zero, in the case
13 of the ROV and except for a couple of cases for the towed camera
14 vehicle.

15
16 As far as the counts of fish on the reefs, the towed acoustic
17 sled had the least effect, as far as what was observed by the
18 cameras, but you have to remember that the towed camera sled was
19 up in the water column, at a depth of about a few meters, three
20 or four meters, and I failed to mention, earlier on, that these
21 reefs are between about thirty-five and forty meters depth, and
22 so that's an important consideration that I apologize for
23 leaving out.

24
25 On the right-hand side, you can see we have three panels that
26 are the movement data estimated from our three-dimensional
27 acoustic telemetry and accelerometer tags, and so at the top is
28 the distance to the survey reef, in meters, and, again, this is
29 just in the X and the Y dimensions, and the Panel B is height
30 off the bottom, measured in Z, and then Panel C is acceleration
31 is meters per second squared.

32
33 For each of these, and so, again, the diver on the left, and the
34 sort of mustard-yellow is the ROV, and the blue is the towed
35 camera vehicle, and the orange color is the towed acoustic sled,
36 and so you can see the control for each of these is that
37 fifteen-minute acclimation period.

38
39 If you look at the distance to the survey reef, you will note
40 that the means are pretty similar for these acclimation periods
41 for whether the diver is in the water or the ROV, and, for the
42 towed camera or the towed acoustic sled, the distance to the
43 reef actually drops a bit, although this is only significant
44 here for the towed acoustic sled, and the sample sizes that you
45 see above each of these are the number of pings that we got for
46 fish.

47
48 The model that was fit here was a generalized linear mixed

1 model, and so we had a random effect on the fish, to control for
2 autocorrelation there, or lack of independence for those
3 individuals, and so, in some cases, we were able to track one
4 fish for some period of time, but each of these represents
5 multiple fish from different reefs, but, if we had multiple
6 measurements for a given fish, we controlled for that by putting
7 a random effect on the fish.

8
9 Panel B, the height off the bottom, you can see there's a real
10 significant drop, or there was a real significant drop, from a
11 little over three meters to a little less than two meters, when
12 the diver was in the water, but, for the other gears, there is
13 not much of an effect whatsoever. Again, for acceleration, the
14 only one here that showed much of an effect is the towed camera
15 vehicle, and there's a slight drop in acceleration for the ROV,
16 but there is too much variance, in the case of the towed
17 acoustic sled, to draw much inference there.

18
19 Overall, among these various data, what we observed is that the
20 fish, these tagged red snapper, and otherwise observed red
21 snapper in the systems, had the greatest reaction to divers,
22 with decreased height off the bottom, decreased distance from
23 reef, and increased acceleration.

24
25 The behavioral reaction to mobile fishing gears were more or
26 less neutral, and we did see some slight effects, but, in Sarah
27 Grasty's analysis, we would consider this to be perhaps mildly
28 positive, or slightly positive, but, in many cases, we had no
29 significant statistical effects, and so the ROV is slightly more
30 than the towed camera vehicle, which is slightly more than the
31 towed acoustic sled.

32
33 In examining the data and understanding the scale of the
34 sampling, as far as the width of the transects, which were about
35 fifteen meters for the ROV, we felt that we didn't have a
36 significant issue here with either attraction or repulsion of
37 red snapper during the ROV sampling.

38
39 Now, there is an important caveat here to mention, in that
40 experiments were conducted around artificial reefs, and, again,
41 this was due to the probability of observing and being able to
42 tag and track multiple red snapper, but the artificial reefs
43 themselves may affect red snapper behavior that is different
44 than at least low-profile natural bottom, and I have a couple of
45 images shown here of what these reefs look like.

46
47 You can see that there's a pretty expansive sandy habitat around
48 these reefs, and they very much function like patch reefs, and

1 so, if the artificial reefs themselves somehow affect the
2 behavior of the fish and mask any attraction or avoidance of the
3 gear, then, obviously, we wouldn't be able to test for those
4 effects, and they would be confounded with the artificial reef.

5
6 We would very much like to repeat this study on natural bottom,
7 and it's just very difficult to reliably find red snapper in
8 high enough concentrations to be able to do this kind of work,
9 and you need a very large sample size, and it would take
10 probably a few hundred thousand dollars to be able to put this
11 together to test this in natural bottom, even with all the gear
12 that we already own, with the acoustic receivers and the ROVs,
13 et cetera, and so it's just a really daunting task, and we just
14 didn't feel like we had the budget to do it here, other than a
15 place where we could go and reliably tag and observe quite a few
16 fish.

17
18 That is the end of this early section on the behavioral
19 experimentation. Joe, I don't know if you -- What is your
20 prerogative here, as far as fielding questions or just moving on
21 to the next sections and fielding them all at the end?

22
23 **CHAIRMAN POWERS:** Let's see if there's any overriding questions
24 now, and then, if not, we can move on, but, first off, are there
25 any questions of Will? John Mareska.

26
27 **MR. MARESKA:** Will, I was looking at Slide 8, and one thing I
28 noticed is, on the right-hand side, for the towed sled, and,
29 for your deployed, it looks like your number of pings -- That
30 that number systematically goes down, and so it's like the fish
31 are leaving the system, but the ones that remain don't seem to
32 have much difference with their reactions, but, with that sled,
33 it looks like the number of pings is going down, and is there
34 something different about that towed sled that may be driving
35 fish away?

36
37 **DR. PATTERSON:** If you look at the height off bottom, the height
38 off the bottom is higher for the towed sled, in Panel B in this
39 figure, and, if you go back to this figure, you can see, from
40 the stereo camera estimates, the fish were higher in the water
41 column, and you can see, from the direction of the movement, the
42 ones that were observed were moving up into the water column.

43
44 It's possible that some fish went to check out what was going on
45 with the acoustic sled up in the water column. With the stereo
46 camera, we didn't have the ability to track them more than a few
47 meters above the reef.

1 In the case of the telemetry data, we would be able to track
2 them into the water column. After a certain distance, depending
3 on where they were in the array, we would start to lose
4 resolution, as far as triangulating their position for distance
5 from reef, and we would also -- We might lose the ability to
6 capture accelerometer data, and so I don't think the
7 accelerometer data issue would be as high as the potential to
8 lose the ability to track their distance from the reef, but,
9 yes, that's an important consideration that we probably need to
10 think some more about.

11
12 **MR. MARESKA:** All right. Thank you.

13
14 **DR. PATTERSON:** If you look across the sample sizes for the
15 other gear deployments, you can see some other numbers that are
16 in the teens, and so it's just kind of luck of the draw of what
17 got randomly selected on that site, and there are plenty of
18 other sample sizes in the twenties, and even the distance from
19 reef estimate for the control period for the towed acoustic sled
20 is forty-five, and so I would have to think about your question
21 some more, John, but it doesn't look like the sample sizes are
22 that much lower than what we see across some of the other
23 treatments.

24
25 **MR. MARESKA:** But your pings -- So if you look at the control
26 and the deployed for the distance from the reefs, the height
27 from the bottom, or the acceleration, the number of pings tends
28 to go up for the other gears, the diver, the ROV, and the towed
29 camera vehicle, but, for the sled, regardless of that parameter,
30 the number of pings is going down for the deployed.

31
32 **DR. PATTERSON:** Yes, I see that. We hadn't paid much attention
33 to that, and we need to think about that some more. Thanks,
34 John.

35
36 **CHAIRMAN POWERS:** Go ahead, David.

37
38 **DR. EGGLESTON:** Thanks, Will. Just seeing your pictures
39 underwater got me thinking about -- I know you know this, but
40 you're diving during the day, and those fish are hanging around
41 the reef, and then, at night, you go out, and they're spread out
42 over the surrounding area, and I was just curious about any of
43 the towed hydroacoustic gear. Was it always during the day, or
44 was any of that done at night? Again, I'm just wrestling a
45 little bit with the, I guess, lower detections with the
46 hydroacoustics.

47
48 **DR. PATTERSON:** It was always done during the day for this work,

1 and, for the sampling, that was done on the West Florida Shelf.
2 I don't know the answer to that question, and I think it was
3 during the day in the west with Jay, but he could answer that
4 better.

5
6 **DR. EGGLESTON:** All right. Thank you.

7
8 **CHAIRMAN POWERS:** Go ahead, Mary.

9
10 **DR. CHRISTMAN:** Thank you. I'm also looking at Slide 8, and
11 this is more for your publication that's in review. I assume
12 that, when you did the generalized linear mixed models, you used
13 a lognormal or a non-normal distribution with a long tail?

14
15 **DR. PATTERSON:** Yes, and they were different distributions based
16 on the data, but yes.

17
18 **DR. CHRISTMAN:** Okay, because one of the things I'm thinking
19 here is that you're putting these standard errors on as though
20 the data are symmetric, when they're not, and so I would
21 recommend you rethink how you describe them, because one's first
22 reaction is, looking at the raw counts, for example, on the left
23 -- I'm looking at that and going, is that mean correct? Five,
24 when I see something like eleven of those minutes are above
25 five, and so I think it's more of a matter of just you have to
26 keep in mind the actual distribution of the data, and I think it
27 would be reinforced if you didn't use symmetric standard error
28 marks like that.

29
30 **DR. PATTERSON:** Okay.

31
32 **DR. CHRISTMAN:** I did have one more question. You were
33 commenting about your study being done on high-density
34 artificial reefs, and what about -- I would expect that fish
35 that are in a conglomeration would respond differently to
36 something that an individual or just a few fish would respond to
37 something, because an individual smaller fish might be less
38 likely to want to go explore and see what's happening, as
39 opposed to when there is twenty-five fish surrounding them. Can
40 you address the assumption that you're making that fish behave
41 the same everywhere and in every density?

42
43 **DR. PATTERSON:** I don't think fish behave everywhere in the same
44 density, but we just don't have any data to suggest how that
45 might differ. Therefore, the caveat there at the end. If they
46 do, if their behavior does change demonstrably, then that would
47 affect the inferences that we're able to draw from this.

1 Red snapper aren't schooling fish, and they don't form tight
2 aggregations, and so they're not -- As they swim, they're not
3 teeing-off their neighbor, like a herring or a menhaden would
4 do, and they don't form tight aggregations like an amberjack
5 might, and so, in that respect, they move more or less
6 independently, but, you know, in any case, when fish sense
7 feeding opportunities, they tend to all kind of go check out a
8 feeding opportunity, and we think that's what we see when the
9 camera rig and the sonar rig hits the bottom and fish kind of
10 show up on the video.

11
12 They are responding to that cloud of sediment that's being
13 resuspended, and there are, obviously, fishing techniques where
14 you can bounce jigs off the bottom, to try to cause the sediment
15 to get stirred up, to get fish to bite your gear, but, as far as
16 whether they're more likely to respond to an ROV or to a towed
17 camera vehicle, if it's a single fish or multiple fish, in the
18 case of red snapper, I don't have a good feel for that.

19
20 **CHAIRMAN POWERS:** Carrie.

21
22 **EXECUTIVE DIRECTOR CARRIE SIMMONS:** Thank you, Mr. Chair. Very
23 interesting study, Dr. Patterson. I have a question about the
24 diverse mean abundance in the counts there, and it looks like
25 you were getting higher counts, mean counts, with divers than
26 the other three methods. Was that significantly different for
27 this study, and do you have any idea why?

28
29 **DR. PATTERSON:** The divers were significant, and one drawback of
30 the way we constructed this, and something we would do
31 differently in the future, is that we had a finite amount of
32 time to do the work, and we weren't able -- Ideally, in
33 hindsight, we should have put the gear in the water, put divers
34 down, aimed it, left it a few days or a week, allowed the fish
35 to totally acclimate to it, and then come back and do our
36 experiment, but we didn't have the flexibility then, and we
37 didn't really consider that issue as we should have on the
38 frontend.

39
40 One of the issues here, Carrie, with the diver deal is that this
41 is following -- Always the diver is following the deployment of
42 the rig, the rigs on the bottom, and so you have -- It's sort of
43 a confounded effect here. The diver issue couldn't be
44 randomized like the ROV, the towed camera vehicle, or the towed
45 acoustic sled, and it always followed right after we put down
46 the gear, and so we can't separate whether this is an
47 acclimation effect.

1 However, what we did see in our data beforehand, and this is
2 discussed in the paper, is that the fish tended to settle down
3 after about forty minutes, and so that hour acclimation period
4 on the frontend we presumed was enough time for things to kind
5 of go back to normal, but, yes, the divers did have, in many
6 different metrics, the most substantial effect on red snapper
7 movement behavior.

8
9 **EXECUTIVE DIRECTOR SIMMONS:** But they were counting more fish
10 when they put the gear down first and then they went to the reef
11 and counted the fish, versus counting the fish and then going
12 back down and putting the gear down, and is that what you're
13 saying?

14
15 **DR. PATTERSON:** No, and I'm sorry. The counts on the two
16 columns on the left, those are counts from stereo cameras, and
17 so the divers were just in the water to be in the water and
18 affect fish movement, and they weren't actually doing anything
19 productive. They were just kind of hanging out.

20
21 **EXECUTIVE DIRECTOR SIMMONS:** Okay. Thank you.

22
23 **DR. PATTERSON:** Sorry about that.

24
25 **CHAIRMAN POWERS:** Thank you. If there are no other questions at
26 this point in time, perhaps now would be a good time to take a
27 quick break, let's say for ten minutes, and then Will can go on
28 and rapidly go through the other parts of his presentation, and
29 so let's take a ten-minute break.

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

32
33 **CHAIRMAN POWERS:** All right. Welcome back, everybody, for this
34 afternoon's session. Dr. Patterson, will you carry on?

35
36 **DR. PATTERSON:** Yes. On the left-hand side here, you see a map
37 of the West Florida Shelf and the Panhandle, and so the five
38 regions, and these were just regions that we had internally to
39 map out our sampling, and these don't have anything to do with
40 the study design, but you can see, across the shelf here, the
41 circles are natural bottom sites or unclassified bottom, and the
42 triangles are artificial reefs.

43
44 The filled shapes are ones where we had sonar as well as ROV
45 data, and so you can see, toward the southern end of the range,
46 most of these we have overlap, and in the Panhandle, we have
47 overlap, and, for part of the central region, Region 2 and
48 Region 3, we have overlap between the sampling gears.

1
2 When we get up to the northern end of Region 2, we had less
3 overlap, and that was due to the fact that we were working on
4 some smaller vessels, and Kevin's group had some other sampling
5 that they needed to do at the time, and it was difficult to
6 coordinate the overlap there, and so we didn't have the acoustic
7 data for much of those.

8
9 Throughout the sampling that we did, we took multiday trips on
10 participating charter boats, and so you can see an example here
11 in the top-right, and this is the Intimidator out of Orange
12 Beach, and it's sixty-five feet, and there's plenty of room for
13 a crew of three or four, between myself and Kevin's lab.

14
15 On the bottom, you can see the R/V Hogarth, which is owned and
16 operated by the Florida Institute of Oceanography in St. Pete,
17 and this vessel had been christened just prior to when we
18 started our work in 2018, and I think we were actually the first
19 substantial multiday trips on the vessel.

20
21 The vessel was meant to be equipped with a dynamic positioning
22 system, but they didn't have that working quite yet, and so it
23 took us a couple of days to get rolling with that. One
24 advantage was that the transducers for Kevin's work were mounted
25 to the hull, and so we didn't have to deploy any gear or
26 retrieve the sled there, and so we did ten-day trips on the
27 Hogarth, mostly on the greater than fifty-meter sites, and we
28 did typically four-day trips on the various charter boats that
29 we utilized from the Panhandle of Florida down into south
30 Florida.

31
32 I just want to reiterate that we followed the design that Rob
33 produced with the random forest modeling explicitly, except for
34 the fact that we did add some additional artificial reef samples
35 in the Panhandle from other research that we were doing in that
36 region.

37
38 The gear, again, that we utilized predominantly to estimate red
39 snapper abundance on reefs were these small video array ROVs,
40 and my group actually has three of these systems, and so we were
41 able to send two on the Hogarth, in case we had any kind of
42 issues, and we didn't want to return to shore from that far out,
43 and then one on the charter boat, and so we often had two field
44 crews, one led by Steve Garner and one led by Joe Tarnecki,
45 operating a time.

46
47 You can see a typical natural reef here, and this is off of
48 Destin, Florida. There's lots of diversity and lots of small

1 demersal reef fishes. Artificial reefs tend to be much more
2 focused biomass around the reef, and you can see lots of
3 different snappers, and you can see vermillion, red, gray
4 snapper, triggerfish, and some grouper, but the two habitats,
5 because of their different spatial dimensions, required
6 different types of sampling.

7
8 On the bottom-left, this is a point count sampling approach that
9 we took for these smaller single or paired-module artificial
10 reefs, and the right-hand side depicts the transect method that
11 we utilized for larger-scale natural bottom. For those sites,
12 we got to the coordinates of the structure, and we dropped the
13 ROV in the water, and, with a downrigger weight ball, a twelve-
14 pound weight ball attached to the tether, and we flew four
15 twenty-five meter orthogonal transects away from that weight
16 ball, and so in opposite directions to and from, and then
17 changing north, south, east, west.

18
19 In the document, there is quite a bit of algebra shown, and
20 trigonometry, for how the C-BASS estimates the path, the width,
21 of the transect, and so we take a similar approach here with the
22 ROV, and theta-one is the angle of the camera relative to the
23 seabed, and, if we know the height off the bottom, and we know
24 this angle, then we can estimate the distance, A , and then,
25 because we know the field of view of the camera, and different
26 cameras have different fields of view, and they have different
27 issues with parabolic shifts, and then we also have different
28 settings on different cameras, and so it's important for us to
29 know what camera we have and what the settings are.

30
31 We mount a GoPro actually to the top of the ROV, and the image
32 that you see here on the top-right, this is actually from the
33 camera of the ROV, and we have a GoPro mounted above it that's
34 angled at forty-five degrees toward the substrate, and so this
35 allows us to see in front of and then down and map those
36 transects, and so, again, two different approaches, and there
37 are several different papers that we've utilized these
38 approaches that are cited in the report, and I can provide those
39 to anybody who would like to see them, but these methods have
40 been utilized extensively over about the past fifteen years in
41 the region.

42
43 There's quite a diversity of habitats, and so grazed-down
44 seagrass beds in the Big Bend area. In the top-right, we can
45 have these broad sandy patches with lots of benthic microalgae
46 on the sediment surface.

47
48 The bottom-left is some patchy reef habitat, and you see lots of

1 gray triggerfish here, and some snapper in the background, and
2 then there's some other small-scale patch reef habitat with red
3 snapper, and we find that it often doesn't take much to hold
4 snapper and triggerfish, but a lot of these areas were away from
5 known habitats that had been well mapped and studied, like the
6 Middle Grounds and Madison-Swanson and The Edges, et cetera,
7 where we would find snapper.

8
9 The randomization from the design that Rob put together I think
10 was really key in Florida, to be able to estimate the numbers
11 and density of fish in the system there.

12
13 Next, we had some higher-profile and more continuous reef
14 systems, and so from one to two meters in vertical relief, and
15 sometimes we would find lots of species, but not red snapper,
16 and you can see scamp here in the background, and this is small
17 damselfishes here in the foreground in the top-left image. On
18 the right, and so this is midway across the mid-Florida Shelf,
19 and you can see a couple of red snapper, three or four in that
20 image. The bottom-left is another habitat in that same system,
21 and the bottom-right is some significant sponge habitat.

22
23 There's quite a bit of this natural live-bottom habitat on the
24 West Florida Shelf, and sometimes we would find red snapper and
25 sometimes we wouldn't. Often, they would be in pretty low
26 densities, one or two or three fish, spread out over this
27 expansive low-relief natural bottom.

28
29 Then, as we move farther offshore, we tend to get higher-profile
30 reefs, and so this is -- These are mesophotic reefs in the top-
31 left off of Pensacola and Destin. On the right-hand side over
32 here, this is along the outer Middle Grounds area on the West
33 Florida Shelf, and, again, we would encounter quite a diversity
34 of fishes on these deeper mesophotic reefs, and sometimes we
35 would see snapper present, and sometimes not.

36
37 Then, at the bottom, we have a couple of examples of artificial
38 reefs in the system, and so, on the bottom-left, it's just a
39 concrete module, and you can see several red snapper around this
40 module.

41
42 Ten years ago, we might see forty or fifty red snapper on this
43 site, but, since 2010 in the Panhandle, where this reef is,
44 we've seen about a 70 percent decline in the red snapper
45 densities in that system, and this is more indicative of what we
46 would encounter today, just a handful of fish, and there's
47 several lionfish around the reef as well, but this is pretty
48 indicative of what we find there. In the bottom-right, here we

1 have a more substantial artificial reef, and, obviously, there's
2 lots of snappers and triggerfish around there.

3
4 All told, we sampled 749 of these natural bottom or unclassified
5 sites and sixty-five artificial reef sites. Among all of these
6 samples, we counted 148,644 individual fish. Of those, 3,850
7 were red snapper, and there were 179 different taxa, 155 to
8 species, ten to genus, and fourteen to family, and so there's a
9 wealth of information that we're just starting to tap into here,
10 and, obviously, that wasn't the objective of the funding agency,
11 Sea Grant, for us to develop fish community structure and
12 habitat associations across the West Florida Shelf, but it's
13 actually one of the more interesting components of the work,
14 from my perspective, and so I'm glad to have had the opportunity
15 to collect these data, and I think it's going to be very useful
16 for lots of applications, both fisheries-specific or
17 independent.

18
19 On the bottom here, you can see the distribution of estimates of
20 number of fish per hundred square meters among these 749 natural
21 bottom sites, and so you can see we have this distribution with
22 lots of zeroes and then this long tail from that, which is not
23 atypical.

24
25 We did throw out one sample, which is mentioned in the report,
26 and I'm drawing a blank as to what its density was, but it was
27 an order of magnitude higher than the other samples, and there
28 were ten other samples within that stratum, and it had an
29 enormous effect on the overall estimate, because of how large
30 the stratum was, and so this kind of speaks to some of the
31 issues raised earlier about numbers of samples and number of
32 unsampled cells in a stratum.

33
34 An argument could be made that, if your samples are randomly
35 distributed, and your variance is what you expected it to be,
36 then that's a perfectly appropriate way to conduct the sampling.
37 In this case, that one sample, which we replaced with a mean
38 among the other samples, had a twenty-million fish impact on the
39 estimate, and we had quite a bit of discussion about that
40 sample.

41
42 My initial perspective was that the data are what they are, but,
43 after talking to Jay and Greg weighing-in, and a big group
44 discussion we had among the team, and how they were handling a
45 couple of the outliers they encountered in Texas, the consensus
46 was developed to remove that sample and present their rationale
47 for that in the report, and so that's what we did, and I ended
48 up changing my mind about that, that sample. Joe, this is kind

1 of the end of the second section of the talk, and I can keep
2 going. There are only a handful more slides in this last
3 section, or we can pause here, whichever you would like.

4
5 **CHAIRMAN POWERS:** Why don't you go ahead and keep going?

6
7 **DR. PATTERSON:** Okay. In the report, and, obviously, in Doctors
8 Christman's, Cadrin's, and Eggleston's draft critiques of the
9 report, this issue of the correlation between the sonar-
10 estimated red snapper and the ROV estimates, and, again, scaled
11 to an area of a hundred square meters. That shouldn't be meters
12 to the minus two, and that should just be square meters on both
13 axes, and sorry about that.

14
15 What you see here is there is a relationship. There's a
16 correlation here, and it's significant, but, overall, the count
17 from the ROV is, on average, nine-times higher than the count
18 from estimates from the sonar, and so we've thought quite a bit
19 about what could be driving this difference, and so one thing to
20 consider, and this figure on the right is a new figure that
21 doesn't show up in the report, and I'm sure we'll include it in
22 the final report to Sea Grant, which is yet to be submitted.

23
24 Here, we have the transects, and these are sonar transects that
25 Kevin Boswell's group would have run, and there were at least
26 three one-kilometer-long transects centered over the top of the
27 reef coordinates from Rob's model, and there were as many as
28 six, but, after the first few days, or the first couple of trips
29 of sampling, we settled on three, to get as much done in a given
30 day as we could with the sonar gear, and so, after the initial
31 sampling, this became sort of the path forward.

32
33 You can see that the dimensions of this -- The area in which
34 this sort of asterisk shape is, it's a square kilometer. Now,
35 all of that square kilometer is not being sampled, but that's
36 the other dimensions, and so that's a million square meters, and
37 the path that you see here is the center black line, and this is
38 the shift path, and then the gray is the estimated width of the
39 sonar cone, about a meter off the bottom, where we can reliably
40 measure, or estimate, fish targets.

41
42 Then the path, you can see the arrows kind of indicate, and the
43 dotted lines are the turns, and then this purple box that you
44 see here, this is the sample unit, and so these are the three
45 units, basically ninety-meters-by-ninety-meters, from Rob's
46 design, and so they're not perfect squares, but I show it here
47 as a square, and, inside that, this is the dimension of the ROV
48 transects.

1
2 The dimensions of the sonar transects doesn't match at all the
3 ROV, right, and it's an order of magnitude greater. The ROV
4 transects are about 1,500 square kilometers, and the sonar
5 transects, on average, are 100,000 square -- Not square
6 kilometers, but square meters. So 1,500 square meters and
7 100,000, and so two orders of magnitude, actually, difference
8 between the two.

9
10 The ROV transects actually match pretty well the dimensions of
11 the sample unit, but the sonar is sampling over a much broader
12 area than what we see in the ROV transects, and so, if we think
13 about this in the context of the habitat, of these sample units,
14 like the purple squares that you see here, with the one with the
15 ROV transects highlighted in a little thicker outline, the area
16 over which the sonar sampling is occurring is about a square
17 kilometer, which is approximately 122 of these sample units that
18 we have from Rob's design.

19
20 We're averaging across a much broader area, and, if we had
21 random placement of our sample units that were selected, such as
22 the highlighted purple square, then we have a random sample of
23 the shelf distributed according to the random forest model.

24
25 However, with the sonar, we're actually averaging across
26 multiple of these units, and so, in the top-right, this image,
27 where we have this more expansive habitat, sort of the central
28 West Florida Shelf habitat, then that probably isn't that big of
29 a deal, because the habitat is more or less continuous, and it's
30 similar throughout that one-square-kilometer area over which the
31 sonar is really sampling.

32
33 The bottom two habitats -- So, in the center one, this is sort
34 of that patch reef habitat that can occur throughout the region,
35 where we just have random carbonate or sponge habitat, and a
36 handful of red snapper may or may not be there, and so, if this
37 is the case, and, through our random draw, we end up with a
38 sample that's right there, like we did in this case, and we
39 count a handful of red snapper, most of the habitat around this
40 is sandy bottom, and so that's what Kevin's sonar is going to be
41 seeing in that particular -- Away from those central
42 coordinates.

43
44 Then, at the bottom here, artificial reefs in the system,
45 especially where they exist in highest concentration in the
46 Panhandle, where the sediments are mostly the MAFLA sand sheet,
47 and we have these quartz silica sediments, and this sort of flat
48 plain that we have on the shelf, and these are true -- The

1 patchiest reef habitat in the entire Gulf, and it's artificial,
2 but it's reef habitat, and it's incredibly patchy.

3
4 We actually had nine stations where we had sonar data and we had
5 the ROV data where we saw red snapper, and so, at these sites,
6 we went back -- We had excluded those from the initial analysis,
7 and we went back and looked at these, and there's actually a
8 thousand-fold greater red snapper estimates from the ROV than
9 from the sonar at these sites, because there is no other reef
10 habitat in that one-square kilometer, unless there happens to be
11 another artificial reef in that area.

12
13 I really think it lends some credence to this issue that the
14 patchiness of the habitat, the scale of the sampling, is driving
15 some of this difference. How that applies to the western Gulf,
16 where the sonar is being used over really truly unconsolidated
17 habitats, I don't know exactly how to put that together yet, but
18 I think the patchiness here is driving some of this, and it's
19 confounded.

20
21 We can't say how much of the snapper we're missing because of
22 the reflectance along the seabed and having to subtract out some
23 of that, but I feel pretty confident that some of the difference
24 that we're seeing here is just driven by the patchiness and the
25 scale of the habitats, and so spatial distribution of habitat
26 versus transect length is probably an issue.

27
28 Acoustic dead zones could be contributed to this, and then,
29 lastly, if we have attraction of red snapper to the ROVs, this
30 would, obviously, bias the ROV counts high. Across the data,
31 watching the fish in the water, the experiments that we did, I
32 don't perceive this to be a large issue, and, again, I won't go
33 back and repeat the caveats of our experiments, but I think it's
34 probably these first two that are playing a larger role.

35
36 In the course of doing this work, we wanted to develop a system
37 where we could get really good length composition data, thinking
38 about integration with the assessment and reconciling our
39 estimates with the assessment and understanding the size
40 distribution of fish from inshore to offshore, et cetera, and,
41 traditionally, we've used a small laser scaler, shown here in
42 the top-left, with this Distance B.

43
44 This is a paper that Steve Garner recently published, and so we
45 developed the stereo camera system to be used with our small
46 video array ROVs. The pictures in the bottom-left, these are
47 some pool experiments, where we adjusted our calibration for
48 this gear, and so the calibration involved this checkerboard

1 pattern and moving it up and down and all around, to get
2 different fixes on the data points, to calibrate the R package,
3 on the backend.

4
5 The figures on the top-right, the panels here, the top row is
6 for a fish that was 280 millimeters, and then, in the middle, we
7 had a fish that was about 550, and the bottom is a fish that was
8 about 890, and you can see the different rows, and these are
9 from the laser scaling. The middle is the stereo camera
10 distance of 409 millimeters, then 610 millimeters, and then 762
11 millimeters, and so we wanted to see -- The farther you set your
12 cameras apart, and they're inset ten degrees, but, the farther
13 you set them apart, the higher the accuracy, and, typically, the
14 better the precision of your size estimates.

15
16 I will actually point out too that, going from the lightest
17 shading to the darkest shading for each of these distances, one
18 meter to five meters, from the ROV to the target, the difference
19 shadings are angles from perpendicular that we're viewing the
20 fish, and so, the greater you depart from perpendicular, the
21 more bias you have, and you can see that, as long as we keep
22 this less than twenty degrees, then we meet our threshold of
23 about five degrees of bias.

24
25 Amazingly, with the stereo camera system, even set at 409
26 millimeters, most of the samples were well within our five
27 degrees of bias tolerance, except at five meters, and we start
28 to get some departure at the 409 millimeter distance, but the
29 cameras that we deployed in situ, to take measurements, we had
30 the setting at about 500 millimeters, because we felt like that
31 would capture the bulk of the issue here with the potential
32 bias, but, also, it would enable us to get the cameras in close
33 enough that it wouldn't affect the stability of the ROV, and, at
34 500 millimeters, we found sort of our sweet spot.

35
36 We also then scaled these PVC pipes in situ, and so these are
37 multiple measurements taken at different distances away from the
38 pipe on deployments off the Panhandle for our sampling, and so
39 you can see that all of these are within our five degrees of
40 bias, and mostly a slight positive bias, and we used these data
41 then to produce a distribution to then correct for the estimates
42 that we derived of fish that we actually observed.

43
44 This is an image from Steve's paper that shows a school of
45 vermilion snapper, and this fish right here in the center,
46 Number 4, is one where the laser scaler actually hit it
47 broadside, so we could estimate the length of that fish, and,
48 among the other fish on the screen, we had nine fish that we

1 could estimate using the stereo cameras, and the two stereo
2 cameras are shown in Panels B and C. Panel A is actually this
3 top camera on the ROV.

4
5 We're able to greatly enhance the number of length measurements,
6 estimates, that we can take using this stereo camera system with
7 the small ROV, and the result of that is this distribution,
8 which we were able to scale 637, or 16.5 percent of all of the
9 red snapper that we observed.

10
11 We have this pattern of quite a drop-off after about 400
12 millimeters, and then lower numbers of fish and sizes above 500
13 millimeters, and so could this be an issue of avoidance, a
14 potential selectivity issue of the gear, or is this related to
15 the fact that we have a rebuilding snapper population in the
16 West Florida Shelf and fish in the size range from 700 to 1,000
17 millimeters, that could be between ten and fifty years old, just
18 don't occur in that system, to the extent that they will be as
19 the age composition recovers over time?

20
21 We don't really have the information to tease that apart, and I
22 do want to highlight a comment that Dr. Cadrin had in his review
23 of the report, when he went back to the stock assessment and
24 talked about the biomass distribution estimates in the east and
25 the west and how the biomass distribution in the west was
26 estimated -- The biomass amount in the west was estimated to be
27 so much higher than in the east.

28
29 The metric for that is eggs in the assessment, and so it's an
30 SPR measurement that's being utilized as a measure of spawning
31 stock biomass, and so it's kind of a disproportionate issue,
32 because most of these are small, young fish here that we're
33 showing in the east, again sampling bias potential
34 notwithstanding, and so these fish aren't going to represent the
35 same egg distribution, or egg amounts, as what we see in the
36 west, where we have a much more filled-out age composition, age
37 distribution, in that system.

38
39 We did see some of these really small fish, and, as I mentioned
40 earlier, these fish really start recruiting to reefs when
41 they're about 250 millimeters, and so this would argue that they
42 probably don't fully recruit to the reefs until they're about
43 300 or 350 millimeters, but we know they start showing up later,
44 as they're entering their second year of life, but we had these
45 really small fish that were likely age-zeroes, and so, because
46 we had all of this age composition, or size composition, data
47 from Florida, we thought we really needed to address the
48 potential for these fish affecting our estimate, and that was

1 meant to be an age-two-plus estimate.

2
3 We computed a growth function, based on some older data and some
4 more recent data for red snapper in Florida waters, and the
5 different distributions that you see here are for fishes
6 estimated to be one-year-old, 1.25, 1.5, 1.75, 2.0, and 2.5
7 years.

8
9 Now, a red snapper, on average, is going to be 1.5 years old
10 January 1 of its second year of life, because they have -- Most
11 of the spawning happens in mid-summer, and so we settled on a
12 cutoff here at 250 millimeters, and some of the reviewers
13 pointed out that this might have been a conservative cutoff,
14 given the fact that 40 percent of the fish that are 1.5 years,
15 estimated to be 1.5 years old, are actually less than this
16 threshold.

17
18 However, if we drop the threshold down to 225 millimeters, then
19 we have a lot of fish that are less than 1.5, again, which is
20 that age-two cohort at January 1, and that wouldn't meet our
21 criterion of age-two-plus, and so we had a lot of discussion
22 about this, and we thought this was probably the most pragmatic
23 solution, was to set our threshold at 250 millimeters, and so
24 that was the cutoff, and then we went back and recalibrated, re-
25 estimated, what our density estimates were, and Rob produced the
26 population abundance by stratum, and then for the Florida Shelf,
27 and then Sean also used this approach in Alabama.

28
29 Obviously, thanks to the funding agency, Mississippi-Alabama Sea
30 Grant, for allowing us to do this work, funding this work. Then
31 the captains and crews of lots of participating vessels up and
32 down the west coast of Florida, and they were really
33 instrumental in performing the work.

34
35 Jess Van Vaerenbergh and Jordan Bajema were the two folks that
36 accompanied Joe and Steve on most of the trips, and we had quite
37 a few different NOAA Fisheries collaborators, talking to Matt
38 Laretta and John Walter about some of the assumptions and how
39 to go about some of our bias checks, and then Matt Campbell and
40 his crew, Adam Pollack and others, and Pascagoula, kicking
41 around ideas about how we could actually test some of this.

42
43 Then the Grants Administration folks at the UF School of Forest,
44 Fisheries, and Geomatic Sciences were really instrumental in
45 helping us move money around and get invoices paid. There were
46 lots of volunteer anglers for different components of this.
47 Peer reviewers and editors for the couple of journal submissions
48 that we've had so far, and then, obviously, the external and SSC

1 reviewers, whose comments have already and will continue to
2 improve our work, and so that's a wrap.

3
4 **CHAIRMAN POWERS:** Thank you. Let me open the floor to questions
5 for the issues that Will has brought up in the presentation.
6 Steve Cadrin.

7
8 **DR. CADRIN:** Thank you, Mr. Chair. Will, thanks to you and your
9 team and the broader group for a great presentation and an
10 impressive report. I know the SSC is going to be focused on
11 catch recommendations in the near-term, or this week, but I
12 completely agree with what you said in your presentation, and I
13 expect this is going to be a goldmine of information to use for
14 a lot of different applications for years, to study the biology,
15 but one clarification on the comparisons of the SEDAR 52
16 estimates to the Great Red Snapper Count.

17
18 I was looking through the SEDAR 52, and I was a little
19 challenged to find a direct comparison of age-two abundance, and
20 so I bothered Matt Smith to send me the Stock Synthesis output,
21 and so my comparisons were based on the age-two-plus abundance
22 from both, and so I didn't really get into the egg fecundity
23 currency on that, but my question to you is based on the
24 comparisons of the ROV and sonar. From your perspective, can
25 those results, and those comparisons, be used to estimate a
26 detection for sonar?

27
28 **DR. PATTERSON:** First, my apologies, Steve, for misappropriating
29 a comment to you that was inaccurate, and I actually didn't
30 catch that, and so that was my mistake. Sorry about that. The
31 answer to your question is I don't think so. I don't think so,
32 because we don't have perfect knowledge of the habitat, right,
33 and so we can't -- There are some confounding effects here that
34 we can't pull apart with the information we have.

35
36 If we went back out to these systems and we felt confident that
37 we were right on top of the numbers that we sampled before, and
38 we could do some broader surveys, and collect new information,
39 then perhaps we could examine the detectability of the sonar.

40
41 My group is actually leading the new study that just was
42 announced in the Atlantic to estimate the population abundance
43 of red snapper in that system, from the Carolinas down through
44 the Keys.

45
46 There are a couple of different methods that are being used
47 there, one of which is close-kin mark-recapture, and that's
48 being led by Dave Portenoy at Texas A&M Corpus Christi, but

1 there's another integrated modeling approach that involves the
2 camera trap survey that MARMAP and SEFIS does combined into
3 SERFS, and then we're going to be doing some ROV sampling over
4 there, where we're going to do longer transects, and we're also
5 -- We didn't do the longer transects or worry about
6 detectability in Florida, because the water is so clear, and we
7 just didn't think it was going to be an issue, but it can be an
8 issue on the east coast, in different areas at different times
9 of the year.

10
11 There, we're going to do some distance sampling, to try to
12 estimate detectability, flying the ROV at different heights off
13 the bottom and different water clarity conditions, and I think,
14 if you combine that approach with the sonar, especially if you
15 had them running at the same time, then you could perhaps look
16 at detectability of -- Because you could estimate the
17 detectability of the ROV based on the distance sampling, and, if
18 you then assume that that's an unbiased estimate, detectability,
19 then you could back-out what the detectability then would be
20 with sonar, but I think you would have to do that type of
21 approach to really get at that question.

22
23 **DR. CADRIN:** Great. Thanks. Well, hopefully we can have that
24 South Atlantic red snapper meeting live.

25
26 **DR PATTERSON:** Yes.

27
28 **CHAIRMAN POWERS:** Thank you. Mary.

29
30 **DR. CHRISTMAN:** Thank you. Thank you, Will. That was very
31 interesting, but now I have a bunch of questions about sample
32 sizes and things of that nature. You said sixty-five artificial
33 reefs were selected by Rob that you sampled, and is that
34 correct?

35
36 **DR. PATTERSON:** Actually, it was nine, or maybe fourteen it was,
37 that Rob selected, and we were able to add some data from other
38 work we were doing in the Panhandle, and so we randomly selected
39 from a broader number, a larger number, of reefs to be included
40 into this estimate.

41
42 **DR. CHRISTMAN:** Okay, and so that -- How do you explain that --
43 In the text, you say it was sixty-five, but Table 6 shows
44 eighty-four.

45
46 **DR. PATTERSON:** I don't know. I didn't put together the table,
47 and so I would have to go back and look. I'm sure there are
48 going to be other situations where we transposed something

1 incorrectly, but I can't answer that. I don't know.

2
3 **DR. CHRISTMAN:** Okay. The next question I have is, when you
4 talk about natural bottom, what you mean is the uncharacterized
5 bottom, the UCB?

6
7 **DR. PATTERSON:** When I talk about natural bottom, it's showing
8 my bias, and that is there are no artificial reefs there, and so
9 it can be sand, or it can be reef, or it can be high-profile
10 reef, or ledge, but simply -- I should use the vernacular of the
11 study and just call it uncharacterized. I have a hard time
12 doing that in Florida, because some of it has been characterized
13 and some of it hasn't, but sorry to add confusion to this, but,
14 really, I'm talking about this uncharacterized bottom.

15
16 In Florida, we had artificial reefs and we had uncharacterized
17 bottom, which, for people listening, or people that fish, or do
18 research in Florida, they may think that's kind of silly,
19 because there's so much area that's been mapped and is known,
20 but the problem is, from a stratification point of view, all of
21 it hasn't been mapped, and so we knew where some stuff was, but
22 not everything, and so we couldn't use a habitat map to stratify
23 bottom.

24
25 **DR. CHRISTMAN:** Okay, but that leads to lots of confusion, for
26 me at least, with respect to where the sample sizes wound up.
27 If you look at Table 6, it shows uncharacterized bottom, and
28 there were 530 observations, and, for natural bottom, there were
29 505, and so is one a subset of the other, or did you take the
30 uncharacterized bottom, the 749, and remove some that were post-
31 hoc stratified to natural hardbottom?

32
33 **DR. PATTERSON:** We provided Rob the habitat characterizations
34 after we did the ROV sampling, and so we didn't know, heading
35 into it, what the habitat was in those areas, and we had some
36 reasonable guesses, given, geographically, where samples were
37 placed, but we provided the information to Rob on the backend,
38 as to what we actually encountered when we went to the
39 coordinates of those 749 sites.

40
41 **DR. CHRISTMAN:** Okay. So, somewhere along the line, either some
42 sites were double-counted or something, because 505 and 530
43 don't add up to 749, and so we need to figure out what's going
44 on there.

45
46 **CHAIRMAN POWERS:** Along those lines, if I may interject, I'm
47 unclear -- I mean, in the original design, you had three basic
48 strata of the artificial reef, unclassified bottom, and natural,

1 and so where does the natural come in, in the case of Florida?
2 Are you saying that all of what you called -- Well, what you
3 just reported on, you say it was basically uncharacterized
4 bottom, and so where is the natural stratum? Where does that
5 information come from?
6

7 **DR. PATTERSON:** I am going to defer to Rob for that question,
8 because I don't want to misinterpret, or misstate, that design
9 aspect, and so if Rob is on and he could field that.

10
11 **DR. CHRISTMAN:** Probably not.

12
13 **MS. MATOS:** He's not on right now.

14
15 **DR. CHRISTMAN:** So that's something that, Ryan, maybe you could
16 make a note that we need to get Rob to clarify. So where did
17 the 22,800 square kilometers of natural, presumably hardbottom,
18 come from then? That was left over from the prior work that was
19 done in Phase 1?
20

21 **DR. PATTERSON:** I thought I just heard Rob's voice.

22
23 **DR. AHRENS:** Yes, I'm on.

24
25 **DR. CHRISTMAN:** Rob, can you explain why Table 6 shows 505
26 natural bottom and 530 uncharacterized bottom samples?
27

28 **DR. AHRENS:** I cannot.

29
30 **DR. CHRISTMAN:** Okay, and so we need to find out why those
31 numbers aren't right.
32

33 **DR. AHRENS:** For Florida, all bottom was uncharacterized to
34 allow -- For some of the tables being created, we took the high-
35 probability random forest category habitat as the natural
36 bottom.
37

38 **DR. CHRISTMAN:** But still that adds up to more than 749 samples.

39
40 **DR. AHRENS:** What happened in the sample sizing here, I'm not
41 100 percent sure, and that would have to be looked into.
42

43 **DR. CHRISTMAN:** So let me make sure that I understand you
44 correctly. You did not post-stratify based on what was observed
45 in the videos?
46

47 **DR. AHRENS:** I did not.
48

1 **DR. CHRISTMAS:** You stratified hardbottom as the high-
2 probability random forest class, if it was uncharacterized
3 bottom?
4
5 **DR. AHRENS:** Yes, and the decision was made, to allow for
6 comparisons where natural hardbottom was known in regions, that
7 we would use the category of high-probability as a natural
8 bottom comparison.
9
10 **DR. CHRISTMAN:** I'm sorry, but could you say that again, because
11 that doesn't sound like what I am trying to -- If 749 sites were
12 selected on what was called internally in Florida natural
13 bottom, some of which is -- All of which is basically
14 uncharacterized bottom, how did you wind up with any hardbottom,
15 for estimation purposes? That's what I am trying to figure out.
16
17 **DR. AHRENS:** We selected the high-probability habitat as the
18 hardbottom.
19
20 **DR. CHRISTMAN:** So any intersection of uncharacterized bottom
21 with random forest high-probability bottom, that then got
22 labeled as natural bottom?
23
24 **DR. AHRENS:** Yes.
25
26 **DR. CHRISTMAN:** It was then removed from the remaining
27 uncharacterized bottom?
28
29 **DR. AHRENS:** That was done by others, and so I'm not exactly 100
30 percent sure how these exact numbers were derived, and Greg, or
31 someone else, could answer that question.
32
33 **DR. CHRISTMAN:** Okay. Then one other question related to this
34 high-probability random forest class. Which cutoff did you use
35 for high-probability? Was it 0.77 or 0.989?
36
37 **DR. AHRENS:** For the random forest?
38
39 **DR. CHRISTMAN:** In Florida, specifically.
40
41 **DR. AHRENS:** Well, in Florida, I believe it was 0.86.
42
43 **DR. CHRISTMAN:** Okay. It's listed in the report as 0.989 is the
44 cutoff between mid and high-probability.
45
46 **DR. AHRENS:** Let me -- It's 0.86, and so zero to 0.56 was low,
47 0.56 to 0.86 was mid, and 0.86 to 1.0 was high.
48

1 **DR. CHRISTMAN:** All right, and so the one thing we have to find
2 out is why these two numbers don't add up to 749.

3
4 **DR. AHRENS:** Yes, and I will start looking into that and
5 hopefully have an answer for you shortly.

6
7 **DR. CHRISTMAN:** Okay, and, just to clarify something with you,
8 since you're on, the document says that Florida's shelf was
9 divided into three regions, and I'm not sure if was pre or post-
10 stratum, but the graphic, Figure 5, shows five regions, and so,
11 when you were doing your random selections, were you using three
12 regions, five regions, or no regions?

13
14 **DR. AHRENS:** For Florida?

15
16 **DR. CHRISTMAN:** Yes.

17
18 **DR. AHRENS:** Florida initially was two regions, the Bend area
19 and then the West Florida Shelf. For the analysis that was
20 later, the West Florida Shelf was split, roughly at Tampa, into
21 a north and a south, to try and further control variance.

22
23 **DR. CHRISTMAN:** So do you know why Figure 5 shows five regions
24 then?

25
26 **DR. PATTERSON:** That's my fault, Mary. I didn't coordinate that
27 with the post-stratification, and the five regions was simply
28 how we handled sampling in my group, how we divided stuff up.

29
30 **DR. CHRISTMAN:** That's what I thought happened, and I just
31 wanted to clarify how the actual allocation of observations was
32 done, and it was done not based on five or three, but on two.

33
34 **DR. AHRENS:** Yes.

35
36 **DR. CHRISTMAN:** Okay. Thank you. Let me see. I think those
37 were just the sample size issues that I had. Thank you. I will
38 get off now.

39
40 **CHAIRMAN POWERS:** Okay. Thank you. Doug Gregory.

41
42 **MR. GREGORY:** Thank you. Will, I understand your discussion of
43 the comparison between the sonar and the ROV, and I may have
44 misunderstood something that I read in the overall report, but
45 was that nine-times difference used to adjust or upgrade the
46 sonar estimates in the western Gulf, where there was little or
47 no visibility? Maybe somebody else would be better to answer
48 that, but I thought that I read somewhere where the data from

1 your study was taken to adjust actual sonar readings in the
2 western Gulf.

3
4 **DR. PATTERSON:** Not to my knowledge, Doug, but Greg or Jay could
5 probably speak to that better.

6
7 **DR. STUNZ:** Doug, that nine-fold difference was not -- We made
8 no adjustments in the western Gulf for that.

9
10 **MR. GREGORY:** Okay. Thank you.

11
12 **CHAIRMAN POWERS:** Thank you. Kai.

13
14 **DR. LORENZEN:** Thanks, Will. I was equally intrigued by that
15 comparison between the sonar and the ROV, and particularly
16 because you really looked very carefully at what's involved and
17 the influence of habitat, for instance, and my question is sort
18 of a generalization of Steve Cadrin's, I guess, and I am
19 wondering -- From your perspective, and that of the other PIs,
20 would it be possible to actually develop reasonably robust sort
21 of intercalibrations between these different methods, and not
22 just hydroacoustics versus ROV, but ROV versus the C-BASS and so
23 on, because, if that could be done, obviously it would be huge,
24 because it would then directly compare abundance estimates
25 between strata, and it would also, arguably, provide a more
26 meaningful overall abundance estimate, but I am really not sure
27 whether -- I am assuming there would be additional funding for
28 that, and if that's something that could realistically be done,
29 or is it essentially not possible to do that? Thanks.

30
31 **DR. PATTERSON:** I think it is possible. It's a challenge,
32 because, any time you enter the system, you change it, and so,
33 when you tow one gear past an aggregation of fish, you're going
34 to affect them, and so there are issues there to sort out, but
35 that could be handled, perhaps, through randomization.

36
37 I think, for gears that are up in the water column, the
38 comparisons between sonar and either a towed camera or an ROV
39 flying long transects, I think are probably the easiest to make.

40
41 We thought quite a bit about these calibrations ahead of time,
42 but I had tunnel vision about what was happening in Florida and
43 how we tried to -- I was mostly concerned about the ROV in that
44 system, but, taking a step back, I think there are some
45 approaches that could be done on large scales, and it would have
46 to be done in multiple systems, and it would have to be done in
47 systems, perhaps, where the visibility was pretty high, or at
48 least high enough over a range of visibilities where you could

1 estimate detection probabilities.

2
3 That would be key, but I do think there are some approaches
4 here, and they wouldn't be cheap. It would take a significant
5 effort, and it would have to be done in different regions and to
6 develop distributions that could perhaps be used as priors in a
7 type of calibration, and one value is not going to pop out of
8 this, I don't think.

9
10 **DR. LORENZEN:** Thank you. That makes sense, but I do think -- I
11 think maybe funders are listening, and it would be something
12 that could add a lot of value to the information that's already
13 been collected. Thanks.

14
15 **DR. PATTERSON:** Thanks, Kai. I agree with that, and, also, as
16 National Marine Fisheries, or NOAA Fisheries, is examining the
17 surveys that exist in the Gulf, and we're going through this
18 process in the Atlantic, with the camera trap versus ROV and
19 some intercalibrations there, and what's the effective sampling
20 area, and Nate Bacheler and Kyle Shertzer and Jeff Buckel and
21 others have been working on those questions for a little while
22 now, but I think there's a lot of potential there. Again,
23 trying to optimize surveys and get as much information as
24 possible, those intercalibrations would be really important.

25
26 **DR. LORENZEN:** Thank you.

27
28 **CHAIRMAN POWERS:** Thank you. Luiz.

29
30 **DR. BARBIERI:** Thank you. Will, thank you for that very
31 thorough presentation. It was really helpful. Most of my
32 questions really have been already asked, and so my points are
33 really, I think, some statements that I want to make while we
34 have this table there and we're in the middle of this
35 discussion.

36
37 I see this issue that you brought up, the sonar versus ROV
38 estimates, and I think that brings up the point that the scale
39 and the resolution of these different sampling gears that are
40 being used, and that we're trying to integrate those data into
41 something that is an absolute abundance, generate an estimate of
42 absolute abundance, becomes extremely difficult, because you're
43 dealing with different levels of detectability, and that scale
44 and resolution of the different gears. It's something, I think,
45 for the committee to think about as we look at that estimate of
46 absolute abundance.

47
48 Then another point, Will, regarding that Table 6 that's there on

1 the board, is, again, I have to bring up, again, the issue of
2 sampling fractions, and so you -- Looking at that map that you
3 showed for the distribution of your samples, I mean, you covered
4 a vast area, and you sampled both the northern, middle, and
5 southern portions of the West Florida Shelf, but still your
6 sampling fraction is just about 1 percent, and so add to this
7 the fact that we have this very imperfect knowledge of the
8 habitats that we're expanding these numbers to, and not just the
9 quality, but the quantity of those habitats that are being used
10 as expansion factors for the absolute abundance numbers, and
11 it's hard for me to reconcile that into my brain and see how
12 that would work. I will just stop there, and I just wanted to
13 make those points while you were on this specific topic. Thank
14 you, Mr. Chairman.

15
16 **CHAIRMAN POWERS:** Thank you. We have Steve Murawski and then
17 Greg Stunz, and then I would like to stop the questioning there,
18 after they get through. We have about an hour left, and I would
19 like to spend that hour to Sean Powers and the Alabama
20 estimates, their part of the study, and so that's my goal, is to
21 finish after Alabama, and so let's go on then with the questions
22 or comments from Steve Murawski and then Greg Stunz.

23
24 **DR. MURAWSKI:** I am just reacting to Kai's question about
25 intercalibration of the gears, and I do think that that's a very
26 productive way to go. You've got these long-term studies. For
27 example, FWRI, and also NMFS, have the still cameras, basically
28 360 cameras, now, but a lot of samples over a lot of different
29 habitats, and a lot of experience with that.

30
31 Of course, the important thing, in terms of going from relative
32 indices to absolute, is understanding the zone of influence of
33 the baited traps, et cetera, but that's possible to do. I mean,
34 as Will's work points out, you have to be careful, in terms of
35 actually understanding all the factors that are influencing the
36 biomass trends and the numbers that you see, but I do think it's
37 possible.

38
39 The NMFS study looking at the untrawlable habitat did a lot of
40 work, in terms of the logistics of setting up field samples, and
41 I do think it's worth a go. In fact, Ted Switzer and Sarah
42 Grasty have an experiment going on later this year, where we're
43 going to try to intercalibrate the fixed cameras and the towed
44 video as well, to see if we can try to sort out some of these
45 issues, and so I think it's a very good investment in the
46 already-paid-for infrastructure of surveys, to try to understand
47 how to scale them up, and I will leave it at that.

1 **CHAIRMAN POWERS:** Thank you. Greg.

2
3 **DR. STUNZ:** To Luiz's point, but also regarding this
4 calibration, and, Luiz, we hear you, I think, the team, loud and
5 clear, and we spent a lot of time talking about your issues, but
6 avoiding trying -- You know, there isn't simply just one gear
7 that works in all these regions, and that's the big problem, and
8 so that leads to calibration and Kai's points.

9
10 Of course, yes, it's critically important for calibration, and
11 it's very expensive and very time consuming, but, of course, it
12 has high value, well beyond we discovered the scope of this
13 study, but, with all the other studies going on, maybe we can
14 chip away at it piece-by-piece, or it looks like Steve is on it
15 with some of his other studies, but it's clearly something that
16 needs to get done, and it's just our hands are a little bit tied
17 with what we are up against with this study to further
18 contribute time, effort, and resources to calibrations, which we
19 couldn't do at this point.

20
21 **CHAIRMAN POWERS:** Okay. Thank you, and thank you, Will, for the
22 presentation, and so let's move on then to Sean Powers, who is
23 going to be talking about Alabama/Mississippi, and we'll turn
24 the floor over to him. Sean.

25
26 **ALABAMA/MISSISSIPPI**
27

28 **DR. POWERS:** Thank you. I think Liese is going to drive this
29 presentation. We're going to do this in several parts, and I am
30 going to lead off with some background, over the overall design
31 and some of the habitat mapping we have and why it's different
32 from the other regions.

33
34 John and Liese are going to follow with some of the specifics of
35 the depletion methodology and then what we did in the natural
36 hardbottom, and then both Liese and I are going to try to
37 control how much Hoenig talks. The overall team you see here,
38 and Marcus Drymon participated as well, and all the peer work
39 was led by my lab manager, Crystal Hightower.

40
41 These are our three strata, and so we have a lot of artificial
42 reef in Alabama, and also, to some degree, in Mississippi, and
43 we'll talk about the depletion methodology, but, essentially,
44 it's a combination of video and depletion. All of our video was
45 done by ROV, using the same ROV, and it's slightly larger than
46 Will's, and we also looked at natural hardbottom, and we did
47 that by the same ROV and the same similar approach that we used
48 in artificial reefs.

1
2 We originally had planned to do depletion on natural hardbottom,
3 but we weren't confident in the results there, and the snapper
4 were in a lot lower density. We did some pilot work, and John
5 might explain that in further detail, but we'll go over --
6 Essentially, we used our counts in just the area of bottom to
7 extrapolate our number.

8
9 The uncharacterized bottom, we originally planned and attempted
10 to actually do some innovative stuff with bottom longlines and
11 to see if we could figure out the area fished of bottom
12 longlines, and that didn't work out for red snapper, and so
13 Steve Murawski helped us out, and we were able to provide some
14 additional funding for Steve to cover the uncharacterized bottom
15 in Mississippi and Alabama.

16
17 Natural hardbottom for us is hard reefs. In our case, most of
18 those reefs have significant elevation to them, and
19 uncharacterized bottom is sand and mud and whatever unmapped
20 features are there.

21
22 We have been doing this in Alabama for a while, trying to get at
23 an absolute abundance. Our system lends itself a little easier
24 to that, because it's a little more tractable, and we've had a
25 fair amount of investment from the Department of Conservation
26 and Natural Resources, the Marine Resource Division, and we've
27 been doing this since about 2011, and, obviously, with
28 improvements over time, but we also have it where we do a before
29 and after snapper season, and we're trying to estimate catch
30 from our absolute abundance estimate, and so this project, for
31 us, is an extension of what we've been doing for a while.

32
33 Let's focus on the map on the right-hand side first, and, here,
34 you see kind of the overview. The blue areas you see are the
35 Alabama reef permit areas, and so that is a unique feature, I
36 think, of Alabama, and that is -- That is an area that's
37 approved by the Corps of Engineers for planting artificial
38 reefs, for lack of a better word, and both the state and private
39 parties are allowed to put artificial reefs in there.

40
41 Of the reefs, and there is thousands of reefs, and our estimates
42 are about 20 percent are put there by the state in Alabama, and
43 so those locations are known and published. 80 percent are put
44 in by private individuals, and they are usually prefab, and now
45 they're prefab approved pyramids, or cages, or a variety of
46 things.

47
48 Technically, you need a permit. You need to go to the Alabama

1 Marine Resource Division and get a permit, a \$25.00 permit, to
2 put something out there, but you do not have to give the
3 location of your reef. You can plant it wherever you want in
4 that pre-permitted area.

5
6 That permit enforcement has been very good in recent years, but,
7 historically, it wasn't, and there was a lot of illegal
8 placement of artificial reefs, and so the upshot of that is we
9 don't know how many reefs were there. We know how many permits
10 were issued and how many the state put in, but we know there's a
11 lot more structure, artificial structures, out there than that.

12
13 What we did is designed a side-scan survey where we divided the
14 whole permit area into two-kilometer-by-two-kilometer grids, and
15 then we selected a subset of those, proportionally allocated by
16 depth, and so 50 percent of our grid selection was in shallow,
17 33 percent mid, and 17 percent deep, and we defined those strata
18 in the report.

19
20 Then we side-scan it, and we find the structures in it, and, for
21 some of our surveys, we randomly choose structures within those
22 grids, because there is multiple structures, particularly in the
23 shallow and mid-depth areas, where there is a lot of artificial
24 structure.

25
26 We also find natural reefs, and there is not a whole lot of
27 natural reef in the shallow and mid-depths in Alabama, and,
28 really, what you see there is that the colorful multibeam
29 imagery is from the USGS, and they mapped the Alabama Alps and
30 Pinnacle regions, which essentially are around that seventy-
31 meter isobath. They extend somewhat into Mississippi, or at
32 least have been mapped somewhat into Mississippi, and mapped
33 through most of Alabama, and so that's where most of our natural
34 reef is.

35
36 We do get scattered natural reef in the permit zone, but the
37 majority of it is in that area that the USGS mapped, and I will
38 show you some video of it in a second, but, as the name
39 indicated, Alps and Pinnacles, these are more or less structures
40 with decent vertical relief.

41
42 The purple area is the Mississippi artificial reef areas, and
43 the one with the red box we included, and we didn't include any
44 of the real shallow-water ones, the inshore reefs, because they
45 don't usually have snapper on them, and the Alabama area has
46 about 300 known reefs, and so we will talk about the selection
47 in a second and how we chose those grids.

1 That leaves a large area of Mississippi and Alabama, and so, if
2 you go west of those blue polygons, you get into an area that is
3 not permitted for reefs. Well, we discovered, through talking
4 to fishermen, and also through the SEAMAP trawl survey, where
5 they reported snags, there is a lot of structure out there as
6 well, a lot of artificial structure that has been either
7 illegally dumped out there, or has fell off of ships, or who
8 knows how it got there, but there is a lot of structure out
9 there as well.

10
11 In 2015, we gridded that whole area in western Alabama and
12 started to include that in our side-scan survey. Again, the
13 black-filled areas are areas that we have mapped in those two-
14 kilometer-by-two-kilometer grids. Some of those areas, we have
15 revisited a couple of times, to see the fate of the materials
16 that were put in there, but, from that large pool of sample
17 sites, we gathered all of the contacts from the side-scan, and,
18 to be a contact in the side-scan, you have to have at least a
19 half-a-meter of vertical relief and cover at least four meters
20 squared of bottom.

21
22 Most structures are larger than that. The typical artificial
23 reef covers seventeen to twenty meters squared, and it has about
24 one to 1.5 meters relief, and so sizeable enough to be detected
25 on the side-scan without a problem, but definitely not huge,
26 compared to some of the natural reef features that we have seen.

27
28 I think that's, essentially, our survey, and so our knowledge of
29 the habitat is very different from the other states. There is
30 no database that contains all of these artificial reef numbers.
31 When we started talking a lot about how to do this, we also had
32 a little bit of a problem, in that some of these data are
33 confidential, because somebody put out that reef, and they
34 wouldn't like the state reporting their location, and so we had
35 to keep some of those numbers internal, for site-selection
36 purposes.

37
38 This is a typical artificial reef in Alabama, and you see all
39 the way back, and I think that's either a chicken coop or a
40 chicken transport device, and that's popular, or an abandoned,
41 rusted-out cargo container, and I can't tell from this, but this
42 shows why we decided to use the depletion approach. This is all
43 snapper, for the most part, and then you see the scaling lasers
44 that were used.

45
46 If we were to do some type of perimeter survey, or even you can
47 see that there's fish up in the water column, we were worried
48 about double-counting fish in the system, where we get these

1 large, large densities, these hundreds of red snapper around a
2 small structure.

3
4 We have, like I said, depending on the estimates, 10,000 to
5 13,000 of these structures out there, and this is why we adopted
6 the depletion methodology, coupled with the ROV index.

7
8 The next video shows you what happens with most of our natural
9 reef, and, here, you can see that there are prominent features,
10 and it's not low-relief banks, and it's prominent features
11 coming up, and we do get scattered boulder fields, and we get a
12 variety of things, but most are these prominent features, and
13 you can see this one has an extraordinary diversity, compared to
14 the artificial reef, but also a fair number of red snapper as
15 well.

16
17 Just to drill down more into how we got the sites, what you see
18 is that same map, but, on the left, you see a typical side-scan
19 sonar that reports the contact, and so each randomly-selected
20 grid can have randomly-selected contacts in it, and I will
21 explain that.

22
23 To get more comparable to the other studies, we didn't use that
24 two-stage design, and we pulled all of the contacts that we had
25 and then randomly selected the contacts from the entire pool.
26 The contacts are usually, like I said, reef pyramids or small
27 groups, and we do occasionally get large structures, like this
28 bridge span, this sunken bridge span, but we don't have many
29 platforms or sunken structures. Most of it are small, nowadays,
30 prefabricated structure.

31
32 We do know the type of structures we have. Like I said, most
33 are prefab pyramids, and sometimes we can't classify them on the
34 ROV, maybe because they're buried a little bit, or maybe because
35 they're just not recognizable, but chicken coops and pyramids
36 are the biggest ones, and we have a series of other concrete
37 pipes and bridge rubble, tanks, wrecks, old cars. In the 1980s
38 and 1990s, it was pretty much a free-for-all, and, now, it's
39 very much controlled, the structures that are there, and the
40 state is trying to do -- To put in some spatial planning
41 procedures to spread out effort and to make sure there is enough
42 artificial reefs, looking at the fate and replacement schedule
43 for many of those artificial reefs.

44
45 That's the background into why our sampling universe needed to
46 be different. Like Greg said, every region has its own nuances,
47 and ours was this, that we had lots of artificial reefs, and
48 probably the greatest concentration of them, but their locations

1 are not publicly known, and so we relied on our previous
2 surveys.

3
4 The natural bottom, we do have, from the USGS, and, like I said,
5 it is naturally occurring more higher-relief hardbottom, and so
6 I think, at this point, John is -- With that introduction, John
7 is going to take over and talk about the technique that we used
8 on artificial reefs and then natural reefs.

9
10 **DR. JOHN HOENIG:** Good afternoon. Sean wanted me to keep this
11 as short as possible, and, to tell you the truth, I would be
12 happy to just sit here and make noises like a turnip, but he
13 also wanted me to cover some material, and so I guess I will
14 have to speak a bit.

15
16 The basic idea is that the abundance is the amount of habitat
17 times the amount of fish per unit habitat, and, from 2011 to
18 2019, we've had an ongoing survey, where they have been going to
19 randomly-selected grid cells and mapping them, and, to date, 432
20 out of 1,399 cells have been mapped. In the report, at one
21 place, it says that 22 percent have been mapped, and that's an
22 error. It's 432 divided by 1,399, and that is 31 percent.

23
24 For each of the depth strata in Alabama, we have calculated the
25 mean number of artificial reefs per grid cell, and so,
26 basically, those 432 cells that have been mapped, each one has a
27 number associated with it of how many reefs were seen there, so
28 we can get the average of that, and we can take the variance of
29 that, as for a simple random sample, and that's formula on the
30 right, and note that there is a finite population correction,
31 because, if we had mapped all 1,399 cells, then we would know
32 how many reefs are out there, but we only did 432 of them, or 31
33 percent, and so you have this finite population correction,
34 which basically reduces our variance by 31 percent.

35
36 Then how many reefs are there total in Alabama, or in a stratum,
37 and you take the average number of reefs per grid cell, and you
38 multiply it by the number of grid cells, and you get your total
39 number of reefs in the stratum, with a variance of just N
40 squared, the number of grid cells squared, times the estimated
41 variance of the mean.

42
43 Here is the results, and we were working in waters ten to 150
44 meters depth, and we actually did it separately for six regions,
45 three of them in the Alabama Artificial Reef Zone and three of
46 them outside the Alabama Artificial Reef Zone. For purposes of
47 estimating the abundance of red snapper, we collapse that down
48 to just three strata, shallow, medium, and deep, but what I

1 wanted to call to your attention was observations outside the
2 reef zone are to the west of the artificial reef zone, and so we
3 had 691, 1,142, and 536 reefs, which sums up to 2,369, and we
4 used that in the next slide, and so, if you're wondering where
5 that 2,369 comes from, it's from our survey of the western part
6 of Alabama waters.

7
8 There, you have the number of reefs estimated, and also the
9 standard errors, and, for most cases, the standard errors are
10 actually quite small relative to the estimate, and so the number
11 of artificial reefs is known quite well.

12
13 For Mississippi, there is a list of registered artificial reefs,
14 but we now believe it to be very incomplete, and, nonetheless,
15 we thought, well, if we know about artificial reefs that are
16 there, if we go there, we'll be sure to sample some artificial
17 reefs, and the state is gridded into permit zones, and five of
18 those permit zones were not too shallow, and so it was believed
19 that, yes, there would be red snapper there, and so that
20 comprises 229 sites that are likely to have red snapper, and we
21 took a random sample of those 229.

22
23 As we got into it and realized that, actually, we don't know the
24 number of artificial reefs very well, we decided to do some
25 alternative calculations, where we assumed that what has been
26 estimated to be in western Alabama is probably also what's in
27 Mississippi, because it's approximately the same area and the
28 same characteristics of the population of anglers, and also a
29 similar habitat and so on. We did the calculations, assuming
30 that there were 229 artificial reefs, and also assuming that
31 there might be 2,369 artificial reefs.

32
33 Here, I have to say something rather embarrassing, and I wrote
34 the section of the report on the statistical methodology that we
35 used, and I've been working with Sean and the others on a
36 manuscript about the previous work in the Alabama Artificial
37 Reef Zone, where we used two-stage cluster sampling, and I
38 copied and pasted and put in some of that language, and then,
39 subsequently, I got confused and thought we used two-stage
40 cluster sampling for this project, but actually we didn't.

41
42 We did sample a random number of -- Sorry. We randomly sampled
43 a number of grid cells, but then we took the list of all the
44 artificial reefs that we had found and put that into one master
45 list and randomly sampled that, and so we did not use the two-
46 stage cluster sampling equations.

47
48 I don't think that that really matters, for a couple of reasons.

1 One is that, as the number of cells that you have mapped
2 approaches the total number of cells out there, the procedure we
3 used reverts to a simple random sample, and, since we did 30
4 percent of all cells, that's approaching now a simple random
5 sample.

6
7 The other thing is that we went to 117 sites, and there are 432
8 cells, and so that's about one site per cell, and so that's
9 assuming that the number of artificial reefs per cell does not
10 vary hugely. If it were the case that most of the artificial
11 reefs are in just a very small number of cells, then we would
12 have a problem, but, to handle cluster sampling methodology, you
13 calculate the within-cluster and between-cluster components of
14 variation, from which you have to have at least two observations
15 per cell, for at least some of the cells, to get the within-cell
16 component of variance.

17
18 I suspect that, in almost all cases, we have one observation per
19 cell, and, if we had two observations or more in a few cells, we
20 would get a very poor estimate of the within-cell component of
21 variability. It turns out, if you ignore the within-cell,
22 within-cluster, component of variability, you get the best
23 variance, and so I don't think this is really a problem, but
24 we'll do a few more calculations to demonstrate that.

25
26 We took a simple random sample of all known reefs in our
27 inventory, and, at each reef site, we collected the type of data
28 you use for index removals, and so, in the next slide, I will
29 explain index-removal.

30
31 Basically, we were using a remote-operated vehicle, an ROV, with
32 a camera to count fish, and we were also using vertical
33 longlines to deplete the population, and we had two kinds of
34 survey sites. We had calibration sites, where we did the full
35 monte, and we did the whole procedure, and then we had
36 production sites, where we used just a subset of the data
37 collection.

38
39 At the calibration sites, we had an ROV count, which we're
40 treating as an index of abundance and not as an absolute number
41 of fish, and then we used a vertical longline three times, and
42 so three sets, to deplete the population, and then we used the
43 ROV again to get another index of abundance, and so, supposing
44 the ROV MaxN count goes from forty before to twenty after you
45 fished and removed seventy-five fish, forty going to twenty is a
46 50 percent decline, and so we're inferring that half the
47 population was removed when we took out seventy-five fish, which
48 would imply that there had been, initially, 150 fish. Since we

1 saw forty out of an estimated 150, that would be our calibration
2 factor. It's the estimated proportion of fish seen in a MaxN
3 count, on average.

4
5 Then we also had production sites, because the deployment of the
6 ROV takes an hour, and so to go to a site and have to spend two
7 hours just to get the two ROV counts, plus the time for the
8 vertical longline, that means you can only go to a very small
9 number of sites per day, and so, to collect additional
10 information, we had what we call production sites, where we did
11 the ROV count, and then we did the three vertical longline sets,
12 and those can be done rather quickly.

13
14 All we did was use the ROV counts, and I'll explain why in a
15 minute, but, basically, if you have an ROV count, and you have
16 that calibration factor that you got from the calibration sites,
17 then, essentially, the production sites, the single ROV count,
18 the MaxN count, is providing information on the abundance.

19
20 We didn't use the vertical longline, for two reasons. One is
21 that the trend over the three sets was very weak. You could see
22 a depletion, but you really couldn't judge the slope of the
23 regression line of catch per set versus set number. Despite
24 that, in total, the three sets were enough to deplete the site
25 that the second ROV count was lower than the first, in almost
26 all cases, and so it was kind of disappointing that the vertical
27 longlines weren't more useful.

28
29 The other thing is that the vertical longlines see a subset of
30 the population, and they don't see the small ones well, and,
31 since we were trying to estimate the population of two-plus,
32 which seemed to be what we were seeing, based on sizes of fish
33 measured in the ROV counts, we thought we will rely on the ROV
34 data as our primary gear for estimating the abundance.

35
36 Now, you might wonder, is this legitimate if the vertical
37 longline is size selective, and the answer is it is legitimate,
38 and you get an unbiased population estimate for the population
39 seen by the ROV if the ROV is not size selective, and so we
40 assume that the ROV will see all fish age-two and above equally
41 well, and then it doesn't matter that the vertical longline is
42 not unbiased, and it doesn't matter that it's selective for
43 larger fish.

44
45 The table in the lower-right is basically a summary of what did
46 we have for sample sizes, and so you can see that, in total, we
47 had 117 sites in Alabama and thirteen in Mississippi, for a
48 total of 130, but we were really quite concerned that our

1 calibration factor should be precise, because that's what we're
2 using to convert the ROV counts into absolute abundance, and we
3 did have data on thirty-four sites that were visited in 2014 and
4 2015, and so we analyzed those data along with the data
5 collected for the Great Red Snapper Count, by assuming that the
6 catchability coefficient in 2014 and 2015 was the same as it is
7 today, but that the abundance was different, and so we estimated
8 one catchability coefficient, or calibration factor, and two
9 population sizes, or, actually, four population sizes, because
10 we had four strata, three depths in Alabama and one in
11 Mississippi, and so we had eighty-eight stations where we did
12 the full calibration study. I think that's the last of my
13 slides.

14
15 **DR. LIESE CARLETON:** Thanks, John. I guess Sean and I didn't do
16 a great job at keeping at John quiet, because John actually
17 stole a lot of the things that I was going to say, but that's
18 okay.

19
20 The rest of this talk, I'm going to be discussing in more detail
21 how we formulated our estimation model. As it's part of a
22 general class of depletion methods, I thought I would introduce
23 some of the general notation, to give you an idea of the reasons
24 for how we would up with our final model.

25
26 The theory here, usually, in practice, your index-removal method
27 assumes some distribution for your indices, and, as John said,
28 when I say "index", I mean the ROV MaxN counts, and so the
29 expectation for the counts at a given site, i , is proportional
30 to the initial abundance at that site by that calibration
31 factor, and, similarly, your expectation for your second index
32 is proportional to the remaining population, the initial minus
33 what you removed.

34
35 In theory, this could be used to obtain estimates of abundance
36 at each site that you visit, but it's not practical, and this is
37 because it's infeasible if the change in your ROV is less than
38 or equal to zero. I believe, if you're looking at the PDF,
39 there's a typo. What you're seeing on the screen right now is
40 correct, and it should be less than or equal to zero, and my
41 apologies for that, and that should make sense, because, if your
42 index goes up, meaning that the change is less than zero, then
43 you're going to get a result that's a negative abundance
44 estimate, and, if there isn't a change, or if it's equal to
45 zero, then your population is going to be infinite.

46
47 That means that that's a large amount of data that is not as
48 meaningful as it could be, and this could occur for any reason,

1 like just random observation error. To get around this, if we
2 assume that the calibration factor is constant over sites, then
3 we can work with the aggregate data, using the means of the two
4 ROV indices and the mean removals, and so that's the next set of
5 equations that follows from above.

6
7 For sites within each stratum, the expectation of the mean of
8 the first index is proportional to the mean initial abundance by
9 that calibration factor. The same for the second, and the only
10 thing I would like to note here is, in this, we were treating
11 the removals as fixed, and John touched partially on why that
12 is, and I will explain more in the next slide.

13
14 This brings us to our model formulation, and it took many
15 iterations to come up with this, and so, in many traditional
16 count-based modeling approaches, you might usually assume that
17 your index has a Poisson or negative binomial distribution, and
18 both of those have limitations on the variance component, but,
19 as we're now working with means of two random variables, we can
20 consider that the mean MaxN indices have a bivariate normal
21 distribution, which is advantageous, because the variance can be
22 estimated based on the data, rather than relying on theoretical
23 properties of distributions.

24
25 In addition, because the two indices are taken from the same
26 site, there is a correlation between the two, which will
27 translate to the covariance that will then reduce the overall
28 variance, and so that's why we're using a bivariate normal.

29
30 In our model, our means of variance are calculated as for
31 stratified random sampling, and the next two equations -- The
32 first one here is the expectation of your index, and it's your
33 stratified index for either pre or post-removal, and,
34 essentially, it's a weighted average. It takes your mean index
35 within Stratum h and is weighted, and the stratum-specific
36 weight is the proportion of reefs in that stratum compared to
37 the total reefs in all strata.

38
39 Next, we have the variance/covariance component for the
40 stratified mean ROV index, and there is only a couple of things
41 that I want to point out here. The N_h over N squared, that's
42 just the weight squared, and the remainder of that is either the
43 variance or covariance, and you will note that the denominators
44 of those are different in some places, and that has to do with
45 the calibration versus production stations that John mentioned,
46 and so some of our sites had only a single ROV index, whereas
47 some had two. I will leave it at that, but I can explain more
48 about our variance formulation if asked.

1
2 We're assuming that our removals are fixed and not random
3 variables, and so we explored the idea of integrating a removal-
4 type method with the index removal that's shown here, but, as
5 John said, we saw a very weak trend, if you looked at the mean
6 of the three consecutive vertical line sets, and so it would be
7 very imprecise, and we would also have to make some -- We would
8 have to resolve some assumptions about the size selectivity,
9 because we have seen, time and time again, that the vertical
10 line catches larger fish than -- Or it tends toward larger fish
11 than the ROV is seeing.

12
13 The last assumption to mention here is that we're assuming the
14 calibration factor is constant over time strata and at sites
15 within strata, and we have done evaluations, and so, for
16 example, the over time piece, we looked at if we analyzed our
17 data separately, our pilot data versus the 2018/2019 data, and
18 the changes were minimal, and we tried to look at constant over
19 strata, but, for some of our strata, the sample sizes were too
20 low to really tell, and so we're assuming that it's constant.

21
22 Here are the results from our depletion study over artificial
23 reefs, and we estimated a calibration factor for the ROV of
24 0.122 and associated standard error, and the table here shows
25 the mean density and its associated standard error for our four
26 strata, and so that's mean fish per reef. We also show the
27 weights we used when stratifying and the number of reef samples.

28
29 Finally, here at the bottom, we present two estimates for the
30 total population on artificial reefs in this region, and the
31 difference between these two estimates is the first assumes that
32 Mississippi has only the published 229 reefs in the permit zone,
33 which is surely an underestimate of the number of reefs.

34
35 The second assumes that Mississippi has the same number of reefs
36 as western Alabama, 2,369, and it also assumes that the sites
37 that we sampled in Mississippi are representative of the reefs
38 in Mississippi.

39
40 That was what we did for artificial reefs, and I only have a few
41 things to say for the rest of this, and I will be going over the
42 natural hardbottom habitat, but, really, this was all Sean's
43 work and Sean's idea, his team. As Sean said, natural bottom is
44 very rare in the shallow and mid-depths, but it's more extensive
45 in deeper waters, and so there's no stratification going on
46 here.

47
48 The first task was to estimate the area, and that was done with

1 the most comprehensive data available, which was the USGS
2 multibeam study, and they estimated that that red shape there
3 has a total area of 1,625 kilometers squared, but, within that
4 area, it's known that there is a combination of hardbottom and
5 sand habitats, and sand we would consider as the uncharacterized
6 bottom, and so we did not want to include that in our estimate
7 of the natural hardbottom.

8
9 To get to a finer scale, this is paired with the side-scan sonar
10 data that Sean mentioned previously, and they looked at areas
11 that they had scanned within where USGS had surveyed, and, from
12 that, they came up with a 13 percent hardbottom estimate, and
13 so, from that, you can figure out that the total area of natural
14 hardbottom is 211 kilometers squared.

15
16 The next task was to estimate density, and so, initially, we
17 wanted to use depletion methods here, to be consistent with the
18 artificial reefs, but, during our pilot studies, we realized
19 that it wasn't going to be feasible. The counts were too low to
20 observe any sign of depletion, and it's possible that this could
21 be due to individuals immigrating from nearby structures during
22 the course of the depletion experiment, and we're not sure why
23 it is exactly, but, in any case, we needed an alternate method
24 to estimate density.

25
26 The team took the MaxN from the ROV and standardized it to
27 account for the average area surveyed, and, when I say that,
28 it's not taking the MaxN and then multiplying it by the area,
29 but it's actually dividing by the average area, and so, in other
30 words, the MaxN, which is considered conservative, because it's
31 the minimum number of fish that could be at that site, is
32 divided by the average area surveyed, which is a little over 400
33 meters squared, and that's how they obtained number of fish per
34 meter squared.

35
36 The mean over thirty-two sites that they sampled was 8.42 fish,
37 and that's after taking into account the 250-millimeter cutoff,
38 and so, dividing by the average survey area, that gives a
39 density of 2.02 fish per hundred meters squared. The last step
40 is to calculate population, which we estimate to be 4.27 million
41 on natural hardbottom habitat.

42
43 This is our final slide, and it just shows a summary of the
44 population estimate at the three habitat types. The first line
45 is for artificial reefs, and, again, there is two numbers there,
46 depending on the assumption you make about number of reefs in
47 Mississippi, and so somewhere around 1.5 or 1.8 million, and we
48 just talked about natural hardbottom, and, from the

1 uncharacterized bottom group, we pulled that there were 4.1
2 million in that habitat type. At the bottom, you can see that,
3 again, depending on your assumptions, there's about ten million
4 fish in this region. This is our last slide, and so I think, at
5 this point, I'm ready to hand-off for questions.

6
7 **CHAIRMAN POWERS:** Thank you very much. I will open the floor to
8 questions then, or, John, did you want to make a comment?

9
10 **DR. HOENIG:** If I might, one thing that it occurs to me that we
11 forgot to say is that there seems to be a lot of concern about
12 whether or not all the sources of uncertainty were captured in
13 the calculations. In what we did, we included uncertainty in
14 the number of reefs, in the calibration factor, Q, and in the
15 sampling error for the mean counts, before and after the
16 removals, and so, undoubtedly, like all studies, we have
17 underestimated the true variability, but, in this case, I think
18 we tried, conscientiously, to include as many sources as we
19 could, and that's all I wanted to say.

20
21 **DR. POWERS:** Joe, I will add to John's comments, and so that is
22 the reason why, if you look at Rob's CV, and Lynne's, I think
23 they are different than ours for the artificial reef. What I
24 provided to Rob was the list of locations, along with the final
25 estimate, and so the error he's reporting is probably just among
26 sites, whereas the error we show here, which is higher, includes
27 these multiple sources.

28
29 **CHAIRMAN POWERS:** Thank you. Hands up, we have Benny Gallaway.
30 Let me recognize Mary Christman, and then we'll go back to
31 Benny.

32
33 **DR. CHRISTMAN:** Thank you. That was very detailed, and I
34 appreciated it. I do have a few questions, though. In the
35 overlap area, and, in other words, that area where you have the
36 orange box for natural hardbottom overlapping with the
37 artificial reef, the AARZ, I think you called it, how were sites
38 within that were selected for natural hardbottom handled? In
39 other words, how did you decide what to do when you got out to
40 the site? It could have had a reef, or it could have been
41 natural hardbottom.

42
43 **DR. POWERS:** We knew that ahead of time on the contact report,
44 and so that grid cell would have been characterized, and we can
45 tell, for the most part, the difference between the artificial
46 reef and a natural reef. In reality, those deeper depths have
47 almost no artificial reefs, and it's very rare that we find
48 artificial reef that deep, and so that contact would have been

1 it, and so our natural reef sites were a random draw, but only -
2 - Not through the complete USGS area, but only through those
3 areas that we had side-scan.

4
5 **DR. CHRISTMAN:** Okay. That helps a lot. My next question is
6 just a simple one, and I'm not sure. Did the vertical longlines
7 ever saturate when you were doing the removal studies?

8
9 **DR. POWERS:** We kept track of the number of baits returned, and
10 so, when we deployed the ROV, we show the vertical longlines,
11 and we have GoPros on the top of those, looking down, and we
12 also count the number of hooks that return with bait, and, often
13 -- We had a few instances, probably I would say 10 or 15
14 percent, where all baits were either gone or the hook had a fish
15 on them. The deployments were only five minutes, but, usually,
16 we turned with bait.

17
18 **DR. CHRISTMAN:** Okay, because I was wondering, and, if you had
19 situations where they saturated, your estimate of the actual
20 removals would have been bounded from above, and so it doesn't
21 sound like you hit that very often.

22
23 **DR. POWERS:** I will let John answer that, because I don't think
24 that matters, as long as you know the number of fish that you
25 pulled up.

26
27 **DR. HOENIG:** It doesn't matter for the index-removal, and I
28 think Mary is asking why the attempt to do a removal estimator
29 from the longline data itself not work, and my impression, and I
30 can go back and check, but my impression is that we did not have
31 a gear saturation problem.

32
33 To tell you the truth, I looked at the number of red snapper
34 caught, and it was never anywhere near the number of hooks set,
35 but I didn't go back and check, but did you have say a shark
36 that went down the line and just removed one bait after another
37 after another after another, which would essentially be like
38 gear saturation, and it's like, oh, you're not catching more
39 because the number of hooks is limited.

40
41 **DR. CHRISTMAN:** Or if other species are more attracted to the
42 longlines.

43
44 **DR. HOENIG:** Yes, and it's mostly -- You do get sharks and red
45 drum and rays and other things, but it's mostly red snapper,
46 and, from what I saw, and, Liese, correct me if I'm getting this
47 all fouled up, but, from what I saw, it didn't appear that it
48 was a simple matter of gear saturation, and I think maybe it was

1 just not enough hooks to actually see the trend well.

2
3 **DR. POWERS:** I think it has to do with something that Will was
4 relating from his region, in that a lot of our fish were small,
5 and they may not have been fully vulnerable to the vertical
6 longline gear, and they were to the ROV.

7
8 **DR. CHRISTMAN:** That was discussed in the document, I believe.
9 Then my final question is to the natural hardbottom habitat.
10 You took MaxN from the ROV, but you standardized it using
11 average area surveyed, as opposed to the area actually surveyed
12 by that particular ROV sample, and I would expect the area
13 surveyed to be pretty variable, depending on turbidity, and so I
14 was just curious as to why the decision to use average area.

15
16 **DR. POWERS:** Originally, and we conducted the survey just like
17 it was an artificial reef, and so we did not do a point survey.
18 We go to the one side of the structure and park the ROV five
19 meters away, and we count the number of fish, the MaxN in the
20 area, and we go around to the other side of the structure, and
21 then we repeat that again, and so we're not counting all the way
22 around, and that's how we get our MaxN. How we calculate the
23 area is that the average, and you're absolute right, of that
24 donut that we cover.

25
26 **DR. CHRISTMAN:** Okay, but that was the artificial reefs, or was
27 that -- The donut was actually used on the natural hardbottom as
28 well?

29
30 **DR. POWERS:** Yes, and so, because our systems, like I said,
31 aren't so much like Will's or Texas, where there is vast
32 expanses of low-relief banks, and it's pretty much pinnacles or
33 alps or some features, and we do get scattered boulder fields,
34 but usually it's some prominent feature.

35
36 **DR. CHRISTMAN:** So you essentially sampled it similar to the
37 artificial reef. Okay. Thank you. That helps a lot. I'm
38 done.

39
40 **CHAIRMAN POWERS:** Thank you. Benny, are you on yet?

41
42 **DR. GALLAWAY:** My question, and I have several questions, but
43 one is I was curious as to why the 150 to 160 or so offshore
44 oil-and-gas platforms weren't included in the census. That's
45 question one, and then, on the hardbottom habitat for the
46 pinnacle reef, I think of the pinnacles as being tall, steep-
47 sided structures, and the picture I saw in the slide that I saw
48 at the beginning looked more like a large boulder field or

1 something, and I am wondering about the 2.02 density estimate,
2 which just seems phenomenal, especially for that area, in light
3 of the existing information about the pinnacle systems, and so I
4 was just curious as to what proportion of that 211 square
5 kilometers consists of the tall, steep-sided peaks, and would
6 you care to comment, or elaborate more, on the density of 2.02
7 fish per hundred square meters? Thanks.

8
9 **DR. POWERS:** On the first question, we did not exclude oil-and-
10 gas platforms. They would have been treated just like any
11 artificial reef, but it's just that, probabilistically, they
12 just didn't get drawn, because we don't have that many off of
13 Alabama, and so we did not have a separate strata for oil and
14 gas platforms.

15
16 On the habitat, the natural habitat, that is definitely one of
17 our limitations, where we didn't have better high-resolution
18 maps and more side-scan. In our area, that we overlapped our
19 side-scan and the USGS survey, those types of what you saw on
20 the video was the dominant form, and you can see that they
21 function essentially like artificial reefs in our system. As
22 far as the density of 2.02, that is higher than the other
23 regions in our survey, compared to other regions, but that is
24 what we saw.

25
26 **DR. GALLAWAY:** So that density estimate would relate also to the
27 pinnacles and that it's not a function of a small fraction of
28 habitat being of that nature?

29
30 **DR. POWERS:** Again, if we had better habitat maps, we could make
31 -- We wouldn't have to make that assumption, but that's the
32 assumption we have to make now.

33
34 **CHAIRMAN POWERS:** Okay. Thank you. We've got two more on the
35 list here, seeing as how we're getting close to the end, I
36 think, for today, and we'll keep it at those two, and, if
37 somebody wants to bring us some more things tomorrow, feel free.
38 Let's begin with Dave Eggleston, and then Luiz Barbieri will
39 finish up.

40
41 **DR. EGGLESTON:** Thank you. I guess, to follow-up on what Benny
42 was focused on, in terms of looking at Table 7 and the
43 Alabama/Mississippi natural and artificial reefs, and I followed
44 the logic, and just looking at the values, and so I see where
45 you came up with the 2.02 and then the average of 170 for mean
46 density per structure, but what was stunning to me is, when I
47 move up that table, for Louisiana artificial reefs, deep, mid,
48 and shallow, especially the mid and shallow, where you have one

1 to two orders of magnitude higher densities than any of the
2 other values in the table, and I was just wondering if you could
3 elaborate on why those values are so high.

4
5 **DR. POWERS:** Can somebody pull up that table, so I can make sure
6 that --

7
8 **DR. EGGLESTON:** It would be page 88. If you can go down to
9 Louisiana, you see 1,399 for a mean density, and 2,733.

10
11 **DR. POWERS:** I see that. Then your question is?

12
13 **DR. EGGLESTON:** I mean, it's just really -- Those numbers are
14 eyepopping, compared to the other numbers in that column, and so
15 I just wanted to try to understand why those numbers are so
16 high.

17
18 **DR. POWERS:** Are you questioning the Louisiana number?

19
20 **DR. EGGLESTON:** The Louisiana number, that's correct. The
21 Louisiana number.

22
23 **DR. POWERS:** That is a question for Greg Stunz. I can speak to
24 the Alabama/Mississippi numbers.

25
26 **DR. HOENIG:** I think it has to do with the size of the
27 artificial reefs. In Alabama, a typical artificial reef is a
28 chicken coop, and it's not an oil platform, and there's a huge
29 difference in size.

30
31 **DR. STUNZ:** To chime in, that's exactly what it is, John. It's
32 the size of the artificial reefs, which are predominantly oil-
33 and-gas platforms in Louisiana, and that's why that number is so
34 high.

35
36 **DR. EGGLESTON:** Okay, and so that's real.

37
38 **DR. STUNZ:** Dave, that number is also pretty substantiated with
39 other reports in literature, and that's not an unusual finding,
40 and, in fact, it may even be a little on the low side.

41
42 **DR. GALLAWAY:** Is that not a total count at those reefs and not
43 a density per hundred square meters?

44
45 **DR. STUNZ:** Benny, I'm sorry, but could you ask me that again?
46 It cut out for me.

47
48 **DR. GALLAWAY:** I think the Louisiana -- Is that a total count, a

1 total number of fish, at an artificial reef in Louisiana at
2 those depths, at the oil platform, whereas, for Alabama and the
3 other, I think they're showing density per hundred square
4 meters.

5
6 **DR. STUNZ:** That's correct, Benny. If you scroll up, I need to
7 look at the title of that table, real quick. We're trying to
8 simplify this into one table, so there's not a million rows or
9 columns, but it's mean density of a hundred meters squared or by
10 structure, and so, if it's an artificial reef, it's the number
11 per structure. If it's others, it's per hundred meters squared.

12
13 **CHAIRMAN POWERS:** Thank you.

14
15 **DR. STUNZ:** That's 1,400, or 1,399, per structure and not --
16 It's per structure and not per hundred meters squared.

17
18 **CHAIRMAN POWERS:** Thank you. Back to the list, I see David
19 Chagaris is on there, and so I guess he gets the last word, but
20 first Luiz.

21
22 **DR. BARBIERI:** Thank you, Mr. Chairman, and thank you, Alabama
23 team, for the great detailed presentation. It was very, very
24 helpful, and I have a few questions. One is about how you
25 estimated your depletion factor for these habitats, using the
26 depletion method, and I know that Liese went into quite a bit of
27 detail to that, but I was wondering about averaging sites where
28 you had negative second counts, versus positive second counts,
29 and how that may have impacted the final results. I don't know
30 who on the team would like to take that one.

31
32 **DR. POWERS:** I think Liese or John can do it, and I don't think
33 it occurred very often, and I know, Luiz, when I gave a
34 presentation to the SSC about this method earlier, before John
35 and Liese joined me, I think it was the case in about 20 percent
36 of the cases, where you actually didn't see a depletion, but I'm
37 not sure, and Liese would be much more familiar with the numbers
38 right now.

39
40 **DR. CARLETON:** Yes, I can take this one. The nice thing about
41 the means is that it takes out that potential negative change,
42 and another thing is we never had negative counts, or a negative
43 index, and so, no matter what, your mean is always going to be
44 positive, but using the means better helped show the decline for
45 the mean abundance, and so the calibration factor -- It's not a
46 mean, and it's just the estimate of the calibration factor,
47 assuming that it's the same for all sites.

1 **DR. BARBIERI:** Right, but what I'm wondering is, especially if
2 you didn't have that many happen, where the second number turned
3 out to be larger than the first one, why didn't you just remove
4 those observations? I mean, it looks like that, in those
5 examples, the method that you're trying to use didn't actually
6 work.

7
8 **DR. HOENIG:** It doesn't work for estimating the abundance at a
9 particular site, a particular chicken coop or whatever, but it
10 works for the aggregate. Basically, imagine that you go out and
11 you see, well, what's the relative abundance, what's an index of
12 abundance, before the fishery, and you get forty, and then the
13 fishermen go wherever they want, and they deplete, and then you
14 go out to another set of stations to see, well, what's the
15 abundance now, and you're seeing, well, in aggregate, the catch
16 rate has gone down, and so, okay, that harvest has caused the
17 abundance to go down, and you can calculate so what was the
18 initial abundance.

19
20 That's basically what we're doing, but what we're saying is you
21 can't do it by one station and say the initial catch rate that
22 we got at this station was forty, but then, at the end of the
23 season, we went back to it, and, gee, we caught forty-two fish,
24 and that means that the abundance went up, and it may have gone
25 up at that one site, but you're interested in the whole
26 population and what's going on, and so it works for a collection
27 of sites, and it doesn't work very well for an individual site.

28
29 **DR. POWERS:** John, if you did what Luiz was suggesting, that
30 would eliminate the sites where you -- It would only include the
31 sites where you saw a decline, and that would decrease the Q,
32 and, thus, increase the estimate of number of red snapper.

33
34 **DR. HOENIG:** That would be a biased estimate, and I wouldn't
35 recommend that.

36
37 **DR. POWERS:** It would be biased high though.

38
39 **DR. HOENIG:** Yes, because you're basically saying that I'm only
40 going to accept the data if it gives me a higher number.

41
42 **DR. BARBIERI:** Right, but there is a level of sampling error,
43 right, John, that is taking place at that resolution level of
44 the individual reef, and how is that being taken into account?

45
46 **DR. HOENIG:** Sorry, but what's the question?

47
48 **DR. BARBIERI:** If you, at the individual chicken coop, or

1 whatever little reef you're looking at, and you do a count, and
2 then you do the depletion, and the second count is higher, and
3 so, when you average over the entire area, or time, whatever
4 you're doing, to come up with that estimate of the depletion,
5 there is a level of observation error, right, for those sites
6 where the estimate ended up being higher in the second count,
7 right?

8
9 **DR. HOENIG:** Right.

10
11 **DR. BARBIERI:** I am just trying to find out how was that
12 accounted for in the actual error estimates.

13
14 **DR. HOENIG:** Okay. Basically, what we were doing is we were
15 working with means over all sites combined, and so we would
16 basically say, if you go out to forty sites and you lower your
17 camera, you're going to see, on average, forty, sometimes more
18 or sometimes less, depending upon both variability among sites,
19 which is okay, or measurement error, that you just happen not to
20 see so many or you happen to see a lot, but you still get a mean
21 count before, and you get a mean count after, and if, at all
22 those sites, you did some removals, and they don't have to be
23 the same number removed, it works out mathematically that you
24 just have to remove enough from enough sites that the second
25 count is lower, and you get an unbiased estimate, and you have
26 the right variance, because you have, basically, observed the
27 variability among the sites, and so you have a variance of a
28 mean. It's the variance of the individual observations divided
29 by N.

30
31 **DR. BARBIERI:** Okay. Got you.

32
33 **DR. CARLETON:** I was just going to add that I think John and I
34 have actually looked into, and we have a small proof that doing
35 it this way provides an unbiased estimate, and I don't have it
36 right in front of me, and so I can't give it to you, but I can
37 send it to you, if you would like.

38
39 **DR. BARBIERI:** That sounds good. Thank you. Then one other
40 question. Back to that Table 6 on page 84, and, again, it's the
41 way that sampling allocation was structured and the influence of
42 that sampling allocation on the total number, and this is not
43 really within the artificial stratum, but, if you look down
44 there, between natural and artificial, the density, the mean
45 density, of the artificial reefs is a lot higher than it is for
46 the natural reefs, right? So the artificial reefs were sampled
47 at a rate that was six-times higher than the natural ones,
48 right?

1
2 **DR. HOENIG:** Yes.

3
4 **DR. BARBIERI:** There were just thirty-two samples of the natural
5 bottom and 198, but then, when you go and multiply across there,
6 all you have is basically multiplication of the area of the
7 number of samples versus the mean density, and you end up with
8 those numbers, without accounting for the fact that reefs where
9 you had much higher density were actually sampled more
10 intensively than the ones with lower density. Was that taken
11 into account by the sampling design?

12
13 **DR. HOENIG:** I think what you're asking is, with 20/20
14 hindsight, would we have done it the same way, and the answer is
15 we didn't really have great information on the amount of
16 habitat, and we were not -- We just had to rely on what had been
17 collected in the past, and so I don't think that our allocation
18 was the best, but it was the best that we could think of at the
19 time that we designed the study. It's easier now to look back
20 and say, why didn't you sample that stratum more heavily than
21 this one, and, yes, I wish I had more information back then to
22 design.

23
24 **DR. POWERS:** That is the case, that, if we had to do it over
25 again, we would reallocate that, although realize that, in our
26 system, the natural reef is very deep, and, hence, very costly
27 to get to, and so it isn't just a one-for-one exchange.

28
29 I mean, we would lose ten artificial reef sites for every
30 natural reef, and that doesn't mean that we wouldn't do it, but
31 that also speaks to Benny's question too, and we would
32 definitely have gone more towards including more reefs, natural
33 reefs, in Mississippi, but ship time is expensive, and we only
34 had a limited budget, and so, yes, we would do it differently.

35
36 Like always, I see your point, although those samples, those
37 thirty-two, were random samples, and we had a lot of -- We had,
38 whatever, 11,000 possible natural reef contacts in there, and so
39 that thirty-two is a random sample of that, and it has a
40 variance, and, now, that speaks to the problem, or the issue, in
41 all regions, that, yes, we're only sampling a very minute
42 fraction of the habitat, but it's random, and it has a variance
43 with it that is reasonable.

44
45 **DR. BARBIERI:** Right, Sean, and my point is that, again, I think
46 that, as far as estimating indices out of this work -- I think
47 that, when you limit your indices to a specific habitat there, I
48 mean, they are indexing abundance at those habitats, but I think

1 trying to integrate these estimates that were unweighted,
2 integrate the different habitats, is generating numbers that,
3 unfortunately, the way I see it, do not really represent a good
4 estimate of the total absolute abundance.

5
6 **DR. POWERS:** I guess we'll have a lot more discussion on that,
7 but I go back to my point that we randomly chose these, and were
8 there enough? Would it get more precise with more samples?
9 Sure, but the question is would the mean change?

10
11 **DR. BARBIERI:** Okay. Thank you.

12
13 **DR. HOENIG:** I think a point is that things were weighted
14 appropriately, and so I don't think we're talking about a big
15 bias, and it's only a question of whether we could have been
16 more precise if we had allocated our sampling differently, and
17 that's always the case, that, yes, with 20/20 hindsight, you can
18 design something better.

19
20 **DR. BARBIERI:** John, I don't want to prolong the discussion, but
21 this bound to create a directional change that indicates bias in
22 the total absolute count. I mean, it's almost like I want to
23 estimate the proportion of people in St. Petersburg who go to
24 the Latino market, I mean to go to supermarkets or actually go
25 to the Latino market, and I'm going to find a lot of Latinos
26 there, because that's where they go, but they may not be
27 representative of the total number of supermarkets in the city.
28 I can go there for efficiency, but I have to know --

29
30 **DR. HOENIG:** I would argue, Luiz, that what you're saying is not
31 correct, that what we did was unbiased, because we did a
32 probability sampling design that causes the results to be
33 unbiased, and so I stand by the work, and I think that you're
34 mistaken.

35
36 **DR. BARBIERI:** Sure, and I will drop it here, but I will send
37 you some information on this and how the weighting of those
38 estimates can be applied in a way that they generate unbiased
39 estimates separately, but --

40
41 **CHAIRMAN POWERS:** I think we've gone through this enough now.
42 We're trying to finish up here. Dave Chagaris was going to get
43 the last word, and so I'm going to give the floor to him then.
44 Thank you.

45
46 **DR. CHAGARIS:** Thank you, and I will be brief, because I think a
47 lot of my question was covered by the previous conversation, but
48 I think maybe there's a couple of points of clarification that

1 need to be made regarding sample sizes. In Table 6, it's listed
2 for artificial reefs, and it's listed at 198, but, in the
3 presentation, it listed 130, and, also, in the report, it was
4 described that what you're calling the calibration sites, or the
5 index and removal method, it says that that was conducted at
6 every tenth site, but, here, it appears that it was done more
7 frequently, at forty-four out of 117 sites, and so I think it
8 would help to clarify those sample sizes and as well as the
9 methodology.

10
11 **DR. HOENIG:** You are correct that we originally thought to do
12 one out of ten as a calibration site, and that was the plan,
13 and, in fact, we wound up doing more, because we kind of
14 rethought it and said, you know what, if we don't get a really
15 precise calibration factor, then the whole results are going to
16 suffer, and so we increased that, and the report is not clear
17 about that, and that should be fixed, and I will look into the
18 198 and see why that's there.

19
20 **DR. POWERS:** The sample size, I can answer that, John. The
21 sample size included -- Like Will, I used the opportunity to
22 conduct a parallel study, and so I sent Rob both what we call
23 the Texas A&M, the Great Red Snapper Count, plus our regular
24 annual runs, and John and I, after Rob had those numbers,
25 discussed it, and we wanted to stay with just the ones that were
26 designed for this study, and so that will change Rob's numbers
27 slightly, as you can see the overall estimate, but we'll
28 straighten that out, but, in our case, we know where those
29 additional sites are from.

30
31 **DR. CHAGARIS:** Okay, and then I have another question. I'm
32 still concerned about appropriately capturing the uncertainty in
33 the variance if you're using a constant calibration factor
34 across all the sites, but I'm also curious, and what's the
35 difference in the calibration factors from the Great Red Snapper
36 Count versus the pilot study?

37
38 **DR. CARLETON:** I can answer that one. The difference between
39 the pilot study and this one, if I analyze those data
40 separately, they were only different from each other by -- I
41 think one was 0.11 and the other was 0.14, something like that,
42 and, about the variability, we do have a calculation. We have
43 an estimate of the variability, and how it's applied could be
44 concerning, because it doesn't seem to be applied, and so I will
45 leave it at that.

46
47 **DR. CHAGARIS:** Okay. Then, also, with the sample sizes in the
48 variance estimate, you used both the calibration and production

1 sites as the number of samples, and, I mean, it seems like it
2 might be more appropriate to only use the calibration sites,
3 sample sizes from the calibration sites, where you actually had
4 the calibration factor estimated, and so I'm wondering if the
5 sample sizes might be inflated there for the variance
6 estimation.

7
8 **DR. HOENIG:** No, they're not, because we did this in a
9 likelihood framework, and so, for each bit of data, you are
10 feeding in either the raw data or sufficient statistics, and so
11 it is taking the sample sizes for each part into consideration
12 in the appropriate way, and so it is appropriate.

13
14 **DR. CHAGARIS:** Okay. That was all I have for now, and I'm sure
15 we'll come back to this.

16
17 **CHAIRMAN POWERS:** Okay. Thank you. Thank you to everybody and
18 their contributions today. We will go back and go at it again
19 at 9:00 tomorrow morning, and, if there are updates to things,
20 questions, that we've already brought up today that people --
21 Some of the estimation team, if they have that information
22 tomorrow, we would certainly accept that, in terms of questions,
23 but, at this point, I think we've reached our limit, and so I'm
24 going to adjourn, and we'll meet again tomorrow morning at 9:00
25 a.m. Eastern Daylight time. Thank you very much.

26
27 (Whereupon, the meeting recessed on March 30, 2021.)

28
29 - - -

30
31 March 31, 2021

32
33 WEDNESDAY MORNING SESSION

34
35 - - -

36
37 The Meeting of the Gulf of Mexico Fishery Management Council
38 Standing and Special Reef Fish and Socioeconomic Scientific and
39 Statistical Committees reconvened via webinar on Wednesday
40 morning, March 31, 2021, and was called to order by Chairman Joe
41 Powers.

42
43 **MR. RINDONE:** I've got a little thing that I need to read, as it
44 regards the peer review process versus the SSC meeting, and so
45 the council would like to clarify the nature of the peer review
46 being conducted at this meeting.

47
48 At its January 2021 meeting, the SSC made a motion to have

1 independent reviewers assist with their peer review of the Great
2 Red Snapper Count, as the relevant results of this study would
3 be incorporated into a red snapper interim analysis.

4
5 Thus, this meeting was set up with two distinct components. The
6 first is the peer review of the Great Red Snapper Count, and the
7 second is the formal SSC meeting to evaluate the interim
8 analysis completed by the Southeast Fisheries Science Center.

9
10 A number of SSC members have participated in the development of
11 the Great Red Snapper Count. Under National Standard 2, which
12 addresses formal peer review, these SSC members have been asked
13 to abstain from any motions and voting regarding whether the
14 absolute abundance estimate from the Great Red Snapper Count,
15 and its variance, is reliable and consistent with input data and
16 population and biological characteristics for red snapper in the
17 U.S. Gulf of Mexico.

18
19 The peer review evaluation of the Great Red Snapper Count will
20 thus be limited to the SSC members not directly involved in the
21 Great Red Snapper Count and the three independent reviewers
22 contracted by the council. Once this evaluation is complete,
23 the second part of the meeting will serve to discuss the
24 analyses completed by the Southeast Fisheries Science Center for
25 the red snapper interim analysis, and this is where the formal
26 SSC meeting begins.

27
28 During this portion of the meeting, the SSC members who
29 participated in the Great Red Snapper Count are again asked to
30 abstain from any motions and voting on whether the analyses
31 represent the best scientific information available and/or are
32 suitable for use in generating management advice, in keeping
33 with historical SSC practices regarding the evaluation of one's
34 own work.

35
36 After the deliberation of the best scientific information
37 available, these SSC members that served as investigators are
38 asked to participate thereafter in any motions regarding
39 recommending catch levels to the council. Does anyone have any
40 questions about this before moving forward?

41
42 **DR. POWERS:** Ryan, I do. It sounds like this is just what you
43 told us yesterday, right?

44
45 **MR. RINDONE:** Yes, and it is almost exactly what I told you guys
46 yesterday, and I'm just trying to make it clear for some who
47 apparently did not understand.

1 **CHAIRMAN POWERS:** I would -- You should probably post it
2 someplace, so that we can actually see the written version of
3 this.

4
5 **MR. RINDONE:** I can do that.

6
7 **CHAIRMAN POWERS:** Again, my feeling is we are going through a
8 review process that has been scientifically driven these few
9 days, and, come tomorrow, when you get to the point of actually
10 integrating it into the management, or the scientific advice for
11 management, then those sorts of issues kick in, but, in terms of
12 people's participation now, I think we have been entirely open,
13 and there has been no problems about bias and things like that,
14 and so I would encourage people to participate today, and
15 probably early tomorrow, as they see fit. Thank you.

16
17 **MR. RINDONE:** Thank you, everyone, for your continued
18 professionalism. You guys are great.

19
20 **CHAIRMAN POWERS:** I take it that we're ready to start then, and
21 there were some other items that came up. First off, I got some
22 email traffic between John Walter and Carrie Simmons about a
23 document that might affect how we the SSC might deal with things
24 tomorrow and Friday, in terms of the catch advice, and, either
25 Carrie or John Walter, can you kind of bring me up-to-speed?
26 There's a document that may or may not be available now, that we
27 may or may not want to read?

28
29 **EXECUTIVE DIRECTOR SIMMONS:** Dr. Powers, we asked for the
30 Gardner et al. paper that was cited in the Red Snapper Count
31 interim analysis catch advice, and I'm not sure if that's
32 available yet. I have not received it, but I believe there was
33 going to be some type of summary, at least of the methods, and
34 potentially the key results, that the SSC may be interested in.

35
36 **CHAIRMAN POWERS:** Okay. John maybe can answer this, John
37 Walter.

38
39 **DR. JOHN WALTER:** Thank you, Chair. The document should be
40 available soon, today, and we're just going through a couple of
41 reviews from a number of people, and that document will help us
42 to determine where the fishery is fishing right now, and then
43 we'll have another presentation that will have some analyses on
44 possible scenarios for where the recreational -- The first
45 document will focus on the commercial fishery, and it uses VMS
46 data, and so that's pretty precise, and we have a good handle on
47 where that fishery is currently operating in space.

1 The recreational fishery, we have to make a few assumptions, and
2 that's going to be very pertinent to considering the advice
3 framework that the Center will present tomorrow, and so these
4 are additional analyses that have really been ongoing to try to
5 characterize how the fishery might be able to fish on the large
6 biomass that's out in the uncharacterized bottom. Thanks.

7
8 **CHAIRMAN POWERS:** Thank you. Kai.

9
10 **DR. LORENZEN:** This is just a question, and I was looking for
11 Steve Murawski's presentation, and I think he sent it, but I
12 can't see it.

13
14 **CHAIRMAN POWERS:** I would also note that John Froeschke sent out
15 some -- There's some difficulty with the website, about
16 security, and he promises that, if you just keep clicking and
17 going ahead, that nothing bad will happen, and so far, with me,
18 that that's the case.

19
20 **DR. LORENZEN:** I had the same, but it doesn't seem to be on the
21 website, and so this is not a security problem, and so I was
22 just wondering whether it was available, and, given the
23 importance of the uncharacterized bottom, it would be great to
24 have that available. Thanks.

25
26 **CHAIRMAN POWERS:** We would like to see that. Another thing is,
27 yesterday afternoon, there was a fair amount of debate about the
28 -- In the Alabama/Mississippi, the longline depletion data, and
29 Dave Chagaris asked for some details about that data. Liese
30 Carleton agreed to provide that information, but Dave will not
31 be available until 10:00 a.m., and so, Liese, I don't really
32 want you to present the information now, and I want to wait
33 until he comes back, but, anyway, we'll keep that on the docket.
34 Liese, is it available, or, John Hoenig, and maybe you could
35 answer real quick?

36
37 **DR. CARLETON:** I am making it as we speak.

38
39 **CHAIRMAN POWERS:** You're what? Excuse me.

40
41 **DR. CARLETON:** I am making it as we speak.

42
43 **CHAIRMAN POWERS:** Okay. Thank you. Steve Murawski, relative to
44 his presentation, I presume?

45
46 **DR. MURAWSKI:** Just to Kai, Ryan has that presentation, and I
47 think they're just trying to figure out how to upload it.

1 **MR. RINDONE:** Dr. Murawski is correct, and we've received
2 several iterations of several presentations, and so most got
3 lost in the mix at some point yesterday, but it will be posted
4 here in mere moments, and so the website security issue has also
5 been resolved, and so, if you guys just refresh your page here
6 in a moment, you will be able to see all the freshly-posted
7 things, hot off the press.

8
9 **DR. LORENZEN:** Wonderful. Thank you.

10
11 **CHAIRMAN POWERS:** Thank you. Then, finally, Greg Stunz had
12 indicated that he wanted to cover some quick issues, and I'm not
13 sure how quick they will be, but, before we get into Greg, there
14 are several other people that want to speak, and so let me go
15 for that. Mary Christman.

16
17 **DR. CHRISTMAN:** This is related to what I was asking. The other
18 presentation that's missing is the primary analysis by Rob
19 Ahrens, and so I assume that either he will be sending it when
20 it's time, or maybe Ryan already has it.

21
22 **MR. RINDONE:** Dr. Christman, I do not have that presentation
23 yet.

24
25 **DR. CHRISTMAN:** Okay. Thanks.

26
27 **CHAIRMAN POWERS:** Thank you. John Hoenig.

28
29 **DR. HOENIG:** I was just responding to something that Greg wanted
30 me to cover, and so maybe I will let Greg introduce the topic,
31 and then I will make a couple of quick comments.

32
33 **CHAIRMAN POWERS:** All right. Greg, as I mentioned, in your
34 email, you mentioned that there were some items that you could
35 go over briefly. If the debate goes much longer than that, then
36 we'll have to adjust the schedule accordingly, but go ahead,
37 Greg, and proceed. Thank you.

38
39 **DR. STUNZ:** Thank you, Chairman Powers. I just wanted to tie up
40 a few of those loose ends from yesterday, and so I think they
41 will add some clarity for the discussion today. Also, I will
42 help you, Ryan, with Rob Ahrens presentation, and I'm not sure -
43 - Obviously, he will be joining us later, based on his time
44 zone, but we'll get that to you, if he hasn't already.

45
46 One is there was some questions about the sample sizes in
47 Florida, and Rob was looking into that, and he'll explain that
48 to us a little bit later, when we get to that analysis section

1 in the agenda, and, essentially, it was some clerical errors.
2 He had done some imputations which weren't accounted for in that
3 N, but he solved that, and so he can explain the details on
4 that.

5
6 Another minor detail that might help folks with a little clarity
7 is on the Table 6 and 7, which we, obviously, keep referring to,
8 and, just to be clear, and Dr. Eggleston had brought this up
9 yesterday as well, and that has to do with that mean density
10 column, or mean density or structure column, and, just to be
11 clear on that, if it was a habitat such as natural bottom, or
12 uncharacterized bottom, those numbers are reported as mean
13 density per hundred square meters, and that's captured in the
14 table legend, but that doesn't always come up with the table
15 we're looking at on the screen, and so it can be a little
16 confusing.

17
18 For artificial reefs, that is a mean number for the entire
19 structure, and it's not based on area, like meters squared or a
20 hundred meters squared or something like that, and I just wanted
21 to clarify that, because some were concerned about why those
22 numbers were higher, for example, on artificial reefs, and
23 that's because that's a total number of red snapper for those
24 structure types.

25
26 The other thing, Dr. Powers, is that we kind of have been going
27 through the agenda, and the intent of the agenda, as it was
28 structured, was we would go through our methods and our sampling
29 framework, in terms of our methodologies, which we've been
30 doing, and, of course, the discussion naturally flowed into the
31 analysis, which is really an agenda item that we haven't made it
32 to yet, and so we're kind of jumping ahead, which is perfectly
33 fine and appropriate, while we're discussing these individual
34 regional estimates, but the meat of the analysis will come
35 later.

36
37 The reason that I'm bringing that up is our statistical experts
38 have a lot to contribute here, particularly Dr. Ahrens and Dr.
39 Stokes, but they haven't really -- Other than the original
40 design, they haven't had the floor to contribute that, and so I
41 just wanted to remind people that that's coming up later, and
42 we, obviously, want to make sure that they have ample time to
43 clarify a lot of these discussion points that are coming up.

44
45 Then the last thing, Dr. Powers, was what Dr. Hoenig had brought
46 up at the last minute yesterday, before it was getting late and
47 we had to end the meeting, but the question came up about the
48 bias, and Dr. Barbieri brought it up, or maybe what I think our

1 team would refer to as maybe perceived bias, and I don't feel
2 that our team had a chance to respond to that, because we were
3 getting at the last minute, and so Dr. Hoenig has prepared a
4 short slide to better answer that question, or maybe better
5 interpret what the question actually was, but, if we could give
6 him a minute to present that slide, that would be great, before
7 we move on to a new region.

8
9 **CHAIRMAN POWERS:** Actually, I would prefer not to do it until
10 10:00-ish, because of the questions that Dave Chagaris asked,
11 and I think, if we get into that discussion, it would put John's
12 comments into a little more context, and I would prefer to go
13 ahead and then wait until 10:00-ish to revisit this, and, again,
14 look at it in the context of the other questions that Dave
15 Chagaris asked as well, and is that okay with you?

16
17 **DR. STUNZ:** Yes, that's fine, and, I mean, we just need a point,
18 at some point this morning, to have an opportunity to respond to
19 that question.

20
21 **CHAIRMAN POWERS:** Sure. I will make sure of that. Okay. Then
22 we're on to new business, I guess. According to the agenda, Dr.
23 Jay Rooker has his presentation, and his presentation was on the
24 website, and he will be telling us about the UCB
25 characterization. Jay.

26
27 **TEXAS**
28 **UCB CHARACTERIZATION**
29

30 **DR. ROOKER:** Thank you, Dr. Powers, and good morning, everyone.
31 I need Dr. Stunz to --

32
33 **DR. STUNZ:** Dr. Powers, we're doing this presentation together,
34 and so they're sharing my screen. If you just give me just a
35 minute here, I will pull it up.

36
37 **CHAIRMAN POWERS:** Okay. Thank you.

38
39 **DR. ROOKER:** All right, and so we're going to pivot over to the
40 western Gulf for an overview of regional sampling on the Texas
41 shelf, which involves the Galveston crew, and that also included
42 Dr. David Wells and Dr. Liu, and I should mention Jason Mestoe,
43 and he was a graduate student, and he did a lot of heavy lifting
44 on the project, and he was our analyst and field engineer.
45 Then, for Greg's group in Corpus Christi, that included Dr. Judd
46 Curtis and Dr. Matt Streich.

47
48 In Texas, what we did is we essentially partitioned the shelf by

1 habitat type, with our team handling the uncharacterized bottom,
2 and, basically, that means enumerating red snapper on, or in,
3 the suspended mud layer over UCB, and Greg's group, I guess,
4 getting the improved visibility on artificial reefs and natural
5 banks.

6
7 We are going to be tag-teaming it here today with the Texas
8 overview, and Greg, again, wanted me to mention that our
9 overview, for the most part, is going to center on the methods,
10 and then with Lynne and Rob following up with the analysis
11 portion of the density data that was provided by each group.

12
13 In terms of uncharacterized bottom in blue here, as I think most
14 everyone knows from talks yesterday, it's the primary bottom
15 type that we're dealing, particularly in Texas, accounting for a
16 large fraction, over 95 percent, of the seabed in this region,
17 and, again, I should mention that the uncharacterized bottom
18 represents unconsolidated sediment mostly, but the
19 uncharacterized bottom also includes unclassified, or unmapped,
20 bottom, and so there are -- I'm going to mention that there are
21 some relief anomalies that we do see in what's referred to as
22 uncharacterized bottom.

23
24 It's generally assumed, or I guess we all did walking into this,
25 that fish density and red snapper density and biomass would be
26 low and patchy in the uncharacterized bottom, and we know its
27 value for nursery habitat, for those of us that do early life
28 history work, but its value as habitat for larger reef fish and
29 snapper was uncertain before we walked into this.

30
31 Surveying red snapper, or I guess I could say any reef fish, for
32 that matter, on uncharacterized bottom in the western Gulf,
33 particularly in water depths less than a hundred meters, is
34 challenging, more than probably any of us had anticipated.

35
36 I guess we've all spent too much time working on the natural
37 banks in the western Gulf, on the outer shelf, that typically
38 have really good visibility, and, until this, we have avoided
39 surveying anything in the nepheloid layer. I guess, what I'm
40 trying to say, for the plot, is what I signed up for was
41 probably Image A, and what we ended up getting on the
42 uncharacterized bottom was a lot of blackout, no-vis areas
43 throughout the survey.

44
45 Because of that, habitat considerations that shaped our survey
46 for the uncharacterized bottom were the large spatial extent of
47 this habitat type, coupled with a persistent nepheloid layer
48 that, unfortunately, never seemed to go away for many of our

1 locations, and, as we all know, all gear types impose tradeoffs,
2 and we ended up going with an integrated survey method, and the
3 same applies to Dr. Stunz as well, that compensated for
4 individual gear limitations and conditions, ambient conditions,
5 that we experienced, and so our integrated acoustic-plus-camera
6 approach involved the use of an EK-80 echosounder and towed
7 cameras.

8
9 I am going to throw in one slide too, and Kevin mentioned this
10 yesterday, in terms of we threw in some paired deployments with
11 the imaging sonar to provide some clarity, but it also provided
12 more data for my graduate student to analyze.

13
14 Because of the large area to cover, and the expectations of low
15 density, and we assumed there would be lots of zeroes on this
16 uncharacterized bottom, we opted for towed gears, to increase
17 our spatial coverage and the number of sampling units, and so
18 Kevin has already covered the EK-80, with our unit, shown here
19 in the top-left plot, integrated into the yellow.

20
21 Just a quick note is we went into this assuming that we could
22 use a towed-camera platform, and you saw that yesterday, and the
23 TERAS is on the bottom-left, and it's very similar to -- It's
24 not quite as sophisticated as Steve's C-BASS, but it's similar,
25 for most of our surveys, but the lack of adequate visibility --
26 The vast majority of our transects, or stations, were poor or
27 no-vis. That forced us to kind of change gears and move to
28 acoustics for counts and then only using cameras for species
29 composition, for backing out the red snapper densities from
30 those total counts.

31
32 We used two types of camera platforms. On the top-right, that's
33 our blue Batmobile, and it's equipped with forward and downward-
34 facing GoPros, and this was basically designed, during the
35 study, for surveys on the inner and mid-shelf on small boats,
36 because the second one, the bottom-left, the deep-ocean
37 engineering sled, or TERAS -- Well, for the most part, it
38 required us to be using the Pelican, our research vessel, to
39 pull it off, and we needed an A-frame and everything.

40
41 The deep-ocean engineering sled was essentially, as I mentioned,
42 a scaled-down version of C-BASS with an altimeter, high-
43 definition cameras, scaling lasers, and onboard viewing, but,
44 again, it only worked on a large research vessel.

45
46 On the bottom-right is another tow-fish, and we had lots of tow-
47 fish, a red tow-fish, and this one includes our ARIS imaging
48 sonar, or multibeam sonar, which we used to essentially try to

1 verify fish counts from the EK-80 and to make us feel better
2 about some of our estimates.

3
4 Our general approach was to estimate total fish counts, or
5 densities, with the EK-80, and an echogram from uncharacterized
6 bottom is shown on the left, and, in this example, and this is a
7 really good example for uncharacterized bottom, in terms of fish
8 biomass, and it shows both isolated targets, in the top-right of
9 the echogram, and then a school target, and Kevin talked about
10 how we actually separated individuals out of schools yesterday,
11 or these school targets.

12
13 Just to mention that the Echoview, the processing, and this
14 applies to both Greg's lab and our lab, was done by our graduate
15 students under guidance from Kevin's team, and, for stations
16 with adequate visibility, we adopted a paired sampling approach,
17 where we also had one of our towed camera platforms going, and
18 this was for species composition. The image that I put up there
19 is one-of-a-kind, and that's from our best-of album, is we just
20 went above the nepheloid layer, and so this type of quality
21 counts on red snapper, or species composition, were uncommon for
22 most of what we were surveying on the uncharacterized bottom.

23
24 Again, from here, we had our counts from EK-80, and we had our
25 species comp from our towed camera gears, and we applied the
26 proportion of red snapper from the assemblage composition to the
27 total counts, and that's how we generated our estimate for red
28 snapper for each sampling unit, or cell.

29
30 We also ran the paired EK-80 with our ARIS imaging sonar, and it
31 looks like that image is working quite well, on about 25 percent
32 of our transects, and this was to verify that the EK-80 was at
33 least picking up similar numbers of fishes, and we were kind of
34 focusing on areas where we had very, very low visibility, and
35 sometimes we would have large school targets, and, when it's
36 going through the processing in Kevin's group and extracting
37 these fish targets, we wanted to align that with what we were
38 getting with the ARIS imaging sonar, where you can clearly see
39 individual fish on there.

40
41 In terms of what we were referring to as medium and large-sized
42 counts, our echosounder counts and our ARIS imaging counts,
43 there was a strong positive relationship, and we did see that
44 the gear types with the EK-80 are generally picking up more fish
45 than the ARIS, but, as Kevin mentioned, these were side-by-side
46 pulls, but they may be due to slight differences in sampling
47 domain.

1 The plot on the left shows the -- I should mention that starting
2 points of our transects and gear deployed at each station on the
3 Texas shelf, and the bubbles, which have some green, or all
4 green, and that's where they were EK-80 transects, and then some
5 of the points that have either red for the camera gear or yellow
6 for the ARIS, and that's where we had paired locations, or we
7 may have had all three gears being deployed, in certain areas.

8
9 Now, in terms of the spatial coverage of the different gear
10 types shown here on the continental shelf, for the EK-80, we had
11 150 transects, and so, again, I'm showing points, but we're
12 running transects, with most of the transects being
13 approximately three kilometers, and so we had well over 300-plus
14 linear kilometers of surveys.

15
16 Other shelf locations, which you can see, and, oftentimes, we
17 have all three gear types, and they were conducted on the
18 Pelican cruise, where we were able to randomly select stations
19 along our survey tracks, or our proposed survey tracks, which we
20 go off a bit to hit specific stations, and this came up in the
21 review, and it's a completely valid point.

22
23 For some of our inner and mid-shelf surveys, several of these
24 were often day trips out of a port, and some of the points --
25 Again, they're points that are shown here, and they look non-
26 random, which makes perfect sense compared to Rob's random
27 distribution across the entire shelf, but it is important to
28 keep in mind that actual starting points and headings,
29 directional headings, were randomly selected.

30
31 Basically, random distance within say a predetermined window was
32 selected for a cross-shelf transect, and we were trying to cover
33 area on each day trip, and that was typically about four -- We
34 could pull off about four surveys, going from inner to outer
35 locations.

36
37 The goal was to try to cover as much potential distance on the
38 shelf as possible. If I were to show a plot here, and we have
39 one, but I couldn't locate it before the talk here, to show
40 transect lines with directionality, instead of points, it would
41 be easier to convey that the starting points and headings were
42 more random than some of these appear, and it looked like kind
43 of uniform plots on here, and it's funny, and this was raised in
44 the review, and I had the same discussion about random starting
45 points with my graduate student, who was doing a lot of the
46 surveys, and I asked for a map with transect lines and headings,
47 to just show that -- To convince me of the random nature of some
48 of the cross-shelf transects that we ran.

1
2 It's also important to note, from this plot, that points
3 presented by our colleagues in other regions, say for instance
4 Dr. Patterson in Florida, often represent one cell, and that's
5 exactly what Dr. Ahrens presented as well, in terms of the
6 sampling design, and so one cell is kind of our ninety-by-
7 ninety-meter sampling unit, whereas each one of our points, at
8 least shown on this map, represents a transect that may have
9 been three kilometers, and so what we're showing here as one
10 point likely represents thirty potential sampling units from
11 that, and that's how we ended up generating approximately 3,500,
12 and I guess we'll call them useable cell estimates, that could
13 be used for uncharacterized bottom.

14
15 Again, our group focused on the two depth zones, from ten to
16 forty and forty to 100, and Dr. Murawski did a Gulf-wide survey
17 and handled some of those outer, deeper zones.

18
19 What we did is all cells that were provided to the analysis
20 team, which would be Rob and Lynne, we provided details on
21 transects and sequence of the cells within that transect, with
22 our general advice to omit consecutive cells, potentially due to
23 spatial autocorrelation, although we looked at it, and it didn't
24 appear to be a big deal, due to the patchy nature of where we
25 were finding fish biomass in these areas, and I believe that
26 Lynne is going to talk to that during her presentation as well.

27
28 Occurrence, frequency of occurrence, and density, and these are
29 for total fish, and so the plot on the left is the proportion of
30 cells in a transect where fish were detected, and so you can
31 assume that each one of these points potentially represents
32 thirty cells, and how many of those cells did we actually detect
33 fish on the EK-80, and then the plot on the right is the
34 density, total fish across all the transects, and so the cells
35 within those transects may be completely different, and this is
36 a mean per transect, each point on the right.

37
38 Our results are very similar to Dr. Patterson's in Florida, in
39 terms of the uncharacterized bottom, and we had lots of zeroes.
40 Over 70 percent of our sampling units were zeroes with no fish
41 detected.

42
43 We wanted to comment on what we think may be extremely
44 important, in terms of getting a handle in terms of what's going
45 on on the uncharacterized bottom, at least in Texas, but the
46 presence of these relief anomalies -- The image here is actually
47 showing relief anomalies from the ARIS, and this is from an ARIS
48 plot, with examples of what we would typically see in terms of

1 relief, from no relief -- So the plot on the left, A, is
2 essentially -- That's typically what we were seeing, no relief
3 whatsoever, but you can see, going from low relief to moderate
4 relief to high relief, and, actually, there's a fish shown on
5 that far-right plot, and we had a lot of relief on the
6 uncharacterized bottom.

7
8 I shouldn't say a lot, and we actually had -- I said 10 percent
9 on the slide, and it actually turned out to be 12 percent of the
10 cells had some degree of seabed relief, and so, whatever these
11 bathymetric highs were for this relief anomaly was due to, we
12 couldn't determine that, but we did quantify the cells that had
13 relief.

14
15 We looked at -- We did develop fish habitat models, and we
16 looked at the influence of these relief anomalies in our GAMs,
17 and, as you would expect, there was a positive relationship with
18 the occurrence of these relief anomalies and total fish density.

19
20 We had counts from our EK-80, total fish counts, but we needed
21 assemblage composition, and that is where the camera gear came
22 in, to determine the density of red snapper by cell, or by
23 sampling unit. Unfortunately -- Yes, you walk into this, and
24 you would like to have a paired camera, so you have species
25 composition at each cell, or each transect, and that was not
26 possible.

27
28 At least in 80 percent of our transects, and there was no vis,
29 and so, essentially, we took all of our species comp information
30 from the different transects and we put it into regional
31 estimates, and these regional estimates were used to back-out
32 red snapper density from our density on total fish counts from
33 the EK-80, and you can see here that we did have some slight
34 differences, in terms of north Texas, the assemblage, and the
35 assemblage was dominated, dominated, by red snapper in all
36 regions.

37
38 We did have, as you would expect, fair numbers of carangids and
39 scombrids, and some sharks as well, but the red snapper were
40 consistently, in terms of the assemblage, numerically dominant
41 throughout, and so 28 percent in the north, and then we had
42 nearly 50 percent in both our central and south region, with an
43 overall species composition for red snapper, in the entire
44 assemblage, being 37 percent of that assemblage.

45
46 We had to use this to -- It isn't ideal, but we had to use this
47 to estimate red snapper on uncharacterized bottom on the Texas
48 shelf, and, as mentioned, we applied the proportions of red

1 snapper from our total fish count densities to arrive at these
2 estimates.

3
4 From cell estimates, and we used a few cell estimates from
5 others as well, but ours were basically 3,500, and they were
6 generated for 3,500 cells, from our uncharacterized bottom, and
7 this is what Lynne and Rob are going to talk about, and the
8 estimate was close to sixteen million red snapper, with a CV of
9 16 percent.

10
11 Now, certainly, there are limitations to our study, and we had a
12 limited number of transects on uncharacterized bottom that had
13 sufficient water clarity to quantify species composition the way
14 that we would want to.

15
16 I mentioned that at least 80 percent were poor to blackout
17 conditions, and we had approximately 10 to 12 percent of the
18 transects that we ran where you could call it marginal to good
19 for estimating species composition, and we were -- Dr. Murawski,
20 and Greg's group as well, when they did hit some uncharacterized
21 bottom, if they did get species comp information, they did
22 provide that to us as well. We factored that in, but it was
23 very similar to what we had from our surveys.

24
25 In terms of the regional species composition estimate, this was
26 brought up in the reviews as well, talking about underestimating
27 natural variability. When you're applying regional species
28 composition estimates to total counts from the echosounder for
29 individual cells or sampling units that are based on regional
30 species composition data, you would expect to downweight your
31 natural variability estimate for red snapper, because you're
32 using the same proportion for all of those cells within that
33 region, and so I think that's important to note.

34
35 I did want to mention one thing, before I pass it along to Greg
36 to start talking about the artificial reefs, and it's just a
37 point about a gear comparison. Yesterday, there was discussion
38 in Florida, by Will and others, about the EK-80 and some
39 mismatches between the EK-80 and the visual data, but I think
40 it's important to note, and Lynne may be talking about this, but
41 keep in mind that we had independent estimates on
42 uncharacterized bottom in Texas from C-BASS.

43
44 Now, these were mostly outer-shelf locations from Dr. Murawski,
45 where visibility is better than we see on the vast majority of
46 the rest of the shelf, and so we have a camera-based approach,
47 and our approach, which was fish counts generated with the
48 echosounder and then species composition applied to those fish

1 counts to back out red snapper, and it, from my understanding,
2 but, again, maybe Lynne or Rob can talk about that, that they
3 produced very similar overall estimates of red snapper on the
4 Texas shelf, and I think, with that, I'm going to pass it along
5 to Greg to keep going.

6
7 **CHAIRMAN POWERS:** Let me interject here, and I would like to
8 open it up for a few questions before we get to Greg, if I may.

9
10 **DR. ROOKER:** Certainly.

11
12 **CHAIRMAN POWERS:** First off, I would like to ask a question, and
13 this is something that I'm unsure about. For the Texas
14 estimates of UCB, what you've been discussing here was for the
15 two shallower-depth strata, and the deepwater depth strata was
16 taken solely from the C-BASS data?

17
18 **DR. ROOKER:** That is correct.

19
20 **CHAIRMAN POWERS:** Okay. Thank you. So, in terms of -- We got
21 into discussion yesterday, a little bit, about that there were
22 independent estimates of some of the strata, or not independent,
23 but two different methodologies, and so, in this case though,
24 you're really talking about different methodologies for
25 different strata completely.

26
27 **DR. ROOKER:** That's a good point, but Steve did, occasionally,
28 venture into shallower zones, and he was focusing on the deep
29 zone, the hundred-plus, but he did occasionally go into the
30 shallower zones, and it was my understanding, but the analysis
31 team can comment on this, that, when we were in similar zones,
32 the numbers matched up quite well.

33
34 **DR. STUNZ:** Jay, there was some overlap between you and Steve's
35 depth sampling.

36
37 **CHAIRMAN POWERS:** That gets carried over into the estimate?
38 Well, I will wait for Rob to deal with that. Are there any
39 other questions about this? Dave.

40
41 **DR. EGGLESTON:** Jay, thank you. Just two simple questions.
42 One, is that nepheloid layer typically found on the shelf break?

43
44 **DR. ROOKER:** Surprisingly -- We assumed that, once we made it
45 out into eighty meters of water, that we wouldn't see it as
46 much, and that's where, obviously, we had good camera work, was
47 on the outer shelf, but, surprisingly, the vast majority of our
48 stations had that, and, if we had any type of relief anomaly

1 that went three or four meters above the seabed, we could get
2 good counts with camera gear, but, for most of the shelf, inside
3 of seventy or eighty meters, the vis was near-blackout, and, if
4 there was no relief, oftentimes, it would extend three, four,
5 five meters above the seabed. It was very difficult.

6
7 **DR. EGGLESTON:** Then the second question is I'm impressed with
8 the fact that the species assemblage, regionally, averages about
9 50 percent red snapper, and so, if that's for real, then what is
10 it about red snapper that allow them to be so dominant in that
11 species assemblage compared to other fish?

12
13 **DR. ROOKER:** That was significantly higher than we probably
14 assumed, going into it, and Greg can likely comment on that as
15 well, in terms of what they're seeing on the artificial reefs,
16 but I think their species composition was, similarly, very high.
17 Is that correct, Greg?

18
19 **DR. STUNZ:** That's correct, Jay, and, Dr. Eggleston, that is
20 interesting. As you get into the western Gulf, you really get a
21 dominance of snapper, compared to some of the videos that Will,
22 and even Sean, showed yesterday. Now, on the artificial reefs
23 and natural bottom, there is diversity, especially on the
24 natural bottom, but, yes it's dominated by red snapper.

25
26 **DR. EGGLESTON:** But any idea why?

27
28 **DR. STUNZ:** No. No real understanding as to why. We just don't
29 have all the grouper species and the variety of snapper that
30 they have in Florida, and maybe more on the coral-based-type
31 sediments or something, but, in general, it's much less diverse
32 as you move west from the Florida region.

33
34 **DR. EGGLESTON:** Okay. Thank you.

35
36 **CHAIRMAN POWERS:** Thank you. I have one other question about
37 the sampling. You showed the slide of the beginning points of
38 transects, and how do those relate to the original random
39 locations that were generated by Rob?

40
41 **DR. ROOKER:** That's a good question, and, basically, if you -- I
42 don't know if you remember from Rob's scatter plot, but Rob had
43 380 sampling units for uncharacterized bottom in Texas, and they
44 were essentially found across the entire shelf with -- I think
45 the one thing you probably noticed from Rob's plot is there was
46 kind of a greater concentration of points kind in the north
47 region, with the broader shelf, and that is where we had more of
48 the transects going as well.

1
2 **CHAIRMAN POWERS:** It might be good to visualize that, and I'm
3 not sure, but, anyway, there's a number of people that want to
4 ask questions, and so let me go on. Mary Christman.

5
6 **DR. CHRISTMAN:** Thank you. That was interesting. About the
7 composition of the species, I assume that, when you say it was
8 50 percent red snapper, that's 50 percent red snapper that were,
9 what, 250 millimeters and up?

10
11 **DR. ROOKER:** That's correct.

12
13 **DR. CHRISTMAN:** Okay, because you didn't really mention the size
14 aspect of it, but I'm sure that's what it was, and, secondly,
15 when you show that graphic where the transects are located, it
16 would appear that almost all of your camera work was offshore,
17 because it was clearer, and is that correct?

18
19 **DR. ROOKER:** That is correct. We basically -- Anything on the
20 mid or inner shelf, we had near-blackout conditions the whole
21 time, and it's interesting, because we do have some artificial
22 reef areas that we survey here, and we have dropped cameras on
23 them before, and, occasionally, occasionally, you have good
24 visibility, but it may only be a handful of days out of the
25 summer.

26
27 **DR. CHRISTMAN:** So, related to this distribution of where the
28 cameras were, one, is that also where a lot of the natural
29 features were that you found, because, like, for example, in
30 Alabama, all of the natural stuff was offshore, the natural
31 hardbottom, and so I was just curious whether there was any
32 overlap of that, which would therefore influence your estimates,
33 and then the second question is, if you have mostly offshore
34 species composition, is it reasonable to assume -- I just want
35 you to discuss this a little bit. Is it reasonable to assume
36 that the more shallow regions would be the same composition?

37
38 **DR. ROOKER:** No, and that's a good question, and one that we've
39 -- When we initially came up with our species composition
40 estimates, we had it in the two depths by region, but then we
41 found ourselves essentially using data from two transects to
42 apply species composition for across that entire inner region,
43 and we didn't feel, necessarily, comfortable with having one or
44 two stations with decent visibility influence everything, and so
45 we opted for a more conservative approach.

46
47 The numbers were generally similar, but we opted to be a little
48 bit more conservative. The inner, the ten to forty and forty to

1 100, were similar, but, again, our sample size was so small, in
2 terms of species composition on the inner shelf.

3
4 **DR. CHRISTMAN:** So how about the distribution of the relief
5 features, the reef anomalies, as you called them?

6
7 **DR. ROOKER:** That's actually a really good point, and I was
8 talking to my graduate student, who has defended and gone, and
9 we were talking about that last week, in terms of that we should
10 plot them, and we haven't yet, but we will plot those, and we
11 could include that, if anyone is interested in seeing it,
12 because there was a strong relationship. Most of those relief
13 anomalies were relatively small, and so, if you were to do maybe
14 thirty cells in a three-kilometer transect, you would probably
15 notice a couple, and, oftentimes, those relief anomalies,
16 regardless of how they small they were, would hold fish.

17
18 **DR. CHRISTMAN:** Then the final question I have was you said the
19 individual, the 147 individual EK-80, transects were randomly --
20 The starting point and direction were randomly chosen, but I
21 would call the ship transects, which are the larger tracks of
22 the points that you're displaying in your graphic here, were
23 they randomly chosen, because they don't look random.

24
25 **DR. ROOKER:** That's what I mentioned too, and, in terms of --
26 They were on the outer shelf, where we had research cruises and
27 we were going along a depth gradient, and it was easier to --
28 The issue for the inner to mid-shelf locations is just it's a
29 logistics issue, in terms of how do we sample that area in one
30 day on a small boat, and we're trying to run as far as we can,
31 which may be sixty nautical miles, and we can usually get three
32 or four transects done in a day, and we're trying to cover
33 regions, different depth regions, across that entire transect,
34 and so, basically, there would be a window, a random window,
35 once we got to a specific point, within say five kilometers,
36 where you would pick a starting point in there randomly, and
37 then you would pick a random heading, and that's the direction
38 that you would pull the transect. It's not ideal.

39
40 **DR. CHRISTMAN:** But the cluster of transects that would run
41 along the line might -- I guess that's Galveston there, where it
42 looks like you ran out one, two, three, four, on like seven or
43 eight days, to run a long a particular line, running transects
44 in random directions along that line. Those ship lines, and
45 let's call them that, weren't randomly selected, or were they?

46
47 **DR. ROOKER:** Basically, what we were trying to do is we were
48 trying to fill the area the best that we possibly could.

1
2 **DR. CHRISTMAN:** Yes, and I completely understand. I mean, it's
3 expensive to do this.

4
5 **DR. ROOKER:** Yes, and then the thought was, Mary, when we into
6 this -- So we thought that -- We tried to be random, in terms of
7 where the actual starting point was, and then then heading, and
8 then our assumption was, if we created thirty sampling units, or
9 cells, from that transect, that the team could randomly select
10 three or four of those units from the transect, because, again,
11 we generated about 3,500, if I'm not mistaken.

12
13 This gets back to Luiz's question, and maybe that's what he is
14 going to ask me about, earlier, just in terms of do we have
15 enough sampling effort, and so, from Rob's design, remember that
16 he had about 380 ninety-by-ninety-meter cells, and we actually
17 did an order of -- Or at least provided an order of magnitude
18 more cells to actually pull from.

19
20 **DR. CHRISTMAN:** So, just to make sure that I completely
21 understand, in an individual transect, and say you had twenty
22 cells, each individual cell was ninety-by-ninety meters, and so
23 what you did was you took the image and converted that into a
24 total count within that ninety-by-ninety.

25
26 **DR. ROOKER:** That's correct.

27
28 **DR. CHRISTMAN:** Then you converted that to red snapper, using
29 the composition.

30
31 **DR. ROOKER:** That's correct, Mary.

32
33 **DR. CHRISTMAN:** Okay. Thanks. I'm done.

34
35 **CHAIRMAN POWERS:** Thank you. Kai.

36
37 **DR. LORENZEN:** I think Mary has asked most of my questions, and
38 so I will be quick. Coming back to the location of the camera
39 versus the acoustics, and I get the point of doing a regional
40 thing, but it still seems to be that your species compositions
41 come from the edge of your region, and then you sort of
42 extrapolate them into the rest of the region, and I understand
43 why, with the visibility, but it still makes me not as confident
44 in the validity of those distributions and the more inshore
45 areas.

46
47 That was one, and I guess it's more a comment than a question,
48 but the other is I'm still -- About, basically, the deviation

1 from the original design, and I get those practical points, but
2 I'm also wondering to what extent, maybe, is it better to stick
3 with the design and do fewer samples, if you have to, and that's
4 kind of more of a question, I guess, for our statisticians, but
5 I'm a little puzzled by the extent of the deviations from the
6 original design that seem to be more common in Texas than in the
7 other parts of the study. Thanks.

8
9 **DR. ROOKER:** I think both of those are valid points, and it was
10 one where we -- We were actually concerned by the number of
11 zeroes going into this with the points, and there were
12 logistical issues too, in terms of how you sample this broad
13 shelf properly with towed gear, but there were a lot of zeroes,
14 and I think this gets back a bit to Luiz's point yesterday about
15 this expansion factor.

16
17 Actually, I think it provides justification for the use of
18 transects, which is going to generate more sampling units, and,
19 again, our assumption going into this was there are going to be
20 lots of zeroes on uncharacterized bottom, and it's going to be
21 extremely high, and we worried about having sufficient samples,
22 not knowing how many relief anomalies were out there, holding
23 biomass to adequately capture the natural variability on this
24 uncharacterized bottom.

25
26 It wouldn't be a big deal if it was zero, zero, zero, zero, one,
27 but, if you get twelve zeroes, and then you get 120, we were
28 worried that, with only having 380 sampling units, would we be
29 able to capture that properly, and so we opted for increasing
30 the sampling area, and I think that's one too -- Will maybe --
31 He commented on this yesterday, but, where they had sampling
32 units, and he had -- If I remember, correctly, and, Will, please
33 chime in if I'm wrong, but it was one or two samples that had a
34 huge impact on the overall estimate once you extrapolated, once
35 we applied this expansion factor.

36
37 Hopefully, by having more sampling units, and knowing that
38 relief anomalies are -- Their distribution is scattered, and
39 somewhat random, that we captured that, and hopefully smoothed
40 out some of the variability, without having one or two sites on
41 uncharacterized bottom that held a bunch of fish having a big
42 influence on our overall estimate.

43
44 **CHAIRMAN POWERS:** Thank you. Jim Tolan.

45
46 **DR. TOLAN:** Thank you, Mr. Chairman. Thank you, Jay. That was
47 a really good presentation, and I feel for you when you start
48 working with the nepheloid layer off of Texas. The question

1 that I have is, really, it kind of struck me when you had -- The
2 species composition that were not red snapper, I was surprised
3 not to see sciaenids up there, because, in most of the longline
4 data from this persistent nepheloid area from the shrimp
5 grounds, red drum are really much more prevalent than red
6 snapper, and so, from an acoustic point of view, this -- Do you
7 think the number of red drum out there might be inflating these
8 red snapper numbers in places where you don't have the camera
9 view? Thanks.

10
11 **DR. ROOKER:** Jim, that's a good point, and I think we were -- I
12 think our effort in that twenty-meter and shallow depth was
13 limited, because we couldn't see much, and I would imagine that
14 the sciaenids would be -- I know some of the nearshore platforms
15 here hold lots of sciaenids, red drum and other species, and I
16 know that places like Freeport Rocks, some of these bathymetric
17 highs that are only -- They are relatively shallow, less than
18 twenty meters, but they hold a lot of sciaenids as well, and,
19 again, I don't know if there's a possibility that those
20 individual sciaenids are farther offshore, and maybe their
21 proximity to the seabed biased our ability to pick them up with
22 the camera here.

23
24 **CHAIRMAN POWERS:** All right. Thank you. Steve Murawski.

25
26 **DR. MURAWSKI:** Thanks, Mr. Chairman. I wanted to generally
27 support what Rob said about the species composition in this
28 particular region, in the northwest region of the Gulf, and, as
29 I said yesterday, we had done a longline survey around the Gulf
30 of Mexico, and it included a number of inshore to offshore
31 transects, and, by inshore, I mean starting at forty meters and
32 going out to 300.

33
34 We did some species accumulation and rarefaction curves for
35 these different sections of the coast, the northwest area, the
36 north central, the West Florida Shelf, and then off of Mexico
37 and Cuba, and, if you look at the rarefaction curves, and
38 particularly the species accumulation curves, they top out at a
39 much lower level, which means that the species diversity in that
40 particular region on the bottom, subject to a longline survey
41 gear -- It's a very depauperate fauna, relative to the other
42 places in the Gulf, and I suspect some of the issues of -- Over
43 on the West Florida Shelf, for example, it's much more grouper
44 dominated.

45
46 You never see red grouper on the western side, as opposed to it
47 being a dominant grouper on the eastern side, et cetera, and so
48 I'm happy to make that -- We published those results in a paper

1 in 2018, and I am happy to send that along, but, generally
2 speaking, when we looked at the longline survey data, large red
3 snapper, and I mean very large red snapper, were the dominant
4 species in the composition from forty meters on. Thanks.

5
6 **CHAIRMAN POWERS:** Thank you. Luiz.

7
8 **DR. BARBIERI:** Actually, I will pass, Mr. Chairman. Thank you,
9 Jay, for the presentation. It was a great presentation, but,
10 between Mary and Kai and Jim, they have already asked the
11 questions that I was thinking about, and so I will pass.
12 Thanks.

13
14 **DR. ROOKER:** Thanks, Luiz.

15
16 **CHAIRMAN POWERS:** Benny Gallaway.

17
18 **DR. GALLAWAY:** That was a very nice presentation, and I concur.
19 All my experience tends to concur with your proportions of red
20 snapper dominating in most of these habitats. I would like to
21 also point out that I -- It's my belief that the shrimp trawl
22 data, the point data, the every-ten-minute intervals while
23 towing, provides a very good index of things and these small
24 habitats and the distribution of habitats utilized by red
25 snapper, and so the shrimpers avoid those areas, because they
26 lose their nets.

27
28 **DR. ROOKER:** Good to hear. Thanks, Benny.

29
30 **CHAIRMAN POWERS:** All right. Thank you. Jim Nance.

31
32 **DR. NANCE:** Thank you, Dr. Powers. Jay, that was a great
33 presentation. I've got a quick question, and most of my
34 questions have been answered, but, on the composition of those
35 relief anomalies, are they hard substrate, or are they just
36 large areas of mud that can move around during storms and
37 things?

38
39 **DR. ROOKER:** That's an excellent question that we do not have an
40 answer for. We could pick them up, but, without having
41 something like side-scan, we don't know what the composition is
42 of those relief anomalies, and so it could be exposed pipeline,
43 or it could be somebody dumped a canister overboard, or it could
44 be that there's some type of uplift in the bottom, and it's
45 really difficult to say, Jim, but it's clearly something that we
46 need to know a little bit more about.

47
48 **DR. NANCE:** Yes, because I know that they do attract fish. In

1 those areas, you see a pile of fish around them, but there could
2 be some movable, that sometimes they're not there, and sometimes
3 they're there in large quantities, and so that would add a lot
4 of variability to the composition data, also.

5
6 **DR. ROOKER:** Yes, I agree.

7
8 **DR. NANCE:** Okay. Thank you.

9
10 **CHAIRMAN POWERS:** Thank you, and thank you for the presentation.
11 Then I believe that now we're going to move on to Greg's portion
12 of the presentation for the other bottom types.

13
14 **ARTIFICIAL REEF/NATURAL BANKS**

15
16 **DR. STUNZ:** That's correct, Joe. Before I get going, those were
17 some great questions, and, just to Benny's and Jim's points that
18 they just brought up, because it will be relevant to some of the
19 work that I'm going to talk about here, a main thing that I
20 think we need do, post-this-study, meaning someone, scientists,
21 is better characterize the uncharacterized bottom.

22
23 Benny has a good idea of looking at shrimp trawl tracks, to try
24 to get a better idea of how much of that is really out there, as
25 well as we just didn't simply have the ability, with the towed
26 gear, to go back and characterize, well, what was it, what was
27 the structure, but that's something that is much needed, and,
28 Jim, your point about movement back and forth among these
29 habitats, even from artificial and natural back to
30 uncharacterized bottom, is important, but it's just something,
31 obviously, that was beyond the scope, but it's very important,
32 in terms of related to the management of the species

33
34 Anyway, back to the Texas estimate, and, obviously, most of the
35 fish were on the uncharacterized bottom, but, specifically, to
36 be true to the RFP, and they explicitly asked us to look at
37 artificial reefs and natural banks, which we did, and, based on
38 Rob's design, we were able to -- His original design was asking
39 us for sixty sites, split evenly between pretty much being
40 artificial reef and natural bottom, and, of course, distributed
41 within our depth strata that we've been talking about since the
42 beginning of these presentations.

43
44 Before I get into that, I want to just talk about what do these
45 habitats really look like, so that it can inform some of our
46 sampling, and I think, Mary, some of your questions about the
47 distribution of natural reef habitat -- I have some maps that I
48 think might answer your question that could be informative.

1
2 Artificial reefs are very diverse. In fact, the artificial reef
3 in Florida is very, very different than artificial reefs in
4 Texas, and we've talked about that, including natural banks, and
5 even within those structures, even in Texas, they're different.

6
7 Sometimes they're standing and up out of the water column, and
8 sometimes they're toppled. Sometimes they're cut off, and
9 sometimes they're tiny, as small as a car, with hundreds and
10 almost thousands in a field, and sometimes they are in between,
11 and, at the sampling resolution we have, that makes it very
12 difficult, and it really forced the post-strata analysis into
13 really large and small-type structures, just because of the
14 sampling resolution we could dedicate to that particular
15 habitat.

16
17 To give you an example of what a rig might look like, and you've
18 seen a lot of video now, but this is the example of the snapper,
19 and, yes, it's dominated by snapper, and they are typically
20 large snapper, compared to the sizes that you see out east.
21 Certainly, there's more size composition, especially on the
22 habitat that Jay just reviewed.

23
24 The natural banks, what's different about the natural banks in
25 Texas is there is relatively very few of them, but they're very
26 high in relief, at least the ones we know about, and, in fact,
27 we find ones that we don't know about all the time, and it's
28 fairly routine, and likely that's what those fish are holding on
29 in our unclassified bottom. That's typically what it looks like
30 in an ROV, but what I want to draw your attention to is the
31 predominance of snapper that you see there.

32
33 Mary, I put this in, because you had the question yesterday, and
34 this is actually a map that John Froeschke with the Gulf Council
35 did, and so, John, thank you. I just pulled this out of a white
36 paper that you did, last night, when I thought about that this
37 might be informative to our discussion.

38
39 Now, keep in mind this is somewhat cursory, and, in fact, it
40 could be more resolution, but I'm trying to fit this on one
41 slide. What you see here is -- This is hard bottom, and it's
42 rock dominant and rock subdominant, and you could group these
43 into various categories, but clearly what you see, as you go to
44 the west, especially in the northwest Gulf, is there's just not
45 much.

46
47 You kind of see the Flower Gardens out here, over in this
48 region, but there's not a lot of bottom, and so they're very

1 discrete, and so that also gets to your point about are we
2 running over them with a transect, like you would in Florida,
3 and probably not.

4
5 It also lends to the sort of Florida-centric design that we had,
6 where you have a lot more of the sort of ones, twos, and threes
7 that Rob talked about, but, in reality, our habitats are very
8 much more like threes, high-feature and high-relief habitat that
9 do hold an abundance of snapper, and, in fact, they're called
10 snapper banks, because, traditionally, that's where the
11 commercial fishery operated, is on those banks.

12
13 I am happy to pull that back up later, through our discussions,
14 and I think that's important, to get a feel for how different --
15 It's a good example of why this regional approach became so
16 essential, because it wasn't a one-size-fits-all sort of thing.

17
18 Here is the universe of our known natural banks that we have,
19 and I am going to overlay this in a minute with the artificial
20 reefs, but I want to bring up another point that you had, Mary.
21 Here, these are to scale, and that's the actual size relative to
22 the uncharacterized bottom, but I want to draw a point that I
23 think will help clarify some other discussions.

24
25 We have three depth strata that you see here, and, even though
26 it's a shallow depth strata, that can be a little bit
27 misleading, because the shallow depth strata ends right here off
28 of Galveston, and that's a long way. You're talking sixty-plus
29 kilometers out.

30
31 Of course, it's narrower as you get into south Texas, and then
32 the deep band, obviously, is very limited as well, and so that
33 also limits our stratification design, because not everything is
34 distributed within the strata that we necessarily would like
35 them to be, but I think those are some important points, that
36 some might be thinking this shallow is up nearshore, in state
37 waters or something like that, and that's not quite the case,
38 especially as you move east, and even more in Louisiana.

39
40 What's not to scale is this slide. These are our known
41 artificial reef universe, and, Mary, you asked the question
42 about, well, it looks up they take up the whole shelf, and, yes,
43 they are scattered about the shelf, but, in reality, they take
44 up just a very tiny portion, in terms of their actual areal
45 coverage.

46
47 If I put the true scale on here of the reefs, you probably
48 couldn't see them, and they would be tiny, and so they're not to

1 scale in these images, and they're just so we can have them for
2 discussion purposes.

3
4 Back to the design, and so, for our layers, we were able to
5 randomly select by strata, of course, our natural reefs to
6 sample, as well as the artificial reefs.

7
8 The gear, and it's very similar to what Jay did on natural
9 banks, and so I won't go into that, and, of course, Dr. Boswell
10 gave a great presentation yesterday on all the acoustic details,
11 so we could efficiently get through these presentations and not
12 have to be repetitive, and so I'm just going to add what's
13 different from what Jay did to the uncharacterized bottom.

14
15 We have our ROVs, which essentially allow us to get a species
16 composition, and we are not -- Unlike Will, we're not counting
17 the fish from the ROV for the estimate, simply because we don't
18 have the visibility, and the nepheloid layer is just as
19 persistent on these two habitats as they are on uncharacterized
20 bottom, although we get days where we can generate really good
21 species composition, but that's very unpredictable.

22
23 The top surface waters are crystal clear, generally, but, once
24 you get down to the bottom, it turns to zero visibility, and
25 there's no way to predict that, even from the surface, and so we
26 simply just have to go out and collect what we can, and we're
27 fortunate to do enough sampling that we come across days where
28 we can generate good species composition.

29
30 I will give an example, because we have some challenges with
31 species composition when you have high-relief habitats that I
32 will talk about, but, essentially, you generate a MaxN, a
33 maximum number of fish in any particular field of view, and we
34 can do that for forward and rear-facing cameras, to avoid
35 duplication, and I will talk in more detail about that in just a
36 second.

37
38 However, we pair that with the acoustic data, which is actually
39 getting our total fish density, which then we can extract the
40 composition, just like Jay did, and then generate a species-
41 specific density, either per unit area on the natural reefs or
42 per structure for the artificial reefs, which we considered as
43 discrete units.

44
45 How we might do a transect, while there is relief on the natural
46 banks, it's not relief like you would have with an oil-and-gas
47 platform, and so we have several papers that are cited that you
48 can read much more details, and we have worked very hard, in the

1 past decade, to develop ways to adequately describe these
2 structures and characterize them, using this methodology, but,
3 for the species comp here, we essentially descend the ROV.

4
5 Then we have a randomly-selected location on one of these banks.
6 When we get down to the location, the ROV is georeferenced, so
7 we know how far it goes, and we do three forty-meter transects,
8 and then we ascend back to the surface, making interval stops
9 along the way and calculating that species composition.

10
11 Typically, red snapper on natural banks being demersal, they are
12 at the bottom, or similar to what you saw in Jay's video, or
13 near the bottom, and so we capture that from our surveys and ROV
14 video, and that's not the case for artificial reefs, and so the
15 difference with artificial reefs is you have a huge amount of
16 relief coming up off of the bottom.

17
18 Typically, the snapper are at the bottom, but, in fact, they do
19 distribute throughout the water column, generally at lower
20 composition as you get higher in the water column, and so that
21 requires us to do essentially a depth interval composition that
22 can be applied across those habitats.

23
24 To give you an idea of what this would look like, clearly the
25 depth varies, and so we start at the bottom and then go up every
26 ten increments to calculate various layers, and then, based upon
27 those layers, we assign back a species composition, and so we'll
28 go down to the bottom and do a one-minute count, and then we'll
29 move up to the next ten meters and do another one-minute count
30 and so on, until you get to the top, depending upon the layer
31 depth that you have.

32
33 Essentially, from that, we can apply species composition, but,
34 in this case, we apply that species composition by site, by
35 depth, and then, of course, we did the species composition for
36 depth strata, because the composition differs from shallow out
37 to deep, and so we do it by depth strata and, of course, by the
38 habitat type, whether natural or artificial, and so that
39 composition, from when we get our acoustic profiles, is applied
40 back to those depth bins, and so we don't just apply one species
41 composition, but, to give you an idea -- So each layer would
42 have a different composition.

43
44 To give you an idea of what it is though, compared to like a
45 natural bank or a natural bottom or unconsolidated bottom that
46 Jay was looking at, where you can have a pretty much uniform
47 composition that you can apply back in a more uniform way, here,
48 it's roughly about 11 to 15 percent red snapper, but the

1 difference is that our acoustic profile captures that entire
2 water column, and so we have to apply those lower-abundance
3 estimates higher up in the water column, where snapper aren't as
4 dense.

5
6 Then that was for the species composition, to actually generate
7 the echogram from our hydroacoustics, and, again, we would go to
8 random point selected on a natural bank, and, based upon the
9 guidance from Dr. Boswell, there's really two patterns that
10 we've been talking about, and so I won't get into that in much
11 detail, other than we typically fly the flower pattern, with a
12 centroid point that we go out a fixed distance, and then, of
13 course, post-process all that back in the lab. That gear is
14 towed, and it's either fixed on the bottom of the boat or towed
15 behind the boat, to create these patterns.

16
17 Many times, we don't know what we're up against, and we know
18 we're in an artificial reef field, but we don't know sometimes
19 even how many are there, and we know one is there, and there
20 might be a center point, and so we have to do a little bit of
21 ground-truthing in those areas, because we can never know, until
22 sometimes we get back in the lab, for sure what's there.

23
24 We will do -- I should point out that, in general, from our
25 tagging studies in the literature and a lot of work that many
26 other folks have done, there is a zone of influence around these
27 natural banks, and especially artificial reefs, of roughly,
28 depending on what study you read, fifty to a hundred meters, and
29 so we considered that, but, typically, the fish are very tight
30 and very close to the structure.

31
32 We would do these more mow-the-lawn transects, just to make sure
33 we covered the area, or we may not know exactly how big it is,
34 and remember these oil-and-gas platforms are very, very large,
35 the size of three-story buildings on their side and that sort of
36 thing, and so we want to make sure that we capture the whole
37 structure, but, at the same time, we've gone beyond that, but,
38 in the lab, that would be back and truncated to that zone of
39 influence.

40
41 I won't get into the processing, because Kevin has already been
42 into that in a lot of detail, but you can kind of see here, in
43 this instance, where a rig was cut off, and it was set next to
44 it, and you see the fish above that, which we would apply the
45 composition to, and the green line, and maybe you can barely
46 make it out, is what we would extract just to get to the fish.

47
48 We know there is fish inside the structure, and there is

1 probably fish next to the structure, and, of course, right on
2 the bottom, that we're having detectability issues, leading to
3 an underestimate.

4
5 We will talk about the exact analyses for this in Rob and
6 Lynne's portion coming up here in just a few minutes, but, to
7 give you the overall take-home message from natural and
8 artificial reefs, this is the estimate on artificial reefs and
9 our variability of just about a million fish, with a 40 percent
10 CV.

11
12 We share the same uncertainties that we've been talking about
13 for the past few days, about the issue with the detectability of
14 these fish, primarily as it relates to visibility concerns, in
15 the sense of the ROV, but also the echogram as well, in terms of
16 what it is or is not picking up.

17
18 For the natural reefs, it's about six million fish, with a 38
19 percent CV, and the same kind of issues we might have, and
20 there's somewhat of a dead zone about a half-meter off of the
21 bottom, which leads us to exclude fish that might be really
22 attached to the bottom, and I should point out that snapper are
23 generally very site-attached. They're very close to the
24 structure, and they do forage out, especially at night, as Dr.
25 Eggleston had mentioned yesterday.

26
27 All of our surveys were done during the day, but they're still
28 typically within that zone of influence, and we know that from
29 our electronic tagging with our acoustic tags and that sort of
30 equipment, but, many times, our tags would have let's say a
31 three-year lifespan on the battery, and those tags are going out
32 on the same structure we tagged them in, and so we tend to think
33 that they're very site-attached.

34
35 Putting this all into perspective, and this is just a copy-and-
36 paste out of the Texas region for the table, if we have some
37 discussion on that, in terms of our sample size, the density per
38 structure, of course, and our total estimate, bringing the Texas
39 estimate to twenty-two million, when you add in Jay's fifteen
40 million uncharacterized bottom component. Dr. Powers, that's
41 the Texas component of this, and I will go ahead, I guess, and
42 stop there for questions, or what do you prefer?

43
44 **CHAIRMAN POWERS:** Yes, let's stop for questions here and give
45 people a chance to -- First up is Mary, Dr. Christman.

46
47 **DR. CHRISTMAN:** I seem to get my hand up a lot. Thanks a lot,
48 Greg, for the maps. That really made a big difference. I

1 appreciated that.
2
3 **DR. STUNZ:** Sure.
4
5 **DR. CHRISTMAN:** I just have one quick question, or, actually, I
6 have two. One was did you do the average composition by
7 artificial reef type, or did you apply the composition, the
8 depth-stratified composition, that was observed at each site for
9 the artificial reefs?
10
11 **DR. STUNZ:** It was combined for the depth strata, and so, for
12 example --
13
14 **DR. CHRISTMAN:** So it was the averages.
15
16 **DR. STUNZ:** Yes, and so we did -- I'm trying to -- Let me think
17 here. We did sixty-six species composition, and, of those -- I
18 don't remember, Mary, and I could get you how it came out, but
19 roughly about half of those on artificial reef and half on
20 natural bottom, and those were by depth strata, and that
21 generated an overall species composition for that depth strata
22 for that habitat that we applied, and, of course, it was binned
23 by depth.
24
25 **DR. CHRISTMAN:** Yes. Exactly. I wanted to confirm that that
26 was done similar to the others. The other question I have,
27 related to your sample size, is you said that Rob had provided
28 you with thirty and thirty, and your final table shows thirty-
29 six and forty-nine, of which four were on small, and I'm
30 wondering -- You did not pre-stratify the artificial by size,
31 and that was post-stratified, correct?
32
33 **DR. STUNZ:** Yes.
34
35 **DR. CHRISTMAN:** So that's why the small sample size for the
36 smalls. Okay. Thanks. I'm done.
37
38 **CHAIRMAN POWERS:** Thank you. Dave Eggleston.
39
40 **DR. EGGLESTON:** Hi, Greg. Thanks. The maps were also very
41 helpful for me, and I'm still struggling with the species
42 composition issue a little bit, in terms of coming up with a
43 reasonable ecological explanation for the dominance of red
44 snapper, and I appreciated Steve Murawski's comments about their
45 published longline data, and I think that would be really
46 helpful to reference, and then Benny made another comment, kind
47 of confirming, and so I just wanted to probe this a little bit,
48 and two things.

1
2 One, in terms of the ROV, we've spent a lot of times, in terms
3 of the visual methods, looking at red snapper behavioral
4 response to that gear, but we really haven't talked about the
5 other species that are in those assemblages that might be
6 responding to that gear, and so amberjack are pretty curious,
7 and so I can see where they might be attracted to it, but, other
8 things, and you showed cobia in your schematic, and I'm guessing
9 that there are species that might see that gear and flee.

10
11 I just wanted to talk about that a little bit, and then the
12 other part of my question relates to reminding me of what target
13 strengths -- What other species have a similar target strength
14 to red snapper? If you could just talk a little bit about those
15 two questions.

16
17 **DR. STUNZ:** To your first question about the sort of species or
18 the dominance of snapper, in Texas, in the western Gulf in
19 general, if there's a relief feature at almost any depth, and
20 now even we're starting to see this inshore, with our recent
21 freezes that we didn't know about, it's got snapper on it,
22 almost guaranteed, and it's just they are very, very prevalent,
23 and there's a lot of reasons why, and maybe it's great juvenile
24 habitat, a lot of juvenile habitat, that they can easily recruit
25 right back to these preferred habitats or something, and we just
26 don't have a good answer for that, Dave.

27
28 On the behavioral component, Will did the studies out in Florida
29 that generally showed not a lot of attraction or repulsion, and
30 I think we feel that's the case here, and we don't have data,
31 and we didn't do behavioral studies to the ROV or anything like
32 that.

33
34 Just from observation, there's really not a response similar to
35 what Steve saw, where we would have captured them on the video
36 before we -- We don't see them on the video and then they flee,
37 for example.

38
39 Now, of course, they could have fled before the video was in the
40 water, and it does take us time to get the gear, and it can take
41 hours to get all of your gear set up and in the water and all
42 that sort of thing, but the general behavior of almost all the
43 fish are unresponsive, except when they get hit by the lasers.
44 They don't like that, and so that's kind of strange, but, in
45 general, and so I don't have a quantitative answer for you, as
46 far as what behavioral response would look like. If anything, I
47 would say that our composition is probably biased towards the
48 low side.

1
2 Target strength, we've got other species, such as gray snapper
3 and vermilion snapper, large cobia, and there are some grouper,
4 but they are very rare, but those all those species are -- We
5 have, of course, all the species compositions calculated, and
6 they're relatively rare, collectively, things like amberjack,
7 compared to the abundance that we see of red snapper, and so,
8 sorry, and I don't know what else you were looking for regarding
9 the target strength, but those are a few species that would be
10 captured on the echogram.

11
12 **DR. EGGLESTON:** Yes, and that's what I was asking, and so,
13 basically, the gray snapper and the vermilion snapper would have
14 a similar target strength to red?

15
16 **DR. STUNZ:** Yes.

17
18 **DR. EGGLESTON:** Okay.

19
20 **DR. STUNZ:** Fortunately, they do partition some that we see,
21 especially the gray snapper and vermilion snapper, on how they
22 are utilizing the reef, especially further up in the water
23 column, which is nice for our -- The snapper tend to utilize
24 areas closer to the bottom. Now, of course, we didn't -- We
25 have not analyzed the distribution around these structures like
26 that, which would be something interesting to do.

27
28 **DR. EGGLESTON:** Just sort of an ecological question, and who is
29 preying on those two-year-old red snapper, besides humans?

30
31 **DR. STUNZ:** Well, given their expansion lately, not a lot in the
32 western Gulf, and so there is amberjack that will eat them, for
33 sure, and, of course, there's a lot of sharks around the area,
34 and there are some large grouper, and we get goliath, but
35 nothing like in Florida or anything. We have bigger warsaw
36 grouper, and those fish

37
38 **DR. EGGLESTON:** Thank you.

39
40 **CHAIRMAN POWERS:** Thank you. Then we have Benny Gallaway, and I
41 think that will close out this section. Then Luiz wants to
42 talk, but go ahead, Benny.

43
44 **DR. GALLAWAY:** Greg, nice job. Would you comment some on the
45 relative density on natural banks from going onshore or
46 offshore? What are the typical densities that you see on those
47 shelf-edge banks, and what is the distribution of red snapper on
48 those shelf-edge banks? Are they on the top of reefs or the

1 slope? Would you comment on that? Then, also, the proportion
2 of red snapper on platforms, on your artificial reef category,
3 is that a large component, an average, or multiple? Thanks.

4
5 **DR. STUNZ:** Benny, those are some great questions, and that's
6 something that some of my graduate students are looking at. As
7 you start to discover things, as you look at -- Not only are
8 artificial reefs very different in Florida than they are in
9 Texas, but even the natural banks and such are different, even
10 how they spatially use some of these natural banks, versus the
11 crest and the edge and that sort of thing, and we're just
12 beginning to sort of look at that, Benny, but we don't -- We
13 think we can tease that out from the information we have, but
14 it's definitely not part of the study.

15
16 Now, we see, on average, about 0.4 or so per hundred meter
17 squared snapper density, and that's pretty consistent across the
18 depth strata, in terms of even with that shallow shelf coming
19 out so far, even in our shallow regions, and a lot of our
20 regions closer to shore, even within state waters, have large
21 populations of red snapper as well.

22
23 I don't know if I would say that it was even, and I would need
24 to go back and look at the data, to really see what that
25 distribution change would look like, but, as far as the overall
26 number per artificial reef compared to natural bank, it's kind
27 of hard to make that comparison, because the artificial reef, as
28 you well know, is going straight up out of the water, and so the
29 footprint is relatively small, where the footprint of a natural
30 bank is much greater, but they are generally less dense.

31
32 We see very high concentrations of densities of red snapper on
33 artificial reefs, much greater than the natural bank, but then,
34 when you start expanding that out to a footprint, of course,
35 that's where it changes, in terms of a little lower densities,
36 but a lot more area, and so they also, Benny, probably partition
37 from size as well, and Dr. Streich, who is the lead for these
38 components with our group, has done a lot of work looking at
39 size distributions, and that's an important component as well.
40 There are still large age-two-plus, but we tend to get larger
41 fish on the natural banks.

42
43 **DR. GALLAWAY:** I'm looking at Table 7, and I saw the deep
44 natural reefs had a density per hundred meters squared of like
45 0.1, whereas it was about 0.4 in shallow and mid-depth, and is
46 that characteristic?

47
48 **DR. STUNZ:** Yes, with keeping in mind that shallow could mean

1 far from shore, depending on what area you're at, and so it's
2 kind of this misleading -- Shallow doesn't necessarily mean very
3 nearshore.

4
5 **DR. GALLAWAY:** Got it.

6
7 **CHAIRMAN POWERS:** Okay. Luiz, and then I want to close out of
8 this section.

9
10 **DR. BARBIERI:** Thank you, Mr. Chairman. Greg, thank you for the
11 summary presentation. That was very helpful. I am back looking
12 at that Table 6 on page 84 of the report, and I am just
13 wondering if you could comment on that main density in
14 uncharacterized bottom.

15
16 When you look across-the-board, for Texas, Louisiana, and
17 Florida, and they're not very different for even Alabama and
18 Mississippi, but the mean density is very similar, if not the
19 same, and I'm trying to reconcile this with what you just said
20 regarding just the dominance of red snapper over vast portions
21 of the bottom there, of the species composition being so tilted
22 towards red snapper in most of the sites.

23
24 **DR. STUNZ:** Luiz, I don't have -- I can speculate for you. In
25 terms of do I think those numbers are real, yes. I think, when
26 you look at that map that I showed, and that was one reason that
27 I put it up there, that Dr. Froeschke created, it's that they
28 have a lot -- I am suspecting there is a lot of relief anomalies
29 out in the uncharacterized bottom that we just don't know about.

30
31 I think we're just scratching the surface of it with this study,
32 and it, obviously, needs to look a lot better at that, including
33 -- Now that we have this hindsight, Luiz, we should have spent a
34 lot more time on uncharacterized bottom, but we didn't know,
35 going in, that we would discover what we did.

36
37 Definitely future studies need to go back out and better
38 characterize that bottom, not only what it is, but are they
39 ephemeral things that come and go, or are they containers, or
40 what does it really look like, but I think, in Texas at least,
41 that I can comment, and the western Gulf in general, there is
42 just a lot of area for them to spread out, and so that's why you
43 see, even though the composition is high, they have places to
44 go, essentially.

45
46 **DR. BARBIERI:** Okay. Got it. Thank you, Greg.

47
48 **CHAIRMAN POWERS:** Thank you, and thank you for the

1 presentations. We're going to take a break now for about ten
2 minutes, and I noticed that Dave Chagaris is back on, and so,
3 when we come back, we will be going to revisiting some of the
4 issues for Alabama/Mississippi, and, essentially, that's going
5 to start with the information from Liese and John Hoenig that we
6 talked about before and to respond to some of Dave Chagaris'
7 questions and debate we had yesterday, particularly with Luiz,
8 and so let's take a ten-minute break, and we'll be back.

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

11
12 **CHAIRMAN POWERS:** Welcome back, and thank you. The way we left
13 it before, in terms of the agenda, we were going to revisit the
14 issues relative to Alabama and Mississippi, in particularly some
15 requests for information that Dave Chagaris had made, and Liese
16 Carleton had agreed to provide some information, as well as John
17 Hoenig was going to address some of those issues as well.

18
19 A number of people have to drop in and out, and I'm not
20 announcing each one of them, but, if there are -- If you're not
21 going to be available for something, drop Ryan or I a line, and
22 we'll try to -- If it comes to critical things, we'll keep that
23 in note, and so, at this point, let me turn the podium over to
24 Liese or John Hoenig, or let's start with the information that
25 Dave Chagaris asked for. Can you kind of start off with sort of
26 reiterating what Dave asked for and that type of thing?

27
28 **DR. CARLETON:** Yes.

29
30 **CHAIRMAN POWERS:** Okay. Thank you.

31
32 **FURTHER DISCUSSION OF MISSISSIPPI/ALABAMA**

33
34 **DR. CARLETON:** Dr. Chagaris asked a couple of very specific
35 questions, and the first one was he wanted to see sort of
36 summary box plots of the vertical line data from just the
37 calibration sites for the depletion study that we did in the
38 Mississippi/Alabama region.

39
40 The first plot on the left there, those are the calibration
41 sites from the Great Red Snapper Count, and there are fifty-four
42 of those, and it's just showing the data summarized in box plot
43 form, with three vertical line sets. On the right, we have the
44 pilot study, because we did use pilot data for calibration. For
45 the pilot study, we only did two vertical lines, which is why
46 there's not a third there, but, again, a similar trend. I'm not
47 sure if you would like to ask more questions about that or if
48 you just want me to move on to the next question.

1
2 **CHAIRMAN POWERS:** Go ahead to the next question.

3
4 **DR. CARLETON:** Okay. Dr. Chagaris' second question was how
5 often is the first ROV index greater than the second, and,
6 again, this would only apply to the calibration sites, and so I
7 put together a little table there, and the first column is when
8 it's greater, and the second is when there was no change, and
9 third is when the first was less than the second, and I'm happy
10 to answer any questions.

11
12 **CHAIRMAN POWERS:** Let me first give the floor to Dave, to see
13 his thoughts and so on.

14
15 **DR. CHAGARIS:** Thank you, Liese, for generating these plots, and
16 so the reason that I asked this question is because I am
17 concerned that each individual site cannot be considered a
18 closed population, and that would be a big assumption that would
19 have to be met for the depletion study.

20
21 For example, if you have an artificial reef that's surveyed by
22 the ROV, and it's measuring fish right on the reef, and then
23 there's fish swimming around the reef, outside the field of
24 view, but then you put down your longlines, and is that going to
25 actually start bringing in fish from outside the survey area,
26 and, if so, if you're allowed to keep fishing and still maintain
27 high catch rates, and it looks like they could be potentially
28 the same as the first longline set, then you aren't really
29 removing enough fish to substantially deplete the population,
30 the local population, and it might also suggest that fish are
31 moving in.

32
33 Because the density estimates are ultimately scaled to this
34 total catch that you get, it could -- If fish are moving into
35 the area, it could bias those densities higher. The second
36 question this is, because you have acknowledged that the density
37 of red snapper on artificial reefs is so high that you can't
38 really count the number of fish, and then you go to the MaxN
39 method -- I mean, I'm wondering if, just by chance alone, if you
40 were to put the ROV down and get a MaxN count, and then put it
41 down again and get another MaxN count, there is probably an
42 equal probability that that second count could be lower or
43 higher, and so, here, it looks like there's potentially a lot of
44 noise just within the ROV data, with almost half of them, or
45 over 40 percent, of the second ROV site taken being higher than
46 the first.

47
48 It just gives me some concern about what is actually being

1 measured here and the scaling of that change in -- What's being
2 measured by the index and then how that's scaled up based on the
3 catch, if the population is not closed.

4
5 **DR. HOENIG:** Liese, do you want to answer that?

6
7 **DR. POWERS:** To your first question, we have good spatial
8 information on distribution of habitat, and so, in general, the
9 reefs are not on top of each other, and so there is at least 500
10 meters that is spread out on different contacts on artificial
11 reef, and we have done experiments, and I think Jim Cowan's
12 group has done similar, to look at the effect of distance that
13 the fish travel to bait, and it's about 150 meters.

14
15 I don't -- I am not as concerned about the migration of pulling
16 from other structures. Now, if there is fish off the structure,
17 which generally there's not too many of, they're generally
18 associated with that structure, and I'm not worried, and I think
19 the assumption that we're dealing with a closed population that
20 is centered around that reef is a justifiable assumption, and I
21 will let John speak, or Liese, to the second issue.

22
23 **DR. HOENIG:** I would like to say something, and sorry, Liese,
24 and I'm kind of elbowing you aside.

25
26 **DR. CARLETON:** It's okay.

27
28 **DR. HOENIG:** But I've been thinking about this quite a bit. The
29 first thing is, with removals, the whole timeframe that we're
30 talking about is very short. The ROV is down for an hour, and
31 then the vertical longlines are fifteen minutes apiece, and so
32 we're talking about a very short period of time, and then the
33 follow-up ROV, and so, when you're talking about, well, maybe
34 the longline is attracting, it's not a ten-hour soak, and it's
35 not a four-hour soak, and it's a very short soak, and so it's
36 not going to be pulling things in from far, and certainly not
37 from other reefs.

38
39 Now, if there's some fish that are kind of swimming around the
40 reef, but not on the reef, that might get pulled in, that
41 depends -- What that does depends upon the behavior, and so, if
42 they circle the reef, but they never come into the reef, then
43 it's like they're a different population, and they are missed.
44 We're estimating what is close to the reef and not what circles
45 the reef, but never comes to it.

46
47 On the other hand, if they randomly go on the reef and off the
48 reef and around the reef, then it doesn't matter. What we're

1 basically saying is you remove some fish, and the fish are
2 redistributing anyway, and so, if there's always 25 percent that
3 is away from the reef, and that remains the case even after the
4 removal, then you get an unbiased estimate, and so the removal
5 does not have to be a random sample of the fish that are there
6 if the fish move around randomly, and so I don't really think
7 that we have a problem with that aspect of the study.

8
9 The other aspect is about whether or not the second ROV count is
10 just random noise around the first ROV count, and, yes, when you
11 look at it and say, gee, 57 percent of the time, ROV1 is greater
12 than ROV2, yes, but, when you take the mean, the means are
13 significantly different, and so there's definitely the case, and
14 you can test the hypotheses.

15
16 Is the mean count after equal to the mean count before, and the
17 answer is no, and it's -- The test says it's lower, and so, in
18 that sense, it's working for the aggregate, but it doesn't work
19 for the individual site, and that's not uncommon with small
20 sample sizes. You can't say what's going on in each component
21 of the population, each reef, but, overall, you can say what's
22 happening over all reefs, and so I think that we're also on safe
23 ground there. Liese, did you want to add anything?

24
25 **DR. CARLETON:** I think you just about covered everything, John.

26
27 **DR. POWERS:** The other thing, Dave, is we do -- We chose to use
28 this approach, but we also did total counts on it, and, as I
29 suspected, total counts were often much, much higher than our
30 estimates derived from this method.

31
32 **CHAIRMAN POWERS:** Thank you. Are there other questions about
33 this, or anything about the Alabama/Mississippi section?

34
35 **DR. HOENIG:** I think the question is whether Dave is satisfied
36 with our explanation.

37
38 **DR. CHAGARIS:** Definitely thank you for the explanation, and
39 it's good to know that the distance between structures and the
40 amount of time -- I still think some other -- Did you do the t-
41 test on the ROV1 and ROV2? It would be interested to see how
42 correlated the cumulative catch is with the delta ROV estimate,
43 and I guess I feel like there's a lot of noise here that might
44 be being attributed to a depletion effect, and so was total
45 catch, total removals, correlated with the change in ROV?

46
47 **DR. HOENIG:** We did do a correlation matrix, and we did do the
48 t-test, and I don't happen to have that in front of me, but we

1 were satisfied that the ROV count after is definitely lower than
2 the ROV count -- The average ROV count after is less than the
3 average ROV before.

4
5 **DR. CHAGARIS:** I think part of the reason I'm struggling here is
6 that, with every other region, we have site-specific density
7 estimates and variances, whereas, here, we're taking an average
8 over multiple sites, and I feel like we might be losing some of
9 the variability at each site. Those site-specific densities,
10 from the ROV or the hydroacoustics, are averaged together to get
11 a stratum density that's expanded, but, here, it's done
12 differently.

13
14 **CHAIRMAN POWERS:** There is a variance estimate.

15
16 **DR. HOENIG:** We have a site-specific index of abundance, and
17 that site-specific index of abundance can be divided by the
18 calibration factor to give you a site-specific estimate of
19 abundance, but that's basically --

20
21 **DR. CHAGARIS:** But the calibration factor is constant?

22
23 **DR. HOENIG:** It is. This calibration factor, in theory, could
24 be subjected to various hypothesis tests, for example depth of
25 the reef, size of the reef, type of reef, and so on, and we
26 tried to do a little bit of that, but what we found was, as soon
27 as you started subsetting your data and trying to do tests, you
28 really didn't have much ability to distinguish whether the
29 medium depth is different from the shallow depth and whether the
30 medium depth is different from the deep depth, and so we
31 basically would have been very happy to estimate more Qs, but
32 the data didn't support it.

33
34 That being said, the approach of estimating a Q, or appropriate
35 Q, if you take other factors into consideration, and then
36 applying that to a population, is not an unreasonable thing.
37 When National Marine Fisheries Service does a trawl survey, if
38 they want to get an absolute abundance, they divide by a
39 catchability coefficient, and, even though there is a great deal
40 of noise at any one site, in terms of you could repeatedly trawl
41 the same spot, and you wouldn't get the same answer every tow,
42 that doesn't mean that you can't get an average abundance.

43
44 **DR. CHAGARIS:** Okay. Well, thank you for following-up.

45
46 **DR. POWERS:** Dave, that is the case. When I gave the data to
47 Rob Ahrens, we used the coefficient, the Q, to turn all the MaxN
48 numbers into a site estimate, and so that is the source, but

1 there is not one overall site estimate that Rob does have the
2 variability in there, but the Q is based on the average.

3
4 **CHAIRMAN POWERS:** Thank you. Are there any other questions?

5
6 **DR. HOENIG:** If I could make one more comment.

7
8 **CHAIRMAN POWERS:** Please do.

9
10 **DR. HOENIG:** We are not assuming that the abundance is the same
11 everywhere, and we are only assuming that the Q is the same
12 everywhere.

13
14 **CHAIRMAN POWERS:** Okay. Mary, do you have a question?

15
16 **DR. CHRISTMAN:** I just want to go back to Dave's first question
17 about the variability and your t-test for the table that you
18 showed there. Well, the table doesn't have the results of your
19 t-test, but I think maybe some of the confusion here is you
20 looked at the delta for the calibration sites and then tested
21 whether that delta was less than zero or more than zero,
22 whatever direction it was supposed to go, but how does that
23 compare to running an experiment where you didn't have any
24 depletion efforts, but you ran the ROVs twice, once and then do
25 it again?

26
27 In other words, how variable is that compared to the variability
28 of the ROV's MaxN count each time? The question then becomes is
29 some of what we're seeing just because MaxN varies between
30 repetitions of the same site, or is it varying because of the
31 depletion?

32
33 **DR. HOENIG:** We did not do repeat ROVs without vertical longline
34 between them, and so I can't answer your question.

35
36 **DR. CHRISTMAN:** It's just a general question of MaxN has some
37 noise associated with it, and I'm just curious as to how much of
38 the total noise was due to that, and that's all.

39
40 **DR. CARLETON:** That's a good question. As John said, we didn't
41 explicitly test this, and there were some sites where the ROVs
42 saw fish, but there was no vertical line catch, and so I could
43 look at those sites, if that would give a bit more of an answer.

44
45 **DR. CHRISTMAN:** That would be interesting. I am not asking you
46 to do it, but I'm just -- It's a more generic, conceptual
47 question.

1 **CHAIRMAN POWERS:** All right. Thank you then. Thank you for the
2 explanations and the response to the question. With that then,
3 we have the Louisiana portion, and Dr. Stunz will be presenting
4 that information. Greg.

5
6 **DR. STUNZ:** I'm ready, and I'm just sharing my screen.

7
8 **DR. HOENIG:** Excuse me, and sorry to barge in, but I was also
9 going to address Luiz Barbieri's comment.

10
11 **DR. STUNZ:** Okay. I will stand by.

12
13 **CHAIRMAN POWERS:** All right. Please do.

14
15 **DR. HOENIG:** I can do it later if you prefer, but --

16
17 **CHAIRMAN POWERS:** No, and I am giving you all the opportunity
18 you need. Please do it.

19
20 **DR. HOENIG:** Okay. Yesterday, it got kind of late, and I got
21 kind of tired at the end, and, in my defense, it was the second
22 day in a row that I was up before the crack of noon, and so it
23 was a long, hard day.

24
25 Luiz made some comments, and so I'm not entirely positive that I
26 understood what his issue was, but I believe it had to do with
27 combining strata and the weights and what should happen and
28 whether there was a bias, and so I put together a very simple
29 example, to try to show what the weights do and what happens
30 with variances.

31
32 On the left is a diagram where I'm saying we have a sampling
33 problem that consists of two strata, and you could think of it
34 as one region has 80 percent of all of the artificial reefs, and
35 another region has 20 percent, or you could think of it as going
36 into two different fish houses, one of which has 80 percent of
37 the red snapper landed in that port on that day and the other
38 has 20 percent, and we decide to get either the mean ROV per
39 artificial reef in the two strata or mean length of the red
40 snapper in the two fish houses, and we do that based on simple
41 random samples.

42
43 In the big stratum, 80 percent of the occurrences, we decide to
44 sample ten reefs, or ten fish, and, in the other one, we sample
45 a thousand, and you might say why would you do that, and, yes,
46 that doesn't seem very sensible, but, supposing we did that,
47 what happens?

1 On the top-right, what we're doing is calculating an overall
2 mean, based on the sampling weight in the first stratum times
3 the mean in the first stratum, plus the weight in the second
4 stratum times the mean in the second stratum, and so the weights
5 are 0.8 and 0.2, and they have to add up to 1.0, the whole
6 thing, and so 0.8 times 140 plus 0.2 times 180 gives you a
7 number that is very close to 180, rather than 140, because --
8 Sorry. That's very close to 140, rather than 180, because most
9 of the weight is going to the bigger stratum, and so, even
10 though we didn't sample it very intensively, we're giving a lot
11 of weight, because most of the sampling units are in that big
12 stratum.

13
14 The N s don't enter into the weighting, and they only enter into
15 calculating the means, because you sum up all of your
16 observations and divide by N . When you look at the variance
17 then of this overall mean, this stratified mean, it's the
18 weights squared times the variances of the means, and so that
19 would be the weight for the first stratum is 0.8 squared, and
20 you take the sampling variance, the variability among the
21 observations in the stratum, and divide by the sample size, N ,
22 which is ten, and, for the second stratum, you're dividing by
23 1,000.

24
25 Essentially, that second term, the variance for the second
26 stratum, starts to approach zero, because you're dividing by
27 1,000, and what we're saying, is, yes, all your variability is
28 due to the fact that you didn't sample Stratum 1 very much, and
29 that gets magnified by the fact that the weight is very large.

30
31 The bottom line is we sampled the big stratum with very low
32 intensity, which means we have a very imprecise estimate, but
33 it's unbiased, in the sense that we can't say that our estimate
34 is too high or too low, and it all depends upon whether our mean
35 for that first stratum, 140, is too low or too high.

36
37 In this example, I'm assuming that the sampling variability
38 within the units in the two strata is the same or similar. If
39 we knew that, oh, Stratum 2 had huge variability relative to
40 Stratum 1, then it might make sense to increase the sample size
41 for Stratum 2, but, if the variances are similar, then making
42 the sample size for Stratum 2 1,000 was not a good idea, and it
43 basically said that we'll take a minor component of the
44 population and estimate it very precisely, and the whole action
45 is in the big stratum, and that we're not going to estimate very
46 precisely.

47
48 In terms of what we did with unconsolidated bottom and

1 hardbottom in Mississippi and Alabama, we did not realize the
2 importance of unconsolidated bottom and hardbottom, the huge
3 amounts that are out there, and so we did not sample it as
4 intensively as we should have, given great 20/20 hindsight, and
5 so our estimate is not as precise as we would have liked and as
6 we could have done with better prior information, but it's not
7 unbiased.

8
9 I hope that that gets at what Luiz was asking. If not, then I
10 apologize for misunderstanding you, Luiz, and I can try again,
11 if you can help me to understand the issue more.

12
13 This second slide just says, for the Great Red Snapper Count, we
14 had thirty-two sites selected, and the MaxN count was 8.48, with
15 a standard error of 1.8, and Sean put this slide together and
16 said, well, if we look at all the sites randomly selected since
17 2018, and so that's Great Red Snapper Count plus some other work
18 he's doing, it's a bigger sample size, and it's a similar
19 population, and so the mean isn't really changing, even though
20 the sample size is going up, but the standard error of the mean
21 is coming down.

22
23 That's kind of what we were trying to say, is, yes, more
24 sampling error would have given us more precision, but the lack
25 of sampling -- The lack of a huge sampling effort did not cause
26 a bias, but just in precision, and that's all I wanted to say
27 about that.

28
29 **CHAIRMAN POWERS:** Thank you. I will give Luiz a chance to
30 respond, if he so desires.

31
32 **DR. BARBIERI:** Thank you, Mr. Chairman. Thank you, John. I
33 mean, I think this helps me understand what you guys did and how
34 this figures into that Table 6. What you're telling me is that
35 those mean densities that show up in Table 6, page 84 of the
36 report, those are actually weighted means that have already gone
37 through the same process that you explained here, because, here,
38 you're presenting weighted means that I agree with. Is that
39 what it shows in Table 6?

40
41 **DR. HOENIG:** I'm afraid that I don't have Table 6 in front of
42 me. Liese or Sean, can you help me out?

43
44 **DR. STUNZ:** I think Sean had to leave for another meeting, and
45 he will be back, and maybe we can address this later or
46 something, and I'm not sure, but he's not on the call right now.

47
48 **CHAIRMAN POWERS:** I am seeing Table 6 on the screen.

1
2 **DR. CHRISTMAN:** The means that are in Table 6 here are for
3 natural, and that should be the weighted average over say the
4 depth strata, or, in the case of Florida, it would be depth
5 strata and the north, central, and southern regions, and so they
6 should be weighted means.

7
8 **DR. HOENIG:** Yes, that's correct.
9

10 **DR. BARBIERI:** Okay, and the same, because, obviously, we're
11 trying to achieve this in a way that each one of these parts of
12 the different habitats becomes additive, so we can come up with
13 a total number.

14
15 **DR. HOENIG:** Yes.
16

17 **DR. BARBIERI:** Do we have weighted means for the artificial
18 habitats as well?
19

20 **DR. HOENIG:** Yes.
21

22 **DR. BARBIERI:** Then that takes care of it, John. That's exactly
23 what I was trying to find out. Thank you for bringing this up,
24 and I was wondering about that, and you clarified it. Thank
25 you.
26

27 **DR. HOENIG:** Okay. Thank you.
28

29 **CHAIRMAN POWERS:** Thank you. Benny, do you have a quick
30 question?
31

32 **DR. GALLAWAY:** Yes, and I asked a question yesterday about the
33 2.02 density per hundred square meters and the total area of 211
34 square kilometers, and the response I got was that the survey,
35 the density, was for features on the average size of sixteen and
36 193 meters squared, but most of that area, the 211 square
37 kilometers, is represented by nine features, each of which is
38 considerably larger than the sample size, and, given that --
39 Every other natural bank in that depth zone, I have seen no
40 densities like that anywhere, and I think we have a mismatch of
41 the sample extrapolation beyond where it should be used to
42 extrapolate.
43

44 **CHAIRMAN POWERS:** But isn't that 2.02 density per structure?
45

46 **DR. CARLETON:** It's per hundred square meters.
47

48 **CHAIRMAN POWERS:** I can't tell which is italics and which isn't.

1 Okay. All right.

2
3 **DR. GALLAWAY:** The 2.02 is density per hundred square meters.
4 The survey area, which -- I just -- I can't accept this, and I'm
5 sorry.

6
7 **DR. HOENIG:** I think Sean will have to address this, and I'm not
8 positive that I have this right, but I think what Sean was
9 saying is the big structures were not uniformly hardbottom and
10 that there is sand mixed in, in places, and so I believe he was
11 looking at these large features and saying, yes, but how much of
12 that is actually hard, and how much of it is sand in between,
13 and so it's kind of --

14
15 **DR. GALLAWAY:** I would refer you to the Corps maps.

16
17 **DR. HOENIG:** Yes, but he had some additional information, more
18 fine-scale observations, to show that the Corps maps, where it
19 indicates hardbottom, it's not uniformly hardbottom, and it's
20 mostly hardbottom, but there's lot of sand in there, and so he
21 had some observations on how much sand is there mixed in there,
22 how much of the area is actually hardbottom and how much of it
23 is sand.

24
25 **CHAIRMAN POWERS:** I am going to cut this off now, because we're
26 going to have to revisit this, particularly in the context of
27 the overall estimates, as we get into that, as so I would like
28 to move on then to the Louisiana portion of it and Dr. Stunz, if
29 we may. Dr. Stunz.

30 31 LOUISIANA

32
33 **DR. STUNZ:** I am presenting the Louisiana section for Dr. Cowan,
34 and some of the work that you're going to hear about today was
35 from me and a post-doc working with me, Dr. Coffey.

36
37 We had some serious sampling challenges, unfortunately, in
38 Louisiana, due to some personnel issues, and so that led to a
39 severe reduction in the amount of samples that we had that
40 required imputation using Texas data nearby, across that
41 Louisiana shelf, essentially, to generate those abundance
42 estimates.

43
44 We had a lot of discussions with our analytical team, who, in
45 just a minute, because they will be up shortly after this, to
46 discuss how those imputation methods were actually applied, and
47 we did have some rationale for why that should occur, but,
48 before I get into that, we did have some sampling there, and

1 particularly Steve Murawski and the uncharacterized bottom, and
2 I will show some maps in a minute, for some of those natural
3 banks and uncharacterized bottom, and so it wasn't that there
4 wasn't any sampling, but, particularly for artificial reefs, we
5 definitely could have used more.

6
7 One rationale is just the sense that we have the western and
8 eastern sub-stock management, in terms of how that's done, and
9 so that's grouping Texas and Louisiana, and so there's some
10 justification there for applying data that might be similar
11 across that area, from some of our original GAM work we did in
12 the Phase 1 component of this proposal, where we really looked
13 at ecoregions throughout the Gulf, and based on habitat type
14 primarily, but also a whole variety of other parameters.

15
16 It's very similar ecoregions and geologic features of that
17 Louisiana/Texas shelf in that region, which, of course, I know
18 that's not all the way, as you move further east, but there is
19 some justification there, and then, also, Texas and Louisiana
20 have very similar artificial reef programs, particularly as they
21 relate to the predominant structures being oil-and-gas
22 platforms.

23
24 The primary difference, from Texas, is there's only a few of
25 them left in Texas that are still active and functioning, and
26 that's not the case in Louisiana, and there's still a lot of
27 them standing, and a lot of removals as well, of course, but
28 there's a lot more artificial reef available habitat, in terms
29 of oil-and-gas platforms that are still there.

30
31 To give you an idea of sort of similar maps that I showed
32 earlier for Texas, in terms of what the natural bottom features
33 look like, probably, and I'm certainly not a geologist, but, as
34 that river is flowing from east to west, you don't get the
35 predominance of shallower natural-feature bottom, and it's much
36 more out on the shelf edge, where it's probably not covered and
37 that sort of thing, with the sediment load coming out of the
38 river, but, for whatever reason, the natural banks are
39 restricted to our depth zone, largely, or close to it. In fact,
40 there are some outside of our depth zone for natural bottoms.

41
42 Similar to Texas, and, again, not to scale, as we've been
43 discussing, is the predominance of artificial reefs in this
44 region. The differences that we see in our estimate here
45 probably can be explained, in the sense that the snapper have a
46 lot of artificial reef habitat and very little natural bank
47 habitat in general, and so that's why you see the elevated
48 abundance on artificial reefs in Louisiana.

1
2 The methods were similar, in the sense of the data collection
3 methods, and so I don't want to go through that again, but, in
4 terms of the imputation, and we can talk about that more, when
5 you look at the ecoregions, we divided -- Essentially, what it
6 was is the upper Texas coast down to the central Texas coast,
7 roughly off of Matagorda Bay, was a similar ecoregion that we
8 applied back to the Louisiana shelf, and so we applied both in
9 situ sampling that we did on uncharacterized bottom, as well as
10 some natural banks, as well as the sampling from natural banks
11 in Texas and artificial reefs that we imputed that data back
12 across to the Louisiana shelf.

13
14 The approach, again, was the same, and, obviously, we don't need
15 to go through that, in terms of how we arrived at our species
16 composition, but the one key difference, and this is why I want
17 to bring this slide up, is that we did have very good species
18 composition information from Louisiana, and it was a plot,
19 obviously, exactly the same, because the data is being imputed
20 across that, but, from a species composition standpoint, we had
21 that information, and the species composition for Louisiana is
22 in fact a little bit higher, more like -- Well, depending on
23 what area you're talking about, what habitat, but, in general,
24 it's about 15 percent on natural and artificial reefs, compared
25 to further out west, but we had good information on that, from
26 work that had been done.

27
28 Where we are with that estimate, and we can talk about the
29 detailed imputation methods and how we broke that down in the
30 next analytical section, and we're looking at a natural reef
31 estimate of about 4.5 million, with a CV of 43 percent, and, of
32 course, it would have the same exact caveats as we had with the
33 methodology in Texas.

34
35 On the artificial reefs, it's about 6.7 million, with 31
36 percent, and, again, we feel that that's the reason, because of
37 the prevalence of those structures in that region, and also lack
38 of natural habitat, relatively speaking, compared to the other
39 areas.

40
41 Again, this pattern holds the same, as far as uncharacterized
42 bottom, with a lot of fish on that, and so the estimate there is
43 about seventeen million fish, with a 27 percent CV, and the same
44 sort of uncertainty caveats that we would have with the Texas
45 estimate. Mr. Chairman, I know that's brief, and much of the
46 discussion, I think, will occur around the imputation
47 methodology that we utilized, that our analytical team is much
48 more capable of discussing.

1
2 In that appropriate section I think is the best place to discuss
3 that, and so I will be happy to answer any questions that folks
4 may have, but here is the general same table that we provided
5 for Texas, and it's a copy-and-paste out of the Table 6 that
6 we've been discussing for so long, and so I will stop there.

7
8 **CHAIRMAN POWERS:** Thank you. Let me open the floor for
9 questions or comments. We'll start with Jim Nance.

10
11 **DR. NANCE:** Thank you, Dr. Powers. Greg, I've got one question.
12 For the artificial reefs, for the number of oil platforms, from
13 what year did you get the number of platforms?

14
15 **DR. STUNZ:** This would have been when the assessment occurred
16 for 2019, I believe, Jim, and I would need to go back and look
17 and see, and keep in mind that those are not just oil-and-gas
18 platforms. They're other things, in addition to oil-and-gas
19 platforms, that we mined datasets, but I know your question is
20 probably related around the rapid removal of those structures,
21 and certainly that's a moving target.

22
23 It's a moving target for all of the reasons, because, literally,
24 as we speak, stuff is being put in the water right now in Texas,
25 and probably other places, as well as being removed, and that's
26 a difficult universe to define, because it's so rapidly
27 changing, but I would have to go look back in our report, Jim,
28 and I don't remember offhand exactly which databases we used to
29 generate that.

30
31 **DR. NANCE:** Okay, because it seemed a little high, because I
32 know they have taken a lot of platforms out of Louisiana now,
33 and they haven't added as much back, but I thank you, Greg, for
34 that. Thank you.

35
36 **DR. STUNZ:** Yes, and something that I want to bring up, Jim,
37 related to that, but also work that LDWF is doing, contracted
38 through Benny Gallaway, and they had appropriated funds, and I
39 don't know the details, and certainly maybe -- I don't want to
40 put Dr. Gallaway on the spot, but, if he's willing to comment or
41 not, and that's up to him, but roughly in the \$2 million, I
42 think, range, and they appropriated funds for him and his team
43 to do a Louisiana-specific Great Red Snapper Count, which I know
44 is underway, which I'm confident I think is going to provide a
45 lot of the missing gaps that we have here.

46
47 As far as the timeline and that sort of thing, Benny has
48 mentioned that I think they've pretty much finished with the

1 actual in-the-field data collection and crunching the numbers,
2 and they may be further along, and I don't want to comment on
3 that, since that's Benny's realm, but, to make up for I guess
4 what we had to do here, and the imputation methodologies and any
5 issues associated with those, Benny hopefully will be coming in
6 shortly with a much more detailed sampling design and
7 accomplishing that design, as well as more than, in fact, I
8 think we would have done for this study, and so, anyway, I will
9 go ahead and stop there.

10
11 **DR. NANCE:** Okay, and maybe I missed it in the report, but is
12 there a place where you specify number of oil platforms against
13 the number of other artificial structures?

14
15 **DR. STUNZ:** No, but we could get you that information, Jim, and,
16 in fact, I've had some discussions with Benny, to really get to
17 the bottom, and this is another good example of where mapping is
18 critical, and having the most current, up-to-date maps is really
19 informative.

20
21 I've had some discussions with Benny about really pinning down
22 exactly the best, most accurate habitat availability at that
23 particular time, which I mentioned is somewhat of a moving
24 target, based on when BOEM databases are updated and whether
25 they got removed or they didn't get removed, and you've got a
26 whole other issue, Jim, as you well know, from trawling and
27 other things, and did they really get removed, or is there still
28 something that will hold snapper, and so that's really getting
29 down into the weeds a little bit, but those are some of the
30 challenges.

31
32 **DR. NANCE:** Okay, because I know that an oil platform itself, a
33 large oil platform, is going to hold a lot more than a single
34 pipe, for example.

35
36 **DR. STUNZ:** Yes.

37
38 **DR. NANCE:** Okay. Thank you, Greg.

39
40 **CHAIRMAN POWERS:** Thank you. Benny, did you wish to talk about
41 this?

42
43 **DR. GALLAWAY:** Artificial reefs, in the Louisiana study,
44 included wrecks and obstructions and the formal artificial
45 reefs, as part of the Louisiana state program, and I have
46 matched those numbers up very well, and you end up with the
47 Louisiana study showing something like nearly 3,600 offshore
48 oil-and-gas platforms of all types, and that's -- That includes

1 everything, and there is only -- There are less than 1,000 total
2 structures, oil-and-gas, still remaining, and that 3,500 is an
3 error, in my opinion, and, also, the application of the more
4 Texas density, I have questions there too, having to do with
5 water quality overall.

6
7 We are nearing completion, and our data are preliminary, but I
8 can tell you that the number of structures, the number of
9 artificial reefs, is badly overestimated in Louisiana.

10
11 **DR. STUNZ:** If I could respond to that, certainly we need to
12 reconcile that, Benny, with basically the data that we have, in
13 terms of artificial reef. As far as applying that to -- Those
14 Texas data back to Louisiana, I mean, certainly, that imputation
15 across there has its limitations, and water quality is just one
16 example of that, but the issue is that's the best data we have
17 to use. I think it's the most appropriate data we have to use
18 at this point, and certainly your study coming in is going to
19 shed a different light on that.

20
21 **DR. GALLAWAY:** As I may have mentioned before, I would urge you
22 to -- It's not a small difference, and we're talking a big
23 difference, a large difference.

24
25 **CHAIRMAN POWERS:** Benny, can you repeat that, what you just
26 said, because you were cutting out.

27
28 **DR. GALLAWAY:** Yes, and I was saying the number of offshore oil-
29 and-gas structures that are being used in this report is badly
30 incorrect, and there's less than 1,000, and they claim to be
31 over 3,500. Historically, there were. If you count all the
32 installations, there have been that many installations, but
33 they're not all still standing, and they haven't been for a long
34 time.

35
36 **CHAIRMAN POWERS:** All right. Thank you. Any other comments or
37 questions for Greg or others? If not, then next up on the
38 agenda was Dr. Catalano, talking about the Gulf-wide tagging
39 initiative, and he is not going to be available until after
40 lunch, and so I think this would be a convenient time to break
41 for lunch. It's a little early for the Central Time Zone
42 people, but, at this point, we will --

43
44 **DR. RINDONE:** Dr. Powers, since we had previously spoken to
45 Matt, before the last break, and he's in class right now, and we
46 had told him that we would come back from lunch at 1:00 p.m.,
47 12:00 p.m. his time, the lunch break should probably go until
48 that time, so that, when he's getting out of class, he's

1 prepared and ready to jump back on.

2
3 **CHAIRMAN POWERS:** Yes, that was what I was going to continue on
4 saying. All right.

5
6 **MR. RINDONE:** Good talk.

7
8 **CHAIRMAN POWERS:** So we'll get a little bit longer for lunch,
9 and we will reconvene at 1:00 p.m. Eastern Daylight time. Thank
10 you very much.

11
12 (Whereupon, the meeting recessed for lunch on March 31, 2021.)

13
14 - - -

15
16 March 31, 2021

17
18 WEDNESDAY AFTERNOON SESSION

19
20 - - -

21
22 The Meeting of the Gulf of Mexico Fishery Management Council
23 Standing and Special Reef Fish and Socioeconomic Scientific and
24 Statistical Committees reconvened via webinar on Wednesday
25 afternoon, March 31, 2021, and was called to order by Chairman
26 Joe Powers.

27
28 **CHAIRMAN POWERS:** Good afternoon. This is your Chair again, and
29 we will resume. We're picking up the agenda where Dr. Catalano
30 is going to be talking about the tagging information, and I
31 haven't checked. Dr. Catalano, you're on?

32
33 **DR. MATT CATALANO:** Yes, I'm here and ready to go.

34
35 **CHAIRMAN POWERS:** Great, and so let us begin then, and I will
36 turn over the screen to Dr. Catalano. Thank you.

37
38 GULF-WIDE TAGGING INITIATIVE

39
40 **DR. CATALANO:** Good afternoon, everybody. I'm going to talk
41 about the high-reward tagging that we did, and this presentation
42 -- The title slide here, with me being the only person on here,
43 is just a reflection on who is talking, and, obviously, it's not
44 representative of this huge team of people that worked on this
45 in all the different regions and the Texas A&M crew of Danielle
46 and Cara and all those folks there that were getting tag returns
47 back, and they had a call center set up, and so, again, a huge
48 amount of people that were working on this and contributed to

1 this.

2
3 What I'm going to talk about is, first of all, just our
4 objectives, and so what we want to do with this tagging is to
5 estimate some parameters of interest for the recreational red
6 snapper fishery for the Gulf of Mexico, and the first thing is
7 to look at -- Try to estimate regional and sector-specific
8 exploitation rates, sector being private and charter, and so
9 just within the recreational fishery, but splitting it into the
10 private and charter sectors.

11
12 Before we go any further, we need to back up and just make sure
13 it's clear that, as you'll see here in a little bit, we're not
14 talking about exploitation rates on the entire population. We
15 have some very realistic constraints on which fish we can get
16 our hands on to tag, first of all, and so these estimates are
17 going to pertain to -- As you will see, these are shallow sites,
18 artificial reef sites, and so these are exploitation estimates
19 on fish that probably experience some of the highest levels of
20 exploitation of the entire population.

21
22 As we've seen from the overall Red Snapper Count part of this,
23 there's a lot of fish, and these fish at these shallow sites, on
24 these artificial reefs, represent probably a relatively small
25 fraction of the total population, and so keep that in mind as
26 we're going through, but, nevertheless, these are some
27 interesting parameters to get at.

28
29 We would like to see if there are effects of distance from port
30 on capture rates of these tagged fish, and we would like to
31 estimate vulnerability to capture, and we can also get at tag
32 shedding rates and discard rates. Along the way, we can look at
33 movement or differences between tagging and recapture locations,
34 and then we can assess angler awareness of the tagging program.

35
36 As far as the methods, and I'll just bounce through here, and
37 it's kind of a long list, but we were tagging January to June of
38 2019, and we were trying to get out to fish, to tag fish, before
39 the recreational season opens, but we put them out as close as
40 possible to the opening of the season. We're using a relatively
41 simple model, where it's just a within-season recapture model,
42 and we're not looking at year-to-year -- We're not modeling
43 survival from year-to-year, and so it's just put the fish out
44 and more or less look at what proportion we get back in that
45 first year.

46
47 We have these four spatial strata, these regions. Texas is
48 split into east and west, and then we have Alabama, and then we

1 have the Florida Panhandle. We didn't tag down the west side of
2 Florida. We thought that having high enough catch rates to get
3 enough fish tagged would be in the Panhandle, and so we focused
4 there.

5
6 We were trying to get 300 fish tagged per region, at at least
7 thirty sites per region. We tried to limit the number of fish
8 per site, just because of issues of the relatedness of the fate
9 of fish tagged at the same site, trying not to select too many
10 fish at each site, but also trying to balance efficiency with --
11 It costs money to go to more sites too, and so trying to balance
12 there.

13
14 As far as the site selection, as you've seen, it depends on the
15 region, and so we had a -- At the Panhandle region, we had
16 different sets of waypoints, and so of these were in-house
17 sites, known, high-relief structure, based on publicly-available
18 sites, depending on the region, and that was true in Florida and
19 Texas. In Alabama, as you saw, we have several years of
20 randomly-selected grids that Sean Powers' crew has been doing
21 side-scan sonar at and looking for bottom structure there,
22 artificial reefs, mainly, and so that's a really nice program
23 dataset that we were able to draw from, and so randomly
24 selecting sites from that dataset of waypoints.

25
26 One other wrinkle to this is that we were trying to look at this
27 effect of distance to port on the return rates, and that just
28 really wasn't going to work out. In Florida, we didn't have --
29 These are mostly relatively close-to-shore sites, and not a lot
30 of -- There's a lot of access points and not a lot of
31 variability there.

32
33 In Alabama, we have a lot of sites to draw from, and we know,
34 from experience, that we can get good contrast and distance to
35 port, at least within that small realm, because we have so many
36 sites spread across the shelf there. In Texas, we have
37 relatively few access points, and there are some pretty big gaps
38 there without access, but there are some sites there. We wanted
39 to not end up with all of our sites stacked up right outside of
40 the ports, and so we did stratify, with respect to distance from
41 port, in order to get more contrast in our data, in terms of the
42 distance to port, and that was done in the Texas region, so we
43 would have sites scattered along the coast.

44
45 These are shallow sites, less than forty meters deep, and we're
46 trying to minimize barotrauma, as much as possible, and so we
47 decided to stick with these shallow sites, and we're tagging
48 legal-sized red snapper, and we used the Hallprint dart tag.

1
2 We double-tagged every third fish, to get at tag loss, and these
3 were done with hook-and-line, and we used a few different hook
4 sizes, to try to get as wide of a range as possible of sizes of
5 fish that we were tagging, and then fish were released with a
6 descender device.

7
8 The tag returns, Texas A&M ran the tag return program, and so
9 the phone line they had set up, and the phone number was written
10 on the tag, and these are high-reward tags. Anglers would
11 receive a \$250 reward for returning the tag, and that was
12 written on the tag, what the reward amount was, and the phone
13 number.

14
15 The information we collected from the anglers were, obviously,
16 tag number, when it was captured, where it was captured, which
17 sector they were in, what they did with the fish, whether it was
18 harvested or released, and then we had -- I mean, this is sort
19 of a subset, and this isn't every single thing we asked, but
20 these are questions that pertain to what I am going to show you
21 today. We asked how they became aware of the tagging program
22 and whether that awareness developed before or after they caught
23 the tagged red snapper, and so did they know about it ahead of
24 time or not?

25
26 As far as the modeling goes, we used a probabilistic tag return
27 model using a Bayesian-type of analysis. It was fitted to the
28 tag returns from June to October, and so we have returns beyond
29 October, and there were really not many coming in during the
30 winter, but, in 2020, we did have some more returns, and we're
31 not analyzing those. The rewards ended at the end of the year
32 there, and so we didn't analyze the 2020 data, because we
33 weren't sure what to make of the returns.

34
35 With the response variables, we're looking at the capture fate,
36 and so either the fish was not returned by anglers or it was
37 returned, either in the private or charter sector, and, if it's
38 a double-tagged fish, either with one of the two tags shed or
39 not, and so there's five fates there, and so we could model the
40 probability of fish coming back with one of those five fates.
41 If it's a single-tag fish, there's only three fates, because the
42 shed tag is not observable.

43
44 Then we had another likelihood, another Bernoulli distributed
45 variable here of having to do with whether the fish was -- The
46 post-capture fate, and whether it was harvested or discarded.

47
48 We're estimating regional and sector-specific capture rates for

1 fully-vulnerable fish, and then regional or length-based
2 vulnerability parameters, using this exponential logistic curve,
3 and it's a flexible function with three parameters that can
4 accommodate a dome-shaped type of vulnerability curve.

5
6 We modeled a loglinear distance effect on the capture rates,
7 distance to the nearest port, and regional tag shedding rates,
8 discard rates, and then we added a term for site-specific
9 mortality anomalies, or really capture rate anomalies, that we
10 allowed -- Fish released at the same site would share some --
11 They would have some shared variability in the capture rate, and
12 so that's a random effect in the analysis.

13
14 Then the tagging mortality, or the discard rates, are also
15 included here, but there's no, really, information in the data
16 on those, and so those are really totally dependent on
17 informative priors that we specified, based on the literature
18 values, and so we have the Campbell et al. analysis, which is a
19 really nice meta-analysis of tagging mortality, or, really,
20 post-release mortality studies that have been done, and so we
21 had -- So we developed informative priors based on that
22 analysis, and then there's some more recent work here, a couple
23 more recent studies.

24
25 This is a weakness of the study, is that we don't have estimates
26 of tagging and post-release mortality conducted with this study,
27 and so we're having to rely on literature values, and so there
28 is probably some room for refinement or sensitivity analysis,
29 but we wanted to allow for uncertainty in these quantities to be
30 carried forward into the estimates of all these other parameters
31 that we're trying to estimate.

32
33 How does the model work? I have a visual here of kind of how we
34 step through the fate of a fish that is released, and so in the
35 blue boxes are things that we can observe, and the black boxes
36 are things that we can't, and the gray are kind of like model
37 quantities.

38
39 A released fish is either dead or alive, based on a tagging
40 mortality rate. The tag is either retained or lost, and so the
41 tag retention in this model is immediate, and so the tag is
42 either retained or lost right away. Within that relatively
43 short season, outside of the model, we looked at time at large
44 and whether or not that was related to the proportion of double-
45 tagged fish that came back with a shed tag, and there was no
46 relationship, and so we just applied an initial tag loss, a tag
47 shedding rate.

1 Fish were either captured or not, based on an exploitation rate,
2 and I'm oversimplifying a bit here, because we have -- It's more
3 complicated than this, because we have two different sectors,
4 and it can be caught by either the private or the charter
5 sector, and we have some fish that have two tags and some fish
6 that have only one, and so, if you have a double-tag, it could
7 be caught with one of the two tags, and so I'm oversimplifying a
8 bit, but I just wanted to give you a sense and a flavor for how
9 this is working.

10
11 The captured fish, they are either discarded or harvested, based
12 on D there, the discard rate, and then they're either reported
13 or not reported, based on a reporting rate, lambda, and then the
14 fish that are discarded either survive or don't, based on a
15 discard mortality rate. I will get to assumptions in a minute,
16 but that's, more or less, how it's working, and so, for each
17 fish, we have the observed data coming back on the captured fish
18 that were either harvested or released.

19
20 There's a bunch of assumptions with any of these sorts of
21 things. A big one is we're assuming a 100 percent reporting
22 rate, and so that lambda parameter. We're assuming that every
23 angler that catches a tagged fish calls it in, and we don't know
24 whether or not that's true. We're going to try to get at that
25 here in a little bit, and I'm going to talk about angler
26 awareness and how they learned of the program. Again, that's
27 not going to answer the question for us, but it can at least
28 provide some information to interpret these data.

29
30 We have a \$250 reward, which it's hard to know what sort of
31 reporting rate that might induce, and we felt like it was high
32 enough that we could reasonably assume 100 percent reporting,
33 but we can't rule out that there are some anglers that aren't
34 going to return those tags, or didn't even notice the tag on the
35 fish, that notwithstanding.

36
37 Literature-based priors, and so we had those literature-based
38 priors on tagging and discard mortality, and we're not
39 estimating those parameters from our data. We're assuming
40 negligible movement among the regions, and we're going to look
41 at movement, and so we'll come back to that.

42
43 Vulnerability to charter and private anglers is identical, and
44 we only have so many degrees of freedom here, and so we did have
45 to make some decisions on shared variability and vulnerability.
46 Distance to nearest port effects are constant across regions and
47 sectors.

1 These site-specific capture rate anomalies that I talked about,
2 and, at some sites, the fish are returned at higher rates than
3 others, and those applied both to the charter and the private,
4 and so, in other words, we're assuming that the charter and
5 private are operating in the same space, that they're
6 overlapping in the distribution of fishing effort, which we all
7 know that there's probably some violation of that.

8
9 Immediate tag loss and discard rates are identical for the two
10 sectors. We didn't deal with the commercial returns, and we
11 didn't have a lot of them, but we didn't model them, and we
12 included those fish that were eventually returned in the
13 commercial fishery as releases, but we didn't model the
14 commercial returns, and it's hard to know what to do with those,
15 because we don't know the reporting rate on those, and it's
16 probably a lot lower than the charter and private sector, but
17 the exploitation, or the proportional rates of return, from the
18 charter and private sector should still be valid to look at.

19
20 Then, again, the sphere of inference, we're looking at this
21 relatively restricted part of the population of red snapper, and
22 these are on shallow, high-relief artificial reef sites.

23
24 Here's our tagging sites in Texas. You can see the blue line is
25 separating the east and west, and so we had a pretty good
26 distribution of sites down the coast, and you can see our
27 tagging numbers there, and we were able to hit our targets. In
28 some cases, we did end up with more than ten fish per site, just
29 depending on how the day was going and what catch rates were
30 looking like and where the next nearest site was, and so there
31 were some times where we tagged some more fish.

32
33 Here is Alabama and Florida, and the red dots are our ports, and
34 so I measured the -- Those are the axis points, and so the
35 distance to port was the distance between those red dots and
36 each of the sites. In Florida, we had some sub-legal fish
37 tagged in the Florida, and so we don't have our 300 fish there.

38
39 Here's the distribution of tagged red snapper, the size
40 distribution in each of the regions, and a couple of things are
41 worth noting. There's a lot of those 400 and 500-millimeter
42 fish, and I think the Florida data roughly line up with what
43 Will was showing yesterday, that, really, beyond about 600
44 millimeters, we're not seeing a lot of fish there, and so I
45 think these are consistent with that.

46
47 Over time, these are the tag returns in each of the sectors,
48 commercial, private, and charter. Again, charter and private

1 are the only ones going into our model, but I wanted to show the
2 commercial returns, and then our model is fit to the data within
3 those vertical dashed lines, but I wanted to show you the
4 returns that we got outside of that too, and so you can see that
5 we did get some fish back in 2020, but the numbers were a lot
6 lower than 2019.

7
8 The dashed lines, that roughly corresponds with the open
9 recreational fishing season, and it, obviously, varies based on
10 the different regions, but we just wanted to standardize that,
11 as much as we could, across the regions.

12
13 Here is just the overall tag return numbers and what they look
14 like for each sector. The private returns, the largest number
15 of returns were from private anglers, followed by charter, and
16 then we did get some commercial, and, for a few people that
17 called in, we didn't have that recorded, which sector they were
18 in, and that was mainly -- That was outside of our model period.

19
20 Overall, the return rate was 32 percent across all regions, and
21 so it was a very high return rate. It was 43 percent in
22 Florida, and that includes -- That is all the fish, and so that
23 includes even some of the sub-legal fish.

24
25 I mentioned this tag return model that we fit, and we actually
26 fit eight different models that represented different
27 combinations of regionally or spatially-invariant vulnerability,
28 tag shedding, and discard rates. We estimated regional
29 exploitation rates, and we didn't test whether or not -- Whether
30 the exploitation rates differed between regions, because we were
31 interested in just what those were, and so we just looked at --
32 We let the model estimate those, but we did explore whether or
33 not we could model a common tag retention rate for all the
34 regions or needed regional tag retention rates, for example, and
35 so that's why we did this model selection.

36
37 The best model here was the one with regional vulnerability, but
38 regionally, spatially-variant, tag retention, and release rates,
39 but, really, none of the models -- Those top four models, there
40 wasn't a lot of clear separation, is probably the best way to
41 say it, and so there was some weak evidence for regional effects
42 on some of these parameters.

43
44 What were the exploitation rates? What did those look like?
45 This figure shows -- We have region on the X-axis and the
46 exploitation rate on the Y, for private on top and charter on
47 the bottom. These bars shows the median, posterior, and the 95
48 percent credible intervals for the exploitation rates, and these

1 are fully vulnerable exploitation rates, and so these are going
2 to be higher than the exploitation rates on the overall tagged
3 population.

4
5 We just wanted to show you the fully-vulnerable rates and the
6 west-to-east gradient and the return rates and the exploitation
7 rates, and we're seeing higher estimates coming in for the
8 charter -- I mean, for the private sector, and then the charter,
9 and we're seeing that. When we looked at the data, that's what
10 we were seeing. In some cases, it's up to 60 percent of fully
11 vulnerable fish were returned, and that would be for Florida,
12 and so we saw really high return rates in Florida.

13
14 What about just the tagged population? If we just forget about
15 fully vulnerable, and not all the fish are fully vulnerable, and
16 so what does our tagged population look like, and so, here,
17 we're seeing anywhere from 20 to 40 percent exploitation rates
18 on the tagged population. Again, it's highest in Florida.

19
20 The Alabama rates are coming in at 25 percent, 0.25, if we add
21 up the private and charter. That's a little bit higher than
22 what we saw when we did some work over the last -- From 2016 to
23 2018, we did some tagging in Alabama, and the rates in this
24 depth stratum were similar, although these were a little bit
25 higher than what we found in our study.

26
27 Then you can see the estimates from Texas there, and so there
28 seems to be a spatial gradient west to east, although keeping in
29 mind that there was a little bit of different site selection in
30 the different regions, depending on just the realities of the
31 available sites that we had, to waypoints that we could go to to
32 tag, and then, in Texas, we imposed a bit of stratification on
33 the distance to port, and so that could have driven down the
34 exploitation rates in that region a little bit, and so maybe a
35 better way to look at this is to look at the distance from port
36 and how that affects these rates.

37
38 This is looking at, on the X-axis, distance to the nearest port,
39 and these are the capture rates, and so the finite capture
40 rates, and so the proportion of fish that the model estimates
41 would be captured by anglers, and the different colors are the
42 different regions.

43
44 You can see there that there is a modest decline in capture
45 rates with increasing distance to port, although it's pretty
46 variable, and so the capture rate is not very well predictable
47 from distance to port, although there is a relationship there.

1 What do the vulnerability curves look like? These are -- The
2 vulnerability is a function of fish total length, and this is
3 the length at release, and we didn't worry about -- Again, a
4 model doesn't deal with movement, and it doesn't deal with fish
5 growth, and so these are all based on the release length, which
6 makes sense for a relatively short period of a tag-return period
7 here.

8
9 Generally, they are dome-shaped relationships, and all of these
10 estimates that I am showing are model-averaged estimates, and so
11 we're taking the model weights from the WAIC model selection
12 analysis and then applying those weights to the posteriors, to
13 get a weighted average posterior estimate, and so dome-shaped
14 estimates, and a little bit smaller modal length in Texas than
15 in the east, and a fair amount of uncertainty. For example, in
16 Texas, we had larger fish, in the 700 to 800 millimeter class,
17 come in at a lot higher return rates than the model would
18 predict, and so I'm not sure what to make of that, but that's
19 what we got.

20
21 Then, in Florida, there's a lot of uncertainty in that dome-
22 shaped relationship. Because we didn't tag a lot of fish over
23 600 millimeters in Florida, you can see that that whole dome-
24 shaped relationship is riding on one datapoint, which is -- You
25 never want to see that, but that's what we've got, and that's
26 the data, and so there's a lot of uncertainty in that
27 relationship.

28
29 I did explore some different approaches to sharing information,
30 sharing vulnerability, between regions, but, for this analysis,
31 I just kind of wanted to let the data speak for that they were,
32 and so rather than trying to kind of rein-in the analysis by
33 sharing vulnerability among like an east versus west type of
34 approach, which would probably have helped with that Florida
35 vulnerability estimate. The vulnerability in Alabama was very
36 consistent with patterns that we got from our 2016 to 2018
37 tagging study.

38
39 Tag shedding rates, so, the data here, this is the proportion of
40 double-tagged fish that were returned with a shed tag. Let's
41 look at the tag shedding rate, because there's two different
42 ways you can lose a tag, because you have two tags, but, anyway,
43 the data that we looked at would be the proportion of those fish
44 that come back with the shed tags, and so those are the dark
45 bars, and that's the observed proportion, and then the gray bars
46 are with the 95 percent credible interval, and so those are the
47 model average estimates.

1 Then, from that, you can back out the tag shedding rate, and
2 that was 6 to 13 percent, depending on the region, but that's
3 the observed tagging shedding rate, and, again, similar
4 estimates in Alabama, similar estimates to that recent study
5 that we did in Alabama.

6
7 Discards, this is the proportion of red snapper discarded,
8 ranging from 11 to 22 percent observed discard rates, and we
9 didn't see a relationship with length. Some of there were out-
10 of-season discards that happened within that timeframe, and we
11 fit the model to the tag returns from the same timeframe across
12 all the different regions, but there were some periods when the
13 fishery was closed within that timeframe in some of the regions,
14 but there were plenty of discards from during the open season
15 too, and so some of this was just -- I don't know if it was
16 anglers high-grading or what they were doing, but there was some
17 discarding going on, and so those are the estimates there.

18
19 This is movement, and we didn't see much movement, at least in
20 terms of the larger regions, and so there were -- All of the
21 fish were recaptured in the region in which they were tagged,
22 except for two, and two fish were tagged in Alabama and were
23 recaptured in Florida, although they were not recaptured all
24 that far from where they were tagged, and the Alabama region is
25 a very small section of the coastline there, and we had plenty
26 of sites in Florida just across the border, and so those two
27 fish didn't really move very far.

28
29 Here are the distances, and so the absolute distance on top
30 between tagging and angler reported recapture locations, and
31 these are for fish -- This is the subset of the fish that had a
32 lat/long coordinate that was reported by the angler, and so you
33 can see that the distances are five to fifteen kilometers, and
34 the average distance, in terms of the vector, distance vector,
35 is going to be less than that, because it's taking into account
36 all the fish and where they're going, and then the bearing, or
37 the directional movement there.

38
39 Zero would be due north, and so Texas, west Texas, and Alabama
40 have sort of a northern movement, and that makes sense in west
41 Texas, but maybe not so much in Alabama, and then I know the
42 roughly 80 to 90 degrees there in east Texas and Florida, and 90
43 degrees would be kind of a right, and so like an eastward
44 movement along the coast there.

45
46 How did the anglers hear about the tagging study? On the top
47 here is the answer to the question. When the anglers called in
48 the fish, and said they had recaptured a tagged fish, we would

1 say, did you become aware of the tagging program before or after
2 you caught the tagged fish, and so 40 percent of them said
3 before, and 60 percent of them said after, and so, in other
4 words, 60 percent of the people learned about the tagging
5 program by noticing the tag in the fish and reading on the tag
6 to call the number and then reading that there's a reward and
7 then finding out more about it.

8
9 Thinking about reporting rate, you would like to see more
10 awareness ahead of catching a fish, a tagged fish, because that
11 would mean that it's less likely that people would just not
12 notice the tag, or see the tag and think, well, I don't know
13 what that is, and I'm not going to mess with it and just throw
14 the fish back, and so I'm not sure what to make of these
15 estimates, in terms of the reporting rate.

16
17 There on the bottom is how did you become aware of the tagging
18 program, and so, for the 40 percent that knew about it ahead of
19 time, word-of-mouth was important, and that's 20 percent, and
20 then there's an other group, and social media and website are
21 both less than 10 percent, and so we did have a great program,
22 outreach program, but it still seems like a lot of people are
23 getting this information by word-of-mouth, if they're getting it
24 at all.

25
26 I'm about to wrap up, and here are the summary and conclusions.
27 The exploitation rates were high, keeping in mind that these are
28 shallow sites, artificial reef sites, and these are sites that
29 we would expect to have the highest exploitation rates for this
30 population. We don't know what fraction of the population these
31 fish represent, but, again, these are significantly -- I mean,
32 these are high exploitation rates, looking at 20 to 40 percent
33 of these tagged fish getting captured, but not unlike what we
34 saw in Alabama in that recent study.

35
36 There was a modest effect of the distance to the nearest port, with
37 fish further offshore being less likely to be captured, and so
38 that's interesting, and it's not unexpected, but it does provide
39 a quantification of the potential for this -- If there's a
40 protective distance effect and knowing now, with the spatial
41 distribution, or having estimates of the spatial distribution of
42 red snapper, from this Red Snapper Count.

43
44 Ultimately, it would be nice if we could take this information
45 and overlay it with the spatial distribution of the population,
46 because that's how you would get at an overall population level
47 exploitation rate, but, anyway, this gets us down that road of
48 trying to quantitatively deal with this potential for a

1 protective distance from port effect on these fish.

2
3 That's not to mention the fish that are not even on the
4 structures, or at least in this unconsolidated bottom, which we
5 can't even get at that point here, because we just tagged fish
6 on these high-relief structures.

7
8 Dome-shaped vulnerability, that's consistent with previous
9 studies and consistent qualitatively with the federal assessment
10 model, although those estimates are in terms of age, and we
11 estimated in terms of length here, but it's still a
12 qualitatively-similar idea.

13
14 We didn't see much in the way of movement, as we would expect
15 from looking at previous studies, looking at the literature. I
16 believe that's my last slide, and so I would be happy to
17 entertain questions, if we have time.

18
19 **CHAIRMAN POWERS:** Thank you. Let me open the floor then for
20 questions and comments. Greg Stunz is up first.

21
22 **DR. STUNZ:** Thanks, Mr. Chairman. I just wanted to comment on
23 Matt's role and presentation. While, obviously, as we discussed
24 earlier, and I appreciate you letting him talk, since this
25 tagging piece was not in the terms of reference, and even though
26 it was high value to the study, for a variety of other reasons,
27 exploitation rates and other things that will be very important
28 for the management component, but our team felt that it was
29 important, as I mentioned yesterday, for the SSC to hear what
30 Matt has done, because there is some important information there
31 that I think they can use in the future, even though what he was
32 generating was not directly used in calculating the actual
33 abundance estimate.

34
35 **CHAIRMAN POWERS:** Thank you. Doug Gregory.

36
37 **MR. GREGORY:** Thank you. I haven't been close to this project
38 at all, and, when I originally heard about it, I thought tagging
39 was going to be the main component for estimating population
40 size, and I see it's not.

41
42 One bit of information that I would like to see is days of
43 freedom and how that affects some of the other attributes, like
44 return rates, and I think looking at distance moved within the
45 regions could be interesting, since it's probably seasonal.
46 Clearly, you couldn't put all the tags out at once, and so days
47 of freedom -- It seems that would be quite variable, and looking
48 at 2019 versus 2020 tag returns might be interesting as well.

1
2 In the document, Table 11, and the graphs you showed, include
3 recaptures through 2020, but it also has about 150, or 140,
4 additional tagged fish than what is reported in the verbiage of
5 the document, and did tagging continue past the opening season
6 in 2019?

7
8 **DR. CATALANO:** I think the discrepancy there is probably some of
9 these sub-legal fish that were tagged, and so the analysis --
10 The tags that we analyzed were just the legal fish, but there
11 were some sub-legal fish that were tagged, particularly in
12 Florida, and so those would be -- Depending on which -- If it's
13 the model type of -- If this table has to do with just the tags
14 that we put out, I included all the tags, even the sub-legal
15 fish, but the model is just the legal fish, and so there's a
16 little bit of a discrepancy there.

17
18 **MR. GREGORY:** Did you look at the effect of days of freedom on
19 recapture rates? Clearly, if some of these sites were from the
20 recreational sector, and they're aware of the sites, and I think
21 40 percent were aware of the study ahead of time, and they would
22 be hitting these sites pretty hard, any sites they know about,
23 because that's just the opening-season phenomena.

24
25 **DR. CATALANO:** I didn't look at the effects of days-at-large,
26 and so you're interested in is there a decline in -- Within the
27 season, is there a decline in the capture rates, or the
28 exploitation rates, as you go through the season, and I didn't
29 look at that. I did look at the effects of days-at-large on tag
30 loss, but not on those return rates.

31
32 **MR. GREGORY:** You said you tried to tag fish as close to the
33 beginning of the season as you could, which wouldn't give them
34 much time to move about, given the open-season phenomenon, and
35 so I was just curious if that could be observed, and the
36 exploitation rates might be somewhat enhanced, or biased,
37 upward, but I am not asking for anything specifically.

38
39 **DR. CATALANO:** Certainly, if we were interested in a more
40 representative estimate of exploitation, ideally, you would tag
41 and let those fish mix back into the broader population, so you
42 could interpret your exploitation estimates as pertaining to the
43 entire population.

44
45 We don't really know what those mixing rates would look like,
46 and so we had to make some decisions on what part of the
47 population can we even get at, and so I think the decision was
48 that we would live with knowing that our estimates are really

1 not -- We can't really extrapolate them to the broader
2 population, and they would be conditional, in that these are
3 fish are the shallow, higher exploitation sites, and so that's
4 part of the interpretation of our estimates, is that we can't
5 really extrapolate to the broader population.

6
7 In that sense, it makes sense to get the tags out closer to the
8 season beginning, rather than trying to get them out more ahead
9 of time and letting them mix in, and so that's just kind of the
10 decision that we made and a way to approach it, but certainly --
11 We can't assume that these fish are -- Just looking at the
12 movement estimates, they probably did not mix a whole lot back
13 into the rest of the population, fish off of structures and
14 things like that, and so that's part of it.

15
16 **MR. GREGORY:** Thank you, and I thought it was kind of comical,
17 the presumption that commercial fishermen would not want to turn
18 in a \$250 tag. I don't think that would be true, but thank you
19 very much. I appreciate it.

20
21 **DR. CATALANO:** You might be right, and the problem is we don't
22 know what the rate would be. If there are some commercial
23 anglers in the room, that would be interesting, to get some
24 feedback from them on that, but, presumably, they are very busy
25 out there, and they have maybe not as much time to inspect each
26 fish and things like that, and so I guess that's the thinking
27 behind it.

28
29 **MR. GREGORY:** Okay. Thank you.

30
31 **CHAIRMAN POWERS:** Thank you. Dave Eggleston.

32
33 **DR. EGGLESTON:** Matt, thanks for your presentation. My question
34 has to do with thoughts on sort of getting the biggest bang for
35 the buck with respect to awareness, and so I wanted to get your
36 thoughts, both on just awareness of the tag recapture study, but
37 also just on the Great Red Snapper Count project in general, if
38 you could comment on that. If you were able to redo the study,
39 are there certain things you would do to kind of enhance that
40 awareness, because it was a fairly expensive tag recapture, your
41 study.

42
43 **DR. CATALANO:** Well, I don't want to get ahead of Marcus Drymon,
44 and that was his -- That was a big part of the stuff that he was
45 doing, the outreach and awareness stuff, and so I don't have
46 specific thoughts on that. From my standpoint, I'm looking at
47 how are these tagging studies typically done, and how do we get
48 at the reporting rate, and one of the things that you can do is

1 vary the tag reward amount, and so potentially put out some
2 fraction of the fish with even higher rewards than \$250 and see
3 if -- Do we get the same return rates on those higher-dollar
4 tags, or is there a saturation point, beyond which, as the
5 reward goes up, there is really diminishing returns, in terms of
6 the return rate from anglers?

7
8 That's the way I would look at it, is could we afford to do some
9 sort of a variable reward, and, I mean, in this case, it's
10 expensive enough just to pull it off at this scale, with one
11 reward amount, let alone trying to have say \$500 reward tags
12 also out there, and so we kind of had to stick with -- We had to
13 pick a reward amount and go with it, but, if it was me, and we
14 had funding to do more, I would probably do some sort of a
15 variable reward, and that might be a better read on the
16 reporting rate than angler surveys and trying to translate what
17 anglers' answers might mean in terms of a reporting rate.

18
19 **DR. EGGLESTON:** Were you working with the different state Sea
20 Grant communications groups or commercial and recreational
21 fishing associations at all?

22
23 **DR. CATALANO:** I personally wasn't, but, as a group, we
24 definitely were, and Marcus could comment more fully on that.

25
26 **DR. EGGLESTON:** Okay. Great. Thank you.

27
28 **CHAIRMAN POWERS:** Thank you. We have Bob Gill and then Greg
29 Stunz.

30
31 **MR. GILL:** Thank you, Mr. Catt, for your presentation. By way
32 of background, I had a fish house on the west coast of Florida
33 for thirty-three years, and we did deal in red snapper and
34 grouper, et cetera, and I absolutely agree with Doug Gregory
35 that every commercial reef fish fisherman would return that tag.
36 \$250 to them is a lot, and you would have had virtually a 100
37 percent return rate.

38
39 **DR. CATALANO:** Okay. Thank you. That's good information to
40 have. Under that assumption then, we could try to interpret
41 those commercial tag returns, and we didn't get a lot of them
42 back, but it could be that they're fishing in other areas, maybe
43 fishing in different areas than where we tagged, maybe a little
44 deeper.

45
46 **MR. GILL:** I think using that assumption would be valid for
47 drawing any conclusions and doing your analysis.

1 DR. CATALANO: Okay. Thank you.

2
3 CHAIRMAN POWERS: Thank you. Greg.

4
5 DR. STUNZ: Thank you, Mr. Chairman. I am trying to enable, o
6 recognize, Marcus Drymon. I see he's coming in now, but he was
7 having trouble unmuting, and so he's the one to -- I was going
8 to talk for him, but I would rather that Marcus jump in here.

9
10 CHAIRMAN POWERS: Okay. Go ahead.

11
12 DR. MARCUS DRYMON: I'm with Mississippi-Alabama Sea Grant,
13 Mississippi State University, and I just wanted to answer the
14 question about angler awareness, and this is something that we
15 actually looked at, through a series of surveys, and one of our
16 primary findings was that roughly 60 percent of the people that
17 we surveyed were aware of the Great Red Snapper Count, which we
18 were pretty pleased with, and, for more details, we have a paper
19 in press right now with *North American Journal* that's included
20 as an appendix in the back of the Great Red Snapper Count, and
21 so a lot of the details about angler awareness and satisfaction
22 and things of that nature are included in those galley proofs,
23 if you would like more information, but just a brief answer to
24 Dr. Eggleston's question.

25
26 CHAIRMAN POWERS: Thank you. I want to close out this
27 discussion. John Hoenig.

28
29 DR. HOENIG: I think this is really a very interesting study,
30 and it's one of the only ones, or maybe the only one, that has
31 ever bothered to ask people how they knew about the high-reward
32 tagging program, because, clearly, if people say, huh, what
33 high-reward tagging program, then there's the possibility that
34 people overlook tags, and they just throw them back, because
35 they think that I don't want another baseball cap.

36
37 There is one thing that you can do to interpret your results,
38 and that is to say that, supposing -- Well, for simplicity,
39 we'll say that you got back 40 percent of your tags, implying
40 that the exploitation rate was at least 40 percent. If your
41 tagging rate was 100 percent, that's -- If your tag reporting
42 rate was 100 percent, then that's, in fact, what your estimate
43 would be, that the exploitation rate was 40 percent.

44
45 On the other hand, if your tag reporting rate was only 40
46 percent, you would be saying that the exploitation rate was 100
47 percent, and that implies that your reporting rate couldn't
48 possibly have been less than 40 percent. Otherwise, you would

1 be catching more than you released, which is impossible, and so,
2 just putting in a few numbers, if your reporting rate is 50
3 percent, that implies that your exploitation rate is 80 percent.
4 If your reporting rate is 80 percent, it implies that your
5 exploitation rate is 50 percent, and so you can put together a
6 curve like that, and you can kind of get some idea of where your
7 reporting rate is and where your exploitation rate is, in the
8 sense that the two together have to make sense.

10 It's probably not the case that your exploitation rate was
11 actually 90 percent, or 80 percent, because your reporting rate
12 is only 50 percent. If you believe that the exploitation rates
13 could have been less than 80 percent, then that implies that
14 your reporting rate was above 50 percent, and so you get kind of
15 a range of possibilities that says, yes, that reporting rate
16 makes sense, and that exploitation rate makes sense, and that is
17 a way to get at how well did you actually do, what was your
18 reporting rate, and I think that might be worth looking at.

20 **DR. CATALANO:** Thanks, John, and any estimates coming out of
21 that, under lower reporting rates, would only be higher than the
22 estimates that we reported here, and so that's just to kind of
23 give folks an idea of the estimates would only go up as you move
24 that reporting rate down, and so a similar take-home message
25 that these are pretty high exploitation rates.

27 **CHAIRMAN POWERS:** Okay. Thank you. All right. Moving on then,
28 let me talk a little bit about the agenda. What we have now is
29 Items IV, V, VI, VII, whatever, which is basically the abundance
30 estimation analysis, and we have allocated, according to the
31 agenda, two-and-a-half hours, and so that's basically the end of
32 today.

34 When we go through these, I want to give the authors the
35 opportunity to kind of go through in the order that they wish to
36 do that, and so we will certainly entertain questions, but I
37 would really like to get that phase of it done today. Then,
38 tomorrow, essentially, we come to some conclusions,
39 collectively, and, at that point, I think, tomorrow, we'll end
40 up asking many more detailed questions, and we'll have to have a
41 very structured discussion, structured in the sense of I don't
42 want to bounce around from subject to subject.

44 My feeling was, because of the magnitude of the unconsolidated
45 bottom and a lot of the questions thus far, we might begin with
46 kind of focusing on that, the unconsolidated bottom estimate for
47 each one of the states, regions, depths, whatever is most
48 important, and so that's kind of how I was seeing structuring

1 the discussion tomorrow.

2
3 Also, the consultants -- I'm not sure exactly -- Well, I am sure
4 that they have a report that they're giving outside of this
5 meeting, but I would like to give them a fair amount of time and
6 the opportunity to report to us tomorrow about their conclusions
7 at that point in time as well, and so that's how I'm seeing the
8 rest of this meeting today and tomorrow morning going, unless
9 there is some objection to that.

10
11 According to the agenda then, we have -- We are starting under
12 II(d)(4), which is the discussion of the primary analysis, the
13 validation analysis, the final estimate discussion with Greg,
14 the discussion of sampling biases, and some conclusions and key
15 takeaways, and that's the order that we're going to proceed,
16 and, according to the agenda, that might take two-and-a-half
17 hours. Of course, if we can do it more quickly, I would be
18 appreciative, but I have my doubts. Anyway, are there any
19 questions about the way I envision this, and, of course, there
20 are. Mary Christman.

21
22 **DR. CHRISTMAN:** Unfortunately, this is, to me, the most
23 important part of all of this, and I know there's all that
24 technology, but it's the analysis of the information that was
25 gathered that they spent extraordinary effort to obtain, and I
26 have to ensure that it's been done correctly, and I cannot do
27 that if I cannot ask Rob Ahrens, who won't be available tomorrow
28 morning, any questions. I need to be able to ask questions, and
29 I can't hold them off.

30
31 **CHAIRMAN POWERS:** Good point. I wasn't aware that he wasn't
32 going to be able to be available.

33
34 **DR. CHRISTMAN:** Well, he's in Hawaii, and so I assume he's not
35 going to be available.

36
37 **CHAIRMAN POWERS:** Well, I don't care where he is, but I thought
38 he was going to be available. Greg, do you have a comment?

39
40 **DR. STUNZ:** Yes, Joe, and that was to -- For your agenda
41 management point, I've got -- There's a lot for me on the end
42 there, but I wanted to tell you that we've really covered a
43 bunch of that.

44
45 Obviously, there are some conclusions and take-aways that I want
46 to wrap up the piece, once we're done with all of this, but I
47 think we could get right into those questions with the
48 analytical team, primarily Dr. Ahrens and Dr. Stokes, who have a

1 lot to contribute right away, if that helps you speed things up.
2 I don't think the other parts are going to take that long, once
3 we get into the -- Obviously, we're going to have to discuss
4 that, but I don't have a long presentation, in other words.

5
6 **CHAIRMAN POWERS:** All right. I have noted Mary's comments, and
7 I agree with her, and I'm glad that she reminded me of that.
8 This is the crux of the review, essentially, is the estimates,
9 and, in fact, it's not going to bother me if we end up going
10 longer than tomorrow morning too, and so it's entirely open, and
11 we're going to proceed with questions to the point that is
12 needed, and we will not curtail that, and my apologies for
13 indicating otherwise. At this point, we are -- We want the
14 presentations item for their abundance estimate and supporting
15 analysis by Dr. Ahrens.

16
17 **ABUNDANCE ESTIMATE AND SUPPORTING ANALYSES**
18 **PRIMARY ANALYSIS**
19

20 **DR. AHRENS:** Aloha, Chair, and thank you. Aloha to the SSC and
21 our reviewers. I will say that I can be available tomorrow, and
22 I'm happy to join. I'm not happy to join at 3:00 a.m., but I
23 can try and join as early as possible to answer further
24 questions on this.

25
26 I have structured this to basically just step through, and I
27 know we've had some discussion around these points, but I think
28 it will be helpful to really clarify what the main issues or
29 concerns are, moving through, and so this is a fairly quick
30 presentation to lay out basically what was done, and really to
31 facilitate the discussion that needs to happen around this.

32
33 I will begin with the unclassified bottom, since this is the one
34 that sets really the magnitude for everything, and so, at the
35 strata level, which was region, depth, and the random forest
36 classification of low, medium, and high probability, the samples
37 that were given for the analysis were assumed to be random
38 samples with no measurement error at the strata level, and the
39 means and the variances were calculated accordingly.

40
41 There were, at times, samples that had to be assigned to depth
42 and random-forest-determined categories based on the geolocation
43 of those samples post hoc, and the regional-level and the Gulf-
44 wide estimates of abundance were calculated as expanded means of
45 variance derived from the appropriate calculations for
46 stratified mean and variances, and then for confidence
47 intervals, using Satterthwaite approximations for degrees of
48 freedom.

1
2 The majority of the Texas data came from acoustic paired with
3 camera composition surveys, as well as camera sled tows, and the
4 Louisiana data for this came from camera sled tows. Mississippi
5 and Alabama came from camera sled tows, and the Florida data
6 came from ROV surveys.

7
8 For some of the regions, depth and random forest categories
9 data, due to logistical constraints, was not collected. This
10 occurred in two strata in Florida, and the mean and variance
11 associated with the most similar strata next to it was used,
12 and, for Mississippi and Alabama, there were four missing
13 strata, and it was determined that those should be assigned a
14 mean and variance from the deepest most probable RF category
15 strata.

16
17 This is a smattering of what the data at the strata level look
18 like, and so the main headings on these -- 1 is Texas, and 2 is
19 the second depth strata of forty to 100 meters, and this one is
20 the random forest classification, and so 1, 2, and 3 are the
21 lowest probability, mid-probability, and highest probability.
22 Then we move across to Louisiana, Mississippi/Alabama, and then
23 a smattering of the Florida data in here. The data is,
24 obviously, zero inflated.

25
26 Interestingly, about 88 percent of the observations were zeroes,
27 and then, depending on the region and the habitat type, the
28 density estimates certainly varied, and there were some quite
29 long tails from some of the data.

30
31 I put this in here so we have it as a reference to go back to,
32 if needed in discussions, but, at the region, depth, and RF
33 classification, we have a mean density and a variance and the
34 sample size associated with that, the associated stratified, and
35 the weight used in the stratified estimates, and then the
36 strata-level population estimates.

37
38 Of note, here are some of the strata, and they appeared to have
39 zeroes. Some of those were associated with small sample sizes,
40 and some with moderate sample sizes. In the case of
41 Mississippi/Alabama, we can see some similar numbers here, and
42 that is the imputed values for habitats that were not sampled.

43
44 Then here's the Florida estimates, and we, once again, can see
45 occasions where we have zeroes, and some are associated with
46 very few samples, and some zeroes are certainly associated with
47 slightly more samples, and, again, we can see a couple of
48 instances here -- Like, here, with the seventy-seven and the 210

1 sample estimates, those were used to impute to strata that were
2 not sampled at the time, and so that's the unclassified bottom.

3
4 For artificial structure population estimates, we had Texas data
5 coming from acoustics and species composition. The Louisiana
6 data was imputed from Texas data, and the Mississippi/Alabama
7 data came from corrected MaxN count from video, and the Florida
8 data came from ROV surveys.

9
10 Again, at the region and depth level, the data were assumed to
11 come from simple random samples with no measurement error. In
12 Florida, the stratification provided no benefit across the
13 structured categories, and, therefore, they were not used. In
14 Texas, estimates were made for small structures and extra-large
15 categories. Data imputed was just for extra-large structures.
16 The Mississippi/Alabama data came from mainly small structures,
17 and that had a correction factor applied to the observed counts,
18 and that was a correction factor of 0.06, in this case.

19
20 The total population values, again, were estimated from expanded
21 means and variances, and the total estimates for the number of
22 sampling units in each category were obtained from state and
23 federal records. Here's just a look at the summary data, and
24 here we have Texas, Mississippi/Alabama, and Florida. Here's
25 the overall estimates that we have by the size categories, the
26 associated reef, the mean density, and the variance associated
27 with it.

28
29 Again, for the known hardbottom population estimates, the
30 samples were assumed to be random samples with no measurement
31 error, and mean and variances were calculated accordingly.
32 Texas were acoustic paired with species composition. Louisiana
33 were imputed from Texas data. Mississippi/Alabama were correct
34 MaxN count numbers per habitat unit, and, for Florida, we did
35 not have a defined known hardbottom habitat, and it was inferred
36 off of the random forest Category 3 habitat.

37
38 At this point, this comes back to a question that came up
39 yesterday about discrepancies in sample sizes, and, while it's
40 in my mind, if we go back here, there was a discrepancy in the
41 numbers used in Florida, and this was just a numbers error.
42 There were 749 samples that were taken in Florida, and then I
43 believe there was 1,035 that appeared in a table, and that was
44 just an error of including the imputed 210 and seventy-seven
45 values in those total numbers, and so that can easily be
46 corrected by removing those.

47
48 Here are the known hardbottom estimates, given the size of the

1 habitat, the mean densities that were calculated, the associated
2 variances, sample sizes, and, ultimately, the population
3 estimates that came from them.

4
5 For the pipeline estimates, it was classified into three
6 categories. The total pipeline distance was calculated from the
7 BOEM georeferenced datasets of active pipeline, pipeline that
8 had not been removed, I should say, and some of it may not
9 actually be active, and then the data was sub-sampled to account
10 for potential biases due to spatial covariation.

11
12 To do that, I ran some Moran's I and some basic spatial
13 autocorrelation tests, and that suggested that every fortieth
14 segment would result in a lack of autocorrelation, and those
15 data were then sub-sampled at every fortieth for each of the
16 segments that were done, randomizing the initial starting point
17 of where that fortieth sample was to start, and then, for each
18 pipeline, the mean density per linear distance was calculated
19 for each category, and then the total population values for each
20 pipeline category were expanded from the means and the
21 variances, based on the total linear length of that category.

22
23 Here we have the mean densities and the associated variances for
24 each of those categories, and, here, the sample size was taken
25 to be the number of pipelines sampled and the total distance of
26 pipeline and the population estimate that we saw, and I will end
27 there, and I will open it up for questions. Thank you.

28
29 **CHAIRMAN POWERS:** Thank you. First off, let's take, for
30 example, the unclassified for Texas, or not unclassified, but
31 uncharacterized bottom, or you called it unclassified, but
32 uncharacterized. I had asked earlier today, and, I mean, that
33 is coming solely from the C-BASS surveys, and I was told yes, at
34 that time. Is that correct?

35
36 **DR. AHRENS:** That is not correct, no. The majority of the C-
37 BASS surveys occurred at the deeper depths, and so this Depth
38 Region 3, and there is some of those surveys that occurred in
39 Depth Region 2, and the shallower regions came from the acoustic
40 surveys, paired with the species composition, and so it was
41 roughly about 3,000 of each.

42
43 **CHAIRMAN POWERS:** All right. Then I am sort of wondering -- To
44 some extent, what is being randomized is the transect, and I am
45 trying to understand all the individual little segments, and, in
46 cases, they are -- I'm not sure what method is used where, and,
47 in some cases, you're using fifteen-second intervals, and are
48 all those -- I mean, all those are being treated as random

1 samples, but, in some sense, it's really the transect that's
2 random, and these are replicates of that transect. I guess this
3 goes to the discussion yesterday about cluster sampling. It
4 would seem, to me, because of this, that the variance is -- It
5 could be very underestimated.

6
7 **DR. AHRENS:** Yes, and I would agree with you.

8
9 **CHAIRMAN POWERS:** All right. Do you have any inclinations about
10 how that might affect the point estimate?

11
12 **DR. AHRENS:** It's difficult to say, without getting back into
13 the data, whether or not there would be a bias as a result of
14 that, and my general thought is that it would not bias the point
15 estimate, although, last night, I did do a two-stage cluster
16 analysis on the pipeline data, and there was a slight difference
17 in the mean estimate that was produced, but that was more of a
18 function of the sub-sampling, and certainly the variance was
19 much larger on that estimate.

20
21 **CHAIRMAN POWERS:** Thank you. I will pass it on to some of the
22 consultants then. Mary.

23
24 **DR. CHRISTMAN:** Thank you. Okay. Let's continue with that
25 cluster sampling. Clearly, these are not clusters. These are
26 not independent observations, no matter how you look at it.
27 When we talk about independence, in a design-based setting, we
28 are referring to the observations that are selected independent
29 of each other, and it's irrelevant whether they tend to be
30 similarly valued or not.

31
32 What's important here is that, one, it was -- The cluster
33 sampling effort was totally ignored, and it's actually a three-
34 stage cluster, at least in Texas, because of the clustering of
35 transects along a ship transect, those lines, and so that has to
36 be addressed.

37
38 Secondly, I am very concerned about -- As one person pointed out
39 yesterday, the sample size that is being currently used is
40 totally artificial, because it's a function of the choice of
41 fifteen-second grabs, and so you use a different grab, and you
42 get a totally different number.

43
44 One way to get the variance down would be to look at -- To
45 consider each transect in toto. In other words, look at all of
46 the fifteen-second ones and come up with a single number that
47 totally characterizes that transect, and now your only source of
48 variation are the transects and how the transects are aligned

1 along the ship tracks, and so that would be one way to reduce
2 variance.

3
4 The second thing is could you go to your slide on unclassified
5 bottom population estimates, and I think it's Slide 5, and what
6 are these strata sizes here?

7
8 **DR. AHRENS:** These are the number of ninety-meter-by-ninety-
9 meter sampling units.

10
11 **DR. CHRISTMAN:** So these Ns represent -- The sample size and
12 strata size refer to the number of ninety-by-ninety-meter cells
13 that a fifteen-second video fell in, at least like in Texas, for
14 example?

15
16 **DR. AHRENS:** Yes. It would be, given that observation, which of
17 the ninety-meter-by-ninety-meter did it fall into.

18
19 **DR. CHRISTMAN:** Okay. The next question I have for you is how
20 come some strata have no strata sizes? Did that strata simply
21 not exist?

22
23 **DR. AHRENS:** That strata may not have existed.

24
25 **DR. CHRISTMAN:** Like let's take Texas 133, and there's eighteen
26 observations in it though, and so were they eighteen that fell
27 offshore or something, I mean further out than 160, or what?

28
29 **DR. AHRENS:** It could have been. Those could have been deeper
30 than the 160-meter cutoff.

31
32 **DR. CHRISTMAN:** Then the next question is why are there no
33 population estimates when you do have strata sizes, but you have
34 a zero? Were they excluded from the summaries or what?

35
36 **DR. AHRENS:** Those were all observations that were zero.

37
38 **DR. CHRISTMAN:** Right. I understand that, but that means that
39 the population estimate in that stratum is zero, that there are
40 no fish in that stratum, but you ignored that in the summing.
41 That's what I'm asking. You had to average over your sub-
42 strata, correct?

43
44 **DR. AHRENS:** Yes.

45
46 **DR. CHRISTMAN:** So that would have been RF 2, I guess. Yes, it
47 was RF 2. No, I'm looking in Mississippi, the
48 Mississippi/Alabama, and so I'm looking at that line that is RF

1 2, which had forty observations out of whatever that huge number
2 is, and so that zero actually has -- That zero estimate for that
3 stratum actually has a weight.

4
5 **DR. AHRENS:** Yes.

6
7 **DR. CHRISTMAN:** So what did you do when you were summing across
8 the three RF strata for that depth?

9
10 **DR. AHRENS:** Well, that would have been for -- At least at the
11 state level, that zero would have included -- It would have been
12 included in the calculation of the mean, stratified mean,
13 density for that.

14
15 **DR. CHRISTMAN:** Okay. That's what I -- I was concerned that,
16 for some reason, you just threw out all the strata that were
17 zero.

18
19 **DR. AHRENS:** No, those were -- No, no, no.

20
21 **DR. CHRISTMAN:** Okay. That was where my confusion was. All
22 right, and so thank you. Could you -- Why, on the -- You have
23 another table where the number of reefs was not an integer, page
24 8. Why is that a non-integer, the number of reefs?

25
26 **DR. AHRENS:** That's for Texas?

27
28 **DR. CHRISTMAN:** Yes.

29
30 **DR. AHRENS:** That is the -- Given the small reefs that exist in
31 Texas, and maybe Greg can comment on this better than I can, and
32 it is average expected number of small clusters of reef that
33 would make up a reef unit that they believe they had sampled,
34 and so, in some instances, that reef cluster they sampled would
35 have been five, or four, or three, of those little associated
36 reefs, and so, to expand the -- Since you weren't dealing with a
37 single unit there, but you were dealing with an aggregate of
38 three, four, or five reefs that were considered the sampling
39 unit, the total number of small units needed to be divided by
40 the kind of average number of those small units that made up
41 what was considered the reef that was sampled.

42
43 **DR. CHRISTMAN:** So this would be a case where, like if we were
44 to go back, if they had sampled the whole row of structures and
45 called that a reef?

46
47 **DR. AHRENS:** Yes.

1 DR. CHRISTMAN: Okay, and so they sampled, and then they had to
2 adjust accordingly.
3
4 DR. AHRENS: The expansion. Yes, the expansion had to be.
5
6 DR. CHRISTMAN: Okay. What did you mean about the fortieth
7 segment and the random start was within the first hundred?
8
9 DR. AHRENS: Yes.
10
11 DR. CHRISTMAN: If your systematic sample was every fortieth,
12 you have forty systematic samples.
13
14 DR. AHRENS: Yes, you do.
15
16 DR. CHRISTMAN: I mean, since you actually have all the data,
17 you could have just -- You didn't need to sub-sample, and
18 certainly, by doing the first hundred, you were lopping off some
19 of the observations.
20
21 DR. AHRENS: Yes, and it could have been randomized at the first
22 forty. You are correct, yes.
23
24 DR. CHRISTMAN: Could you go back through the imputations? I'm
25 not 100 percent sure that I completely understand the imputation
26 numbers that you were talking about for Florida, and could you
27 clarify that, please?
28
29 DR. AHRENS: For Florida?
30
31 DR. CHRISTMAN: 749 are what were sampled with, what, two
32 missing strata, was it?
33
34 DR. AHRENS: With two missing strata, and so --
35
36 DR. CHRISTMAN: So it was 749 plus the imputed sample sizes for
37 the missing strata.
38
39 DR. AHRENS: Yes, and so the -- As close as possible, the mean
40 and the variance from kind of the nearest strata was used, and
41 so, for Strata 513, we used the values from Strata 533, and then
42 I think that's the right way it happened. Then, for Strata 521,
43 we used the values from Strata 511.
44
45 DR. CHRISTMAN: Okay, and so that does represent sample sizes,
46 unless you want to -- So it's not a big deal, but it explains
47 why we have that difference, certainly.
48

1 **DR. AHRENS:** Right. It explains the sample sizes that
2 ultimately went into the calculation of the means, the overall
3 mean and variance, but it's not a measure of the samples that
4 were actually taken, which is what was, in theory, reported in
5 that table.

6
7 **DR. CHRISTMAN:** Okay. I think my other major question for you,
8 Rob, is the column that is the area or number of structures that
9 is in Table 6, for example. Those are all estimates in and of
10 themselves, correct, and, in the case of at least Alabama, we
11 actually have a variance associated with the estimated number of
12 artificial reefs.

13
14 **DR. AHRENS:** Yes.

15
16 **DR. CHRISTMAN:** Or they could get a variance.

17
18 **DR. AHRENS:** Yes.

19
20 **DR. CHRISTMAN:** So that variance could easily be included in the
21 estimated standard error for the number of fish that are -- The
22 estimated number of fish that are out there, at least off of
23 Alabama.

24
25 **DR. AHRENS:** Yes, absolutely.

26
27 **DR. CHRISTMAN:** My concern is that that would be an example of
28 how inflated, or deflated, these standard errors are, if you
29 were to compare the standard error with the variance associated
30 with the number of artificial reefs into the standard error that
31 you currently have listed, or I don't know that you have it
32 listed, but it's listed there, and so I think it would be
33 worthwhile, in the discussions of uncertainty, to at least
34 address that that's estimable, the actual variance of the
35 product of two random values.

36
37 Then, associated with that, another instance is the cases of
38 where they used ROV to get estimates of species composition, and
39 they used the average species composition for the region, or the
40 sub-strata, and those averages have variances associated with
41 them as well, and so the values that you're treating as fixed,
42 with no measurement error, could actually be addressed. Some
43 measurement error could be addressed for them.

44
45 **DR. AHRENS:** I agree with you 100 percent.

46
47 **DR. CHRISTMAN:** Yes, and it just feels like that there's a lot
48 of variances missing.

1
2 **DR. AHRENS:** Yes, there are.

3
4 **DR. CHRISTMAN:** So I think I have gotten my big concerns. I
5 know. The last one was the overlap of C-BASS and Texas sonar
6 work, the just throwing them together. I just don't think
7 that's a real good idea, and I have to think about that some
8 more, but that concerns me a lot. Okay. I am not going to
9 bother you anymore, in the interest of trying to move on. If I
10 have more questions though, maybe I can send them through Ryan
11 to you, and you could answer them via email or something.

12
13 **DR. AHRENS:** I will try my best, and I appreciate your comments,
14 Mary. Thank you.

15
16 **DR. CHRISTMAN:** Talk to you later.

17
18 **CHAIRMAN POWERS:** Thank you. I think one of the key points that
19 is being made here is there is -- Some of this extra variance
20 could be estimated with the existing data. I think that's one
21 of the key points. Steve Cadrin.

22
23 **DR. CADRIN:** Thank you, Chair. Thank you, Dr. Ahrens, on this
24 presentation, on the analysis. Going back to Slides 5 and 6,
25 which Mary was asking about, the stratum statistics, I see that
26 seventeen of the fifty-four strata, and so 31 percent of them,
27 had a mean density of zero and a variance of zero, and two of
28 those had zero stratum size, and so they don't really impact the
29 estimates much, but the other strata with a mean of zero and a
30 variance of zero don't contribute to the stock-wide abundance
31 estimate, as I understand it, and, I mean, they're in the
32 calculations, but they don't contribute any fish to that
33 abundance estimate, but they have considerable influence on the
34 stratified variance.

35
36 If those unclassified bottom strata have red snapper habitat,
37 then the true density is greater than zero, and it's small, and
38 the true variance is greater than zero, and so I'm bit concerned
39 that the mean equals zero and variance equals zero results --
40 Those are from densities that are below the detection limits,
41 and so they're not true zeroes, either in the mean or the
42 variance, and, for that and other reasons, I'm concerned that
43 the stratified variance is biased low from those zero-variance
44 strata, and have you given that any thought, or how much those
45 zero strata contribute to the stratified variance estimate?

46
47 **DR. AHRENS:** I mean, they will contribute based on the strata
48 weight, and I think you raise a really important point about

1 kind of the sample sizes and what we've learned about how
2 variable the observations actually are. The numbers that we
3 have here, we're assuming a CV of 150 percent, and we see ranges
4 200 to 1,000 percent, and so are the zeroes really zeroes?

5
6 I agree with you that they may not be zeroes at all. For the
7 West Florida Shelf, of course, if they aren't zeroes, given the
8 kind of magnitude of the area, they would, obviously, have this
9 full effect on not only the population estimate, but the
10 estimate of the variance, and there's a reality of the data that
11 we had and kind of the information we had going into this, and I
12 would love to be able to go out and do a couple thousand more
13 samples on the West Florida Shelf, to make sure that those
14 zeroes are really zeroes and that we have much more confidence
15 in those means and the variances that we're using.

16
17 **DR. CADRIN:** Great. Thanks. That answered my question.

18
19 **CHAIRMAN POWERS:** Thank you. Dave Eggleston.

20
21 **DR. EGGLESTON:** Rob, thanks for the presentation, and, actually,
22 I thought that you did a nice job of encapsulating the different
23 data sources and imputations by strata, and, in fact, it was
24 such a good job that I don't know if there's a way to like take
25 the essence of your presentation and put it upfront, because I
26 thought it provided a nice roadmap to the details that are in
27 the remainder of the report, and that's just a comment.

28
29 Also, I knew that there was weighting by stratification, after
30 reading the report, but then I got a little confused yesterday
31 in some of the discussions, which sounded like maybe there
32 wasn't weighting, and so this Slide Number 5 -- I think these
33 sort of Excel spreadsheets would really be helpful in the
34 appendix of the report, because it's nice to be able to actually
35 look at how you get from these spreadsheets to Table 6, which I
36 think is the table that keeps getting a lot of scrutiny, as well
37 as Table 7. Then the last comment is just can you remind me how
38 the values were generated for the weights?

39
40 **DR. AHRENS:** The weights is simply the strata size divided by
41 the sum of the strata sizes.

42
43 **DR. EGGLESTON:** Okay. Great. So I think, maybe if there's a
44 way to have these spreadsheets in the appendix, with a table
45 legend that describes the weighting, et cetera, it would also
46 help the reader. I guess, lastly, I just wish that all my grad
47 students could have Mary on their committee.

1 **DR. AHRENS:** She is an incredible resource.
2
3 **DR. EGGLESTON:** Thanks, Rob. That's it.
4
5 **DR. CHRISTMAN:** I'm blushing. I'm blushing.
6
7 **CHAIRMAN POWERS:** Thank you. Dave Chagaris.
8
9 **DR. CHAGARIS:** Thank you. Rob, I noticed, on Slide 7, I think
10 it was, where you were reporting the artificial structure
11 population estimates, it says that the Mississippi/Alabama data
12 had a correction factor of 0.06, but I recall, from yesterday's
13 presentations, and what I was looking at last night, that that
14 calibration factor was reported as 0.12, and so there's a big
15 difference there, which would -- I am just wondering what's the
16 explanation there, and am I interpreting those two numbers as
17 being different numbers?
18
19 **DR. AHRENS:** I'm not 100 percent sure, Dave, and I would have to
20 defer to Dr. Powers or Dr. Hoenig to that question.
21
22 **CHAIRMAN POWERS:** The other Dr. Powers.
23
24 **DR. AHRENS:** The other Dr. Powers, yes, and not our illustrious
25 Chair.
26
27 **DR. HOENIG:** If I may, I'm not positive, and we'll have to check
28 with Sean Powers, but I think that there was just basically just
29 a communications screwup that we sent Rob results when he asked
30 for it, and they were preliminary, and the first estimate was
31 0.06, but then, when we checked everything and improved the
32 model, it changed to 1.2, and it appears that perhaps someone
33 screwed up, and I don't know if it was on our side or Rob's
34 side, in not correcting that factor, and so I think that's
35 something that will need to be addressed, and it won't be hard
36 to address, other than having to redo the calculations, and I'm
37 not sure how much of a pain that will be for Rob, but I think
38 that's a good point that was caught, and, yes, we need to fix
39 that, and I don't think it will change the overall results by a
40 whole lot, but, nonetheless, it should be fixed.
41
42 **DR. CHAGARIS:** Well, if you're dividing the ROV count by that
43 correction factor, if it's twice as large, then your divisor is
44 double, and so your population estimate would be halved. I
45 think we'll see how the calculations turn out.
46
47 **DR. POWERS:** That is not Rob's fault, and that is my fault.
48 When I conveyed the data to him, what I did is I did all the

1 conversions and then supplied him with the reef-specific
2 densities, but I just gave him the wrong one, and the 0.122 is
3 the correct one, and the densities reported in Liese's table are
4 the correct densities per structure, but, yes, we'll have to
5 loop back with Rob, to make sure how that changes his overall
6 estimation in the procedure.

7
8 Again, for some of us, we hope that we have time to take all the
9 review and the panel comments back and incorporate them before
10 our numbers and everything are final, and so we will definitely
11 do that.

12
13 **DR. AHRENS:** Can I make comment, Chair?

14
15 **CHAIRMAN POWERS:** Sure.

16
17 **DR. AHRENS:** I think the best route to go, since Dr. Powers and
18 Dr. Hoenig also incorporated some additional uncertainties in
19 their estimate, would be to use the estimates that they have
20 come up with, as opposed to the one that I did, since, at the
21 artificial reef structure, each area was treated separately and
22 not combined into a random-stratified-type sampling approach.
23 If it is 0.12, it would halve the number that I had come up
24 with, but I know they have done a few other different things,
25 and so maybe they can get together with Dr. Stunz and figure out
26 what they would like to do.

27
28 **CHAIRMAN POWERS:** Thank you. Ken Roberts.

29
30 **DR. ROBERTS:** Thank you, Mr. Chairman. It was said, previously,
31 that the artificial reef projections for Louisiana were imputed
32 from Texas, and am I correct in that?

33
34 **DR. AHRENS:** That is my understanding, yes.

35
36 **DR. ROBERTS:** Okay, and that's resulting in about six million
37 fish for Louisiana, and the rest of the Gulf is about three-and-
38 a-half million. I am wondering how operational the word
39 "imputed" is. It was said, earlier, that the reef number for
40 Louisiana might be called into question, because it's too large,
41 and so my bottom-line question is how was it imputed, and if the
42 number of reefs, artificial reefs, changes in Louisiana, how
43 would the number be affected? Thank you.

44
45 **DR. AHRENS:** I will attempt to answer this, and certainly Dr.
46 Stunz can jump in and correct anything that I say that is
47 misleading. I believe a subset of the structures, the large
48 structures, from Texas were used as a representative sample of

1 what might be found in Louisiana. I can pull that data up and
2 show it, if needed, and so, depending on, out of the Texas data,
3 which ones were selected, that would affect the mean density
4 estimate here.

5
6 The more important thing that was brought up was the discussion
7 earlier today about the actual number of physical reefs that
8 exist, and I believe that it was around -- The indications were
9 given that it was a thousand or so reefs, in which case that
10 would be roughly a quarter of the number of reefs that was used
11 here, in which case, given the expansion, we would have to take
12 a quarter of the total population estimate, if we were to
13 believe the number of physical structures is much smaller than
14 that which was used.

15
16 **DR. ROBERTS:** Among the team members, whose responsibility is it
17 to figure that and make the correction, if necessary?

18
19 **DR. STUNZ:** Mr. Chairman, I can jump in.

20
21 **CHAIRMAN POWERS:** Greg.

22
23 **DR. STUNZ:** That would be our responsibility, as the team that
24 is now handling Louisiana. Just to answer that question, I have
25 my team on, and I don't know if that's something that we can
26 produce, how quickly, but, for sure, we can get to 2,000 just in
27 simple databases that are quickly available, and so that number
28 would be, worst-case scenario, half of that, but I don't want to
29 comment on that number until I can have my team fully look at
30 that, and that's going to take a little bit more time, but that
31 would be our group getting to the bottom of any discrepancy that
32 might be there.

33
34 **DR. ROBERTS:** Good. Thank you. That's all my point was, and I
35 wanted to make sure that it wasn't lost in all of the
36 discussion. Thank you so much.

37
38 **CHAIRMAN POWERS:** Thank you. Mary Christman.

39
40 **DR. CHRISTMAN:** Thank you. Rob, I assume you did not throw out
41 any observations that you received, because there was some
42 discussion yesterday about outliers and throwing them out.

43
44 **DR. AHRENS:** There was one observation from Florida that was not
45 used.

46
47 **DR. CHRISTMAN:** That was that 2,200 or something or other?
48

1 **DR. AHRENS:** It was Observation Number 350. Row 350 is the
2 dataset that I am describing.
3
4 **DR. CHRISTMAN:** That's okay, since I don't have the dataset.
5
6 **DR. AHRENS:** Dr. Patterson brought this point up during his
7 presentation yesterday, that that single datapoint, and I can't
8 remember if it was one out of eleven datapoints, had a very
9 significant impact on the estimate of total population in
10 Florida, simply because of the expansion factor on the strata in
11 which it occurred, to the tune of twenty million fish.
12
13 **DR. CHRISTMAN:** That was using your estimation procedures?
14
15 **DR. AHRENS:** That was using my estimation procedures, yes.
16
17 **DR. CHRISTMAN:** The means of density, and so the means of
18 ratios, as opposed to the ratio of mean.
19
20 **DR. AHRENS:** Yes.
21
22 **DR. CHRISTMAN:** The next question I had was who assigned the
23 region and depth RF classes? You mentioned, in your
24 presentation, that, based on geolocation, you moved a few, but,
25 otherwise, how were they assigned? Was that given to you as
26 part of the dataset, or --
27
28 **DR. AHRENS:** I was given the geolocation of the samples, and
29 then I dropped those onto the stratum that were used.
30
31 **DR. CHRISTMAN:** The final fifty-four strata versus the strata
32 that you used in your initial estimation?
33
34 **DR. AHRENS:** Yes.
35
36 **DR. CHRISTMAN:** So most all of this was basically -- An awful
37 lot of the data were post-stratified, essentially, because of
38 geolocation.
39
40 **DR. AHRENS:** Yes.
41
42 **DR. CHRISTMAN:** Which means they are random sample sizes. Under
43 normal circumstances, if things were allocated proportionally,
44 that's not a big deal, but that certainly has an influence on
45 the final variances, and those random sample sizes themselves
46 have an influence, and it's not just in the earlier discussion
47 that Dr. Hoenig showed, where the -- No, I'm sorry, and it
48 wasn't Hoenig, but where the sample -- Like, for example, the

1 table that you're showing right now. The small sample sizes
2 tend to have really high variances associated with them, because
3 of the way that standard errors are calculated, and so that
4 influences the overall variance estimates.

5
6 Finally, this is a question, maybe, for Greg Stunz. The
7 imputation for Louisiana for reefs was to use the large reef
8 estimate from east Texas, basically, and so my question then is,
9 for the reefs in Louisiana, are those numbers, that show up in
10 like Table 6 for example, all large reefs, or what proportion of
11 reefs in Louisiana are large reefs, I guess is my question, and
12 then I think I'm done.

13
14 **DR. STUNZ:** Mr. Chairman, may I jump in on that?

15
16 **CHAIRMAN POWERS:** Yes, please.

17
18 **DR. STUNZ:** Thanks, Mary. We're going through that exercise as
19 we speak, and so at least approximately 1,000 of those are large
20 reefs, and they also have an active artificial reef program that
21 the rigs have been converted to reefs, and so, since it's
22 dominated by the oil-and-gas platforms, that's why we chose the
23 oil-and-gas platforms to impute -- To provide to Rob to impute
24 those numbers across back to Louisiana.

25
26 However, as far as the percentage of that, we're working on
27 getting to the bottom of that number right now, to make sure
28 that -- We want to, obviously, get that right, and so, just to
29 follow-up on that, we, obviously, want to get it right, but,
30 even if there were no reefs, and we didn't calculate that, that
31 would be six million fish, and so it's not a lot, but we want to
32 make sure, certainly, that we have the correct number to use
33 there.

34
35 Now, if you're suggesting, Mary, if we find some of those are
36 smaller reefs, if we should use a subset of those to assign
37 smaller reefs back to that, we certainly can do that as well,
38 once we determine the composition of that number.

39
40 **DR. CHRISTMAN:** The only reason I'm concerned is, as I recall,
41 the estimated number per structure was hugely different between
42 the two reef types, and so I just wanted to get assurance that,
43 in Louisiana, the majority are large.

44
45 **DR. STUNZ:** Yes, that's correct, but we're verifying that.

46
47 **DR. CHRISTMAN:** That's mainly what I just want to -- I am not
48 worried about if 5 percent are small, and I'm not going to make

1 somebody redo the numbers because of that, but I just was
2 curious. Okay. Thank you.
3
4 **DR. STUNZ:** That's definitely high on my to-do list.
5
6 **DR. CHRISTMAN:** Thank you.
7
8 **CHAIRMAN POWERS:** Thank you. Dave Eggleston.
9
10 **DR. EGGLESTON:** Rob, I just want to make sure that I'm making
11 some correct assumptions about my initial read of the report,
12 and so, obviously, we want to -- If you had great maps, then you
13 would want to allocate your sample size to the footprint of the
14 different habitats, and so, reading the report, it became
15 apparent that the uncharacterized bottom was really important,
16 and, therefore, that footprint was relatively undersampled, and
17 so is that a correct assumption about sort of the initial
18 workflow?
19
20 **DR. AHRENS:** I would say that, given what we know about how
21 variable the samples are, given what was done, then, yes, the
22 sample sizes that were allocated in the unstructured, or
23 unclassified, bottom were low.
24
25 **DR. EGGLESTON:** Okay, and so what I'm wondering -- I'm looking
26 at the weights again, and so the weights were scaled by the
27 footprint of the strata, which you just said a little while ago,
28 and so is there a way to scale those weights to sort of the
29 proportion of samples in that footprint of habitat? I realize
30 it's complicated by the fact that you've got individual
31 structures, like pipelines and reefs, but I was just wondering
32 if there's any way to scale the weights.
33
34 **DR. AHRENS:** Well, the weights are just from the size of the
35 unclassified bottom, and so no other structures factor into that
36 weight.
37
38 **DR. EGGLESTON:** But for -- I guess is there a way to do that
39 across the strata, and so across like unclassified bottom versus
40 hardbottom versus your low and mid-RF strata?
41
42 **DR. AHRENS:** The strata unit here is a region, a depth, an RF
43 class, ninety-meter-by-ninety-meter, approximately, square area,
44 and so that is a strata, and so, when you look at the strata
45 sizes, that is the number of those ninety-meter-by-ninety-meter
46 units that are within the region, depth, and random forest
47 classification. I feel that we might be cross-talking here on
48 something.

1
2 **DR. CHRISTMAN:** David, the strata sizes, although they're
3 numbers that are number of cells, each cell has an area, and so
4 they actually are just proportional to the area that's
5 associated with that region, depth, and RF class, and so what is
6 happening is they take the density in that area, and then
7 density per unit area, and then multiply it by the area. That's
8 what they're doing there. That's what those weights are doing.

9
10 **DR. EGGLESTON:** Great. That helps. Thank you very much.

11
12 **CHAIRMAN POWERS:** Thank you. Any other questions at this stage?
13 If not, then we would move on to the alternative estimation
14 analysis validation, the ratio of the sums.

15
16 **MR. RINDONE:** Harry has his hand up.

17
18 **CHAIRMAN POWERS:** I'm sorry. Harry.

19
20 **MR. BLANCHET:** I had a couple of questions regarding the
21 stratification itself, but I think I will just send those by
22 email.

23
24 **MR. RINDONE:** No, those need to be asked.

25
26 **MR. BLANCHET:** Okay. Going back to the initial point of the
27 development of that random forest model, it seems, for -- I was
28 trying to understand how those classifications ended up, in
29 terms of how important that classification was to the final
30 estimate of the number of fish, and it seems like it's fairly
31 significant, and, when we look in the eastern Gulf of Mexico, it
32 seems like there was a fair amount of information to help train,
33 or estimate, information to guide that model development, but,
34 in the western Gulf, there wasn't nearly as much, and so I was
35 wondering your thoughts -- I heard something that I might have
36 taken out of context, but I was wondering about your thoughts in
37 terms of the amount of information that was available in the
38 western Gulf to help decide, especially for this unclassified
39 bottom, of what bin you were going to put them in.

40
41 **DR. AHRENS:** Those are great questions, and let me address one
42 of them first, which is the notion of the categorization from
43 the random forest model and the choice of the thresholds to
44 divide it into the three categories and the influence of the
45 shifting of those thresholds and the influence that may have on
46 the overall estimate.

47
48 That we didn't explore, and it certainly could be explored, and

1 it would take some time, because everything would have to be
2 post-hoc assigned to the new strata derived from the random
3 forest model, but we do -- For regions and areas that have
4 higher density estimates, if we were to re-jig that random
5 forest classification, it would change the weighting of those
6 strata sizes.

7
8 Now, how it would affect it is hard to say, because some samples
9 would be put in and some samples would be put out, and so
10 exactly the effect on the mean relative to the strata weight is
11 -- I can't intuit it at this point, but it would be potentially
12 an interesting exercise, to look at the sensitivity to that
13 classification.

14
15 The other question is the availability of data to help inform
16 the model, and certainly, within the western Gulf, we were
17 relying more heavily on vertical line, or bottom longline, data,
18 but we also did have the underlying red snapper relative
19 abundance from the work that Nicholas Duchon-Barth did that
20 helps to inform that western part of the Gulf reasonably well.

21
22 One could start to play the game of adding and removing datasets
23 from the overall random forest and look at how that influences,
24 again, the classification of the habitats, but we did not,
25 again, do that.

26
27 **MR. BLANCHET:** So the vertical line is essentially something
28 that's going to give you information on structure, because
29 that's where those vertical line samples were coming from, is
30 from structure. The longline samples is something that would be
31 informing of the unclassified bottom, and one of the issues that
32 I had -- I had looked at the Table 1 in the random forest
33 presentation that's in the appendices, and there is a SEAMAP
34 longline dataset that has a number of samples of 198.

35
36 I inquired of Gulf States Marine Fisheries, and, as best we can
37 come up, we've got about 345 stations that should have been --
38 Some subset of that should have been included, but, more
39 significantly, the dataset that you have has eighty red snapper.
40 The dataset that Gulf States has has 576 red snapper, and so
41 that's some higher proportion positive. That might influence
42 where some of those geographic areas drop out, in terms of one,
43 two, or three, and I don't know how influential that might be.

44
45 **DR. AHRENS:** Let me just clarify one thing that we did with the
46 SEAMAP data, is that we -- There was an overlap in datapoints in
47 the SEAMAP from the CSP program, the Congressional Supplemental
48 Program, and so we pulled the Congressional Supplemental Program

1 datapoints out of the SEAMAP dataset before we used it.
2
3 Now, I'm not certain that that explains the difference that
4 we're seeing between the eighty and the 500 fish, and I would
5 have to go back and re-look at those datasets, but my guess is
6 that it's accounting for some of the difference that you're
7 seeing in that table.
8
9 **MR. BLANCHET:** Okay. The CSP was primarily 2011, and is that
10 correct?
11
12 **DR. AHRENS:** You're stretching my little gray cells at this
13 point.
14
15 **MR. BLANCHET:** You and me both. Most of the positive samples
16 that I am looking at, for at least Louisiana, where I actually
17 have the data, are coming from 2012, 2013, and 2014.
18
19 **DR. AHRENS:** Okay. This is -- We can go back and kind of check,
20 and we can look into that, in terms of the data that went into
21 the model.
22
23 **MR. BLANCHET:** Thank you. The correction positive, what I've
24 got for 2012 in Louisiana, is 0.44, and 0.38 in 2013, for the
25 fraction of the samples that actually have positive fish.
26
27 **DR. AHRENS:** Right. Okay. I would have to go back and do some
28 digging, to fully understand what was going on there.
29
30 **MR. BLANCHET:** Thank you.
31
32 **CHAIRMAN POWERS:** Thank you. Any other questions of Dr. Ahrens
33 at this time?
34
35 **DR. BARBIERI:** Mr. Chairman?
36
37 **CHAIRMAN POWERS:** Go ahead, Luiz.
38
39 **DR. BARBIERI:** Thank you. Rob, a general question, real
40 quickly. I'm trying to understand the big picture here of what
41 was done, and, in terms of the sampling design and then
42 implementation of the field components and how sample sizes and
43 sampling and allocation sampling meshed into all of this.
44
45 I mean, I would expect that, for a study of this magnitude, and
46 considering all those different strata and the subdivision of
47 the overall area, that you guys would have followed something
48 similar to like a probability proportional to a size sampling

1 allocation scheme, where some of these vast areas that are very
2 large strata, like the uncharacterized bottom, that we know very
3 little about, and, therefore, we could expect a high degree of
4 variability in the distribution, I mean existence, in the
5 distribution of red snapper there, and, I mean, you reported
6 that I think 88 percent of those samples turned out to be
7 zeroes.

8
9 Those areas would have been allocated higher sample sizes, and
10 so it could maintain -- The constraint would be to keep your
11 variance, or CV, within desired levels, and so you would
12 estimate what the sample size needs would be for those different
13 strata, keeping that constraint in mind, and so departures from
14 applying that approach are likely then to really tremendously
15 increase the precision of the estimates, and can you try and
16 explain to me if my thinking there is correct and how it fits
17 into what was actually accomplished here?

18
19 **DR. AHRENS:** I will try, Luiz. There is two aspects to this,
20 and one is the total number of samples that you need to take to
21 meet your overall precision objectives, or, if you have cost
22 objective, you can do it that way, or some other objective, but,
23 here, we chose to meet our level of precision, and I showed that
24 equation yesterday, and that has it at, of course, your assumed
25 variance that might exist in that final estimate, and the total
26 number of strata kind of factor in there, and then, at the
27 individual strata level, you have the weight of that strata, the
28 variance of that strata, and then the cost of sampling that
29 strata, and then, here, we just ignored the cost, and so we're
30 really talking about strata weights and the variance that
31 exists.

32
33 Given those variances and the weights, those all go in to
34 influence the overall sample size, and certainly the basic
35 assumption we made was that the coefficient of variation would
36 be about 150 percent, and that, of course, is not what we
37 observed it to be, and it would be higher, and, therefore, you
38 would have allocated a much larger number of samples. In fact,
39 in terms of a stratified random sampling design, if it had truly
40 been implemented in a random way, it would probably have been
41 cost prohibitive, given the extremely generous budget for this
42 program.

43
44 Once you have that total number, then those get allocated
45 between the strata, and that allocation is a function of the
46 strata size, and the large strata will get more samples, and the
47 strata that have larger variances will get more samples, and
48 then, of course, strata that cost more, if you're considering

1 cost, would actually get less samples, and so your intuition is
2 correct that the larger sized strata that have higher variances
3 would receive more samples.

4
5 In the case of some of the Texas observations, where we saw
6 coefficients of variation pushing 500 to 1,000 percent, you
7 would have allocated a lot more samples to those regions, and we
8 did have, certainly, more samples from those regions than we
9 initially allocated in the preliminary design, and there are
10 some challenges, given the nature and the structure of those
11 samples, as it would relate to a stratified random sample
12 design.

13
14 **CHAIRMAN POWERS:** Luiz, do you have any follow-up?

15
16 **DR. BARBIERI:** No, I've got it. Rob, thank you.

17
18 **CHAIRMAN POWERS:** All right. Thank you. Dave Eggleston.

19
20 **DR. EGGLESTON:** Luiz just asked the question that I've been
21 trying to get at, but much more eloquently, and so I was just
22 curious, and I have two questions. One, is it possible, Rob,
23 just to share this Excel spreadsheet with me? I was just kind
24 of curious about it, and I wanted to make sure that I'm looking
25 at the formulas correctly. Then, secondly, any idea how
26 sensitive the population estimates are to these weights?

27
28 **DR. AHRENS:** In terms of the strata weights?

29
30 **DR. EGGLESTON:** Yes, and I was just kind of curious. I mean,
31 how -- I just feel like there's -- At least in my mind, there is
32 some uncertainty in how those weights were -- How they are truly
33 reflecting what's out in the field, and I was just kind of
34 curious about, if you do sort of the classic sensitivity
35 analysis on those weights, and I'm just wondering how important
36 those weights are with respect to those population estimates.

37
38 **DR. AHRENS:** The only way the strata weights would change is if
39 the random forest designation changed, and so we could explore
40 it that way and explore the sensitivity, and I haven't done
41 that, but, because the weight of the strata is basically the
42 physical size of that strata, the region and depth effect on
43 that weight would not change, and it's only the random forest
44 classification, and, again, for areas that have -- For areas
45 that would have less than an order of magnitude differences in
46 the estimated mean densities, my guess is they would have an
47 effect, but not a large effect.

1 As the order of magnitude of difference of those mean estimates
2 changes across those strata, and you change that strata weight,
3 it would have a more noticeable effect on the overall estimate,
4 but, yes, we would have to go back and fundamentally change the
5 random forest classification, either the data that went into it
6 or the thresholds that we ultimately decided upon, to change
7 that kind of low, medium, high probability classification, and
8 certainly that sensitivity could be explored.

9
10 **DR. EGGLESTON:** Okay. Thank you.

11
12 **CHAIRMAN POWERS:** Thank you. Kai Lorenzen.

13
14 **DR. LORENZEN:** Rob, I was wondering -- I mean, given that we've
15 established that the CVs that came out of this design-based
16 analysis are likely to be a massive underestimate, I was
17 wondering what -- Would it be possible to at least get a
18 somewhat realistic estimate of the true CV without too much
19 effort, so that we could -- So that we can have a more informed
20 discussion about sort of the actual magnitude of uncertainty?

21
22 I was thinking, and Dr. Christman pointed out a number of
23 things, in terms of the video sampling, and I guess one could
24 bin some of those fifteen-second samples, and one could -- Then
25 I'm talking specifically about the uncharacterized bottom here,
26 which is such a big part of this, and accounting for the three-
27 stage cluster sampling, and doing some model-based variance on
28 things like the species composition.

29
30 It would seem, to me, that maybe some of that could be
31 accomplished relatively quickly, and it would give us at least
32 some idea of what actual uncertainty we're looking at, and I was
33 just wondering how realistic that would be. Thanks.

34
35 **DR. AHRENS:** I will say something, and then Mary will correct me
36 at this point, but I would say one of the quickest -- A quick-
37 and-dirty way would be to take the sample sizes from some of the
38 towed acoustic stuff and take the sample size not to be the
39 individual cell, but the transect. That would be kind of a
40 really quick-and-dirty way to look at how that variance would
41 expand.

42
43 I can't comment on how variable some of the composition is and
44 stuff, where I actually haven't seen that data, and so I would
45 have to defer to Greg or Jay or someone to comment on that, but
46 certainly that -- If you assumed those were independent, they
47 could just be added onto the variance estimate that resulted.

1 **DR. CHRISTMAN:** I'm just going to jump in quickly. Your idea
2 about the reconfiguring to make it a transect piece of
3 information instead, what you would do there is your strata
4 sizes would be functions of area, rather than cell numbers,
5 because you would then associated each transect with an area
6 covered, and you would just have an estimate for each of those
7 areas, and so, yes, it's doable.

8
9 **DR. LORENZEN:** Thank you. I mean, I do think -- I don't want to
10 encourage a lot of sort of corner-cutting work, but I do think
11 that it would be useful for us to have some idea of what a more
12 realistic estimate of variance might be. Thank you.

13
14 **CHAIRMAN POWERS:** I think it would be very useful, but, when you
15 say relatively easy, in terms of the SSC's timeline right now,
16 we're talking forty-eight hours, or less, actually, now, and so
17 we have to think of it in that context as well. John Hoenig,
18 you asked for the floor.

19
20 **DR. HOENIG:** Rob, I think you've given a very interesting
21 presentation, and it's quite clear. I imagine that you're
22 probably getting punch-drunk after all this time, and I did have
23 something that I wanted to ask you, and I apologize if you've
24 covered it and I just missed it, but I'm getting kind of
25 overwhelmed with all of the information that's being put out.

26
27 I am wondering about post-stratification, the idea being that,
28 if you go over an area of bottom that's just sand, you might not
29 see much at all, but, if you happen to go over a sunken
30 container that was previously unknown, then that's a structural
31 feature that didn't go into any kind of planning, and so you
32 might find that, oh, 12 percent of our transects go over unknown
33 features, and, if you were to create a new stratum, by dividing
34 a bigger stratum into two small strata, one with unknown
35 features and the other the remaining sites, then you might find
36 that you're apportioning the variance quite well, because, when
37 you find unknown structures, you're likely to find fish.

38
39 You can't define a stratum in terms of whether there are fish
40 there or not, because fish is what you're trying to measure, but
41 you could define a stratum in terms of whether or not it has a
42 structural feature or not.

43
44 The problem is that you also have to estimate the amount, or the
45 size, of the stratum, and so, basically, you would be estimating
46 how many transects, of all possible transects, will you find
47 previously unknown structure, and, if you do that, then you
48 could have a stratum with previously unknown structure and the

1 rest. Did that enter into what you were doing, because it
2 wasn't quite clear to me if that's what you were doing, and, if
3 so, how did that improve the variance?

4
5 **DR. AHRENS:** We thought about that, and then we slapped our
6 hands for thinking about it, and it's my understanding that it
7 would not be a wise choice, given that you then have to know
8 what the total size of that stratum was, and, basically, the
9 only inference you can make about that is it has to be in
10 proportion to what you've observed it to be.

11
12 **DR. CHRISTMAN:** Can I jump in and ask a quick question related
13 to John's question? That is, basically, does every observation
14 in the UCB actually have bottom, observed bottom, available,
15 because I expect that, with some of that nepheloid layer, that
16 you probably -- Even with the sonar, you may not be able to
17 specify it explicitly.

18
19 **DR. AHRENS:** You would have to take the backscatter, and the
20 strength of the backscatter, and then ground-truth that with
21 habitat. In theory, it could be done.

22
23 **DR. CHRISTMAN:** I'm just saying that I expect that would be an
24 enormous amount of work, to post-stratify the UCB based on what
25 you actually saw out there, in terms of bottom type.

26
27 **DR. AHRENS:** Certainly the visual surveys all have it.

28
29 **DR. HOENIG:** I would have thought that sonar would be a very
30 easy way to see elevations on the bottom, and you could define a
31 new stratum with previously unknown elevations off the bottom,
32 and the fact that you have to estimate the size of that stratum
33 as the proportion of your transects that had surprises shouldn't
34 be a problem, and it's part of the statistical sampling
35 literature. Anyway, it was just a thought for writing things up
36 for publication, and, obviously, you're not going to do that in
37 the next forty-eight hours.

38
39 **CHAIRMAN POWERS:** Indeed. Luiz.

40
41 **DR. BARBIERI:** Thank you. Rob, just one more. Sorry for
42 bringing up that Table 6, the page 84 Table 6, once again, but,
43 as I look through that table, and I try to estimate -- I did
44 some quick calculations, looking at what the sampling fractions
45 were that used for each one of those strata there, and, mostly,
46 they fluctuate around 1 percent as a sampling fraction, right,
47 and I think that --

1 **CHAIRMAN POWERS:** The area or the fraction of fish?

2
3 **DR. BARBIERI:** Fraction of the area or number of structures, and
4 so the sample size collected, the number of samples collected,
5 from the frame that was defined and so it can be number of
6 structures or area. For example, forty-five divided by 1,775.

7
8 **DR. AHRENS:** I'm with you.

9
10 **DR. BARBIERI:** Right? I can see how, for a study like this,
11 where we're trying to actually develop estimates of absolute
12 abundance, that we could get away with a low sampling fraction
13 like this, if we have, somehow, a way to do a sampling --
14 Optimize our sampling allocation, but, in reading the report,
15 and listening to all the presentations yesterday and today, I
16 get the impression that most people -- That this couldn't use
17 the random forest model, and that whatever sampling frame and
18 sampling allocation scheme was developed, based on that, for a
19 variety of reasons, that couldn't be followed. Is that your
20 assessment as well, that that sampling fraction may not be
21 sufficient to really meet our precision requirements for this
22 project?

23
24 **DR. AHRENS:** I will answer a couple of things that came up
25 there. Given the logistical constraints, it was cost
26 prohibitive to follow the initial random stratified design, and
27 it just logistically couldn't happen in some of the locations.
28 We were able to do it in Florida, and, just given the equipment
29 that had to be used in the west, it just was not going to be
30 obtainable and feasible.

31
32 In terms of the kind of the fraction of habitat that was sampled
33 and was it sufficient, I think, if we are honest about all
34 sources of variance and kind of the final goal of achieving a 30
35 percent PSE, then no, it was not likely that it was sufficient,
36 if we're going to be brutally honest about the variability that
37 probably exists in that final estimate.

38
39 **DR. BARBIERI:** Great. Thank you so much, Rob.

40
41 **CHAIRMAN POWERS:** Thank you. Doug Gregory.

42
43 **MR. GREGORY:** Thank you. Rob, I will give you a break. My
44 comment is more for the Chair and for the SSC than a statistical
45 one, and we've had some analyses overnight, like we do with
46 stock assessments, that are explanatory, and I think that's
47 great, but I think we also should identify other suggested
48 modifications that may not be achievable this week, but are

1 still considered to be warranted.
2
3 I would hate for us to be constrained by only asking for things
4 that can be done overnight, and this is a major, major
5 undertaking, and the questions and stuff that I've been hearing
6 are reasonable for something like this, and not to take away
7 from what's been accomplished, but there's more that needs to be
8 done, and so, if we can identify short-term versus long-term re-
9 analysis, or considerations, then suggest it to the PIs, and we
10 identify it as such and just move on. Thank you very much.
11
12 **CHAIRMAN POWERS:** Thank you. I have no -- I think that would be
13 a reasonable idea, and it doesn't have to be done within the
14 next day, and presumably we can deal with it as the SSC, or even
15 perhaps after this meeting, as long as it isn't forgotten, I
16 think. Along those lines, Harry.
17
18 **MR. BLANCHET:** Yes, Mr. Chair. To that point exactly, one of
19 the comments that I've heard a couple of times is the thought
20 that, rather than sampling every fortieth point along the
21 transect, that all transect points be sampled, for the pipelines
22 specifically, but I guess that could also be true of some of the
23 uncharacterized bottom. My hunch is, and I might be wrong on
24 this, but my hunch is that one-fortieth of the video has been
25 counted at this point, and so I don't think that that is an
26 overnight request.
27
28 **CHAIRMAN POWERS:** No, I didn't believe it was either, but let's
29 hear the answer to the question about -- I mean, not all of that
30 video has been analyzed, and is that correct?
31
32 **DR. AHRENS:** I believe all the C-BASS video has been analyzed,
33 and I will defer to Dr. Stunz.
34
35 **DR. STUNZ:** Joe, I would have to get back with you on that
36 exactly, and it should have all been analyzed, and then the
37 subsets provided, but I don't know that. I mean, obviously, if
38 it requires any type of video analysis at this point, that's a
39 major, major undertaking, but I don't have a good answer for you
40 for that towed -- What of that was analyzed and what wasn't.
41
42 **CHAIRMAN POWERS:** All right. Thank you. I think now would be a
43 good time for a fifteen-minute break, and we haven't broken.
44 Steve Murawski, can this subject wait? Can it wait until we get
45 back, Steve Murawski, or is your question short?
46
47 **DR. MURAWSKI:** My answer is very short. All the video from the
48 C-BASS has been counted, all 15,000 fifteen-second bins.

1
2 **CHAIRMAN POWERS:** Okay. Thank you. All right. Let's take a
3 fifteen-minute break, and we'll return. Thank you.

4
5 (Whereupon, a brief recess was taken.)
6

7 **CHAIRMAN POWERS:** Okay. It's 3:40 p.m., Eastern Daylight time.
8 Next on the agenda, as I understand it, is the discussion of the
9 alternative methodology of estimation, which was using the ratio
10 estimator.

11
12 **MR. RINDONE:** Joe, we have a request from the council to have an
13 opportunity for the public to provide some comment at the end of
14 the day today, and so not to interrupt this portion of the
15 agenda, and I think this should definitely go now, but, after
16 Dr. Stokes is done, if you want to consider a point for allowing
17 that today.

18
19 **CHAIRMAN POWERS:** Why did they want it done today?
20

21 **MR. RINDONE:** It's a four-day meeting, and it's kind of a long
22 process and a lot to take in, and just to provide the
23 opportunity for some members of the public to --
24

25 **CHAIRMAN POWERS:** It was on the agenda, and so that's fine. If
26 they want to have it today, that's fine.
27

28 **MR. RINDONE:** So it would be to have an opportunity, a brief
29 opportunity, at the end of the day today for it, and then also
30 again after the SSC meeting, at the end of the day on Friday.
31

32 **CHAIRMAN POWERS:** All right. Thank you then. So we are going
33 to do the -- Dr. Stokes will be making a presentation about the
34 alternative methodology as a form of validation.
35

36 **VALIDATION ANALYSIS**

37
38 **DR. LYNNE STOKES:** Thank you very much, Mr. Chairman. This
39 analysis was done a lot by my graduate student, Shalima Zalsha,
40 who has now graduated and is working a real job.
41

42 I overheard Mary, during the break, saying I wish we had talked
43 about a planned analysis and then what they actually did, and,
44 by golly, that's the way I've constructed these slides, and so I
45 didn't do them in the five minutes since she talked, and so let
46 me start with this little bit.
47

48 The planned sample design was a stratified random design, as

1 we've talked about here, with three stratification variables
2 having to do with the region, the habitat, and the depth,
3 although not all strata were present in all regions, and so the
4 number of strata varied by region.

5
6 I think they were not present -- My understanding is that they
7 were not present in the world and not just that there wasn't any
8 sampling there, and so, anyway, that was the plan design. The
9 planned analysis, based on that design, for me, was the standard
10 one, which is you can estimate a total, in this case total
11 abundance of fish, with just the sum of the estimates of total
12 over the strata, and so that was the plan.

13
14 T_h -hat represents the total abundance in Stratum h for these
15 various strata, but T_h -hat varied, the way I did it. If the
16 sample units were items, like artificial reefs, for example,
17 things that you could count, then T_h -hat was just the mean per-
18 unit estimator, the usual one, which I have denoted here with
19 that kind of messy notation as $t\text{-hat}_h$, mpu, for mean per unit,
20 and so it's just the regular old unbiased estimator of total,
21 where N_h represents the number of units in the frame and \bar{Y}_h -bar
22 is the average per unit in the sample.

23
24 I am going to take a little timeout here to say something that's
25 been -- It seems to have been kind of a source of confusion over
26 the last couple of days, and that's about weighting. Didn't you
27 use weights? Well, the weights are actually part of -- The way
28 I have represented it here, and I believe the way that Rob did
29 too, is it's part of the estimator, and so, if you think of that
30 \bar{Y}_h -bar as the sum of all the Y s over n_h , then the weight is just
31 N_h over n_h , and that weight attaches to every observation that
32 you measure in that stratum that has N_h in the frame and n_h in
33 the sample, and so you don't have to go back and add extra
34 weights to it, because, the way we present the estimators, the
35 weights are already included in the mean per unit estimator, and
36 I hope that makes sense.

37
38 Anyway, that was the first estimator that I used for countable
39 objects, things where the units, the sampling units, were
40 actually individually listed on the frame, but most of the data
41 wasn't that way, and it was actually area, and so it will be
42 transects, and there was one other exception, and that was in
43 Texas, where there was -- They ended up estimating the small
44 artificial reefs with a design that -- They didn't have a list
45 of all the little pyramids, and so that also was a ratio
46 estimator.

47
48 The way you commonly estimate the total, when you have units

1 that vary in size, is with a ratio estimator, and the ratio
2 estimator is simply the total in the universe for some variable
3 that is related to the thing you're observing. In this case,
4 the thing that is related about the sampling units are their
5 size, and so t_{hx} denotes the total area of the universe, the
6 stratum, from which that sample came.

7
8 Then you multiply that by an estimate of density, and the
9 estimate of density is the sum of all the observed values in
10 that stratum divided by the sum of all the sizes of the observed
11 units, which are transects, in that area, and so you could also
12 represent that as t_{hx} times this density of Stratum h.

13
14 These two estimators are appropriate when the observations have
15 been independently selected, and that is when the observations
16 that you're referring to are a simple random sample. My
17 observations are transects and not pieces of transects, but
18 transects, because that's what was randomly selected, and so
19 they aren't clusters. I mean, they are clusters, in a sense, if
20 you want to think about them being grids, but nothing was done
21 with those individual sub-units in the sample unit, because this
22 was a cluster sample and not a two-stage sample.

23
24 Again, that was the plan. The variance of the stratified
25 estimator was estimated by the sum of the estimated variances,
26 because the sampling was independent from one stratum to
27 another, and so these are just your textbook versions of the
28 variance estimate for simple random samples for either the mean
29 per unit estimator on the top there and the ratio estimator on
30 the bottom there, and the only thing that's a little bit --
31 Maybe the notation is a little non-standard for you, but the
32 s^2_{hd} , which is different than the variance estimate in the first
33 equation.

34
35 The first equation has the plain old sample variance, the s^2_{hy} ,
36 and that's just the observed values, the sample variance of the
37 observed values for all the units in the stratum. S^2_{hd} is a
38 little bit different, because this is a ratio estimator, and
39 this is -- Again the usual estimator of variance from a ratio
40 estimator is based on a delta method or Taylor Series
41 approximation of the variance, and so S^2_{hd} is the variance of the
42 residuals, which I have put a formula down there, which is kind
43 of neither here nor there, but it's just based on a
44 linearization idea of a ratio, and it's a standard way to
45 estimate variances for simple random samples when you estimate
46 it with a ratio estimator.

47
48 In some of the ratio estimators, the number of units in the

1 universe is not actually known, the N_h is not actually known, and
2 so you have to estimate it, and that N_h does not enter into the
3 estimate itself, and so I'm not estimating anything for the
4 ratio estimator itself, and it just comes in in this finite
5 population correction factor for a ratio, when we can't observe
6 the number of units, and so you may say, well, why can't you
7 observe the number of units, and remember that a unit is a
8 transect, and, in reality, the transect only exists after it
9 happens, because you don't know what it is.

10
11 I mean, you could plan how big that transect would be, and then
12 you could take the total area in the stratum and divide by the
13 number of transects, and that would give you -- I mean, excuse
14 me. Divide by the area of the transects, the average area, and
15 it would give you the total number, but, in reality, the
16 transects vary a little bit from one to another, and so you
17 can't really observe that exactly, and it's not like we just
18 looked in grid cells or something, which, if we did that, we
19 could tell, if we knew the area of the stratum.

20
21 Anyway, if you do what I just said, which is to estimate the
22 total number of units, where unit is a transect, in the whole
23 stratum, and you plug it into that little expression that I have
24 there, and, actually, the correction factor is just going to be
25 one minus not the ratio of sample number to population number,
26 but rather sample area covered divided by the area and the
27 population, which we do assume we know for each stratum.

28
29 Anyway, that's what I did, or that's what I planned, and I'm
30 sorry, and the estimates and the standard errors were computed
31 in SAS PROC SURVEYMEANS, which includes both ratio estimators
32 and mean per unit estimators and a variance, and we did it
33 stratum-by-stratum, instead of dumping all the data in at once
34 and weighting it, just because it helped us to keep things
35 straight, because there were so many different strata.

36
37 Now, I am sort of acting like the sample design that was planned
38 was the one in the sample analysis was the one that was done,
39 and that's not quite true. There were some changes.

40
41 First of all, the sample sizes changed from what was planned in
42 the beginning, due to some complexities of data collection, and
43 I just assumed that the sample was missing completely at random.
44 In other words, I did not make any adjustments for so-called
45 non-response, missing data, except that I reduced the sample
46 sizes to the ones that we actually had, rather than the ones
47 that we had planned.

1 The one other change that happened from the plan to the
2 execution was the pyramids, the small artificial reefs in Texas
3 which are referred to as pyramids, and they found -- I am a
4 little bit fuzzy on why this happened, and I just got the data,
5 and I really didn't know exactly why this revealed itself as it
6 did in the middle of sampling, but, anyway, maybe Greg can talk
7 about that later, but, instead of sampling individual units,
8 like having a pyramid be a sampling unit, since they didn't
9 really have any way to --

10
11 They didn't have a frame for them, and so you couldn't just pick
12 a random number of them, a random sample of them, and what they
13 did was they gridded the area over which these occurred and
14 sampled grids, grid cells, and then again used a ratio
15 estimator, where the Y, the observed value, is number of fish,
16 but now the X, rather than area, is number of pyramids in a
17 gridded cell. In other words, it's a ratio estimator with the
18 auxiliary data being number of pyramids in a grid cell. That
19 was the exception to using mean per unit estimators wherever the
20 observations were countable things.

21
22 One other exception to the original plan was, as I understand
23 it, post-strata were added beyond the original plan in Florida.
24 Now, I did not use any of the random forest information for
25 post-strata, and I post-stratified -- I think this is correct,
26 but I was given these post-strata, and they were named
27 northwest, mid, and south, and so it's regions in Florida, which
28 I don't think were in the original stratification design, and so
29 that meant they were post-strata, and, as Mary suggested, when
30 you post-stratify, rather than stratify, it does add a little
31 bit of variance.

32
33 That is actually not -- You don't add very much variance, if the
34 sample sizes are reasonable in the post-strata, which they were
35 in this case, and so it really only matters sort of in two
36 conditions that adds variance, and one is when you don't have
37 very much data in every one of them, and the other is if you're
38 mostly concerned with a marginal variance, and, in other words,
39 before you start the sample -- If you're trying to predict what
40 the variance will be, the fact that you have a random number in
41 each post-stratum -- You will end up with a random number in
42 each post-stratum, and that really does affect the variance of
43 the estimator.

44
45 That's not what we're doing here, and so what I calculated, by
46 ignoring the fact that these were post-strata and treating them
47 like they were strata, is, basically, I calculated what's known
48 as a conditional variance for them, and, once I saw the sample

1 sizes in the post-strata, I used those sample sizes, and so,
2 effectively, that's a -- Given the sample size in the post-
3 stratum, this is the variance, which I can observe after they
4 are allocated.

5
6 Those were changes to the plan, and there was another change to
7 the plan, and I think you've heard about this. Data from
8 Louisiana were mostly unavailable, and so we did a substitution,
9 and I don't like to call this an imputation, exactly, because we
10 didn't do anything fancy to impute.

11
12 In other words, we did not -- We didn't generate new data based
13 on the Texas data or anything like that, but we just simply used
14 the Texas data averages in Louisiana, and we just substituted,
15 and then we expanded by the ratio estimator, and so, in other
16 words, we got the \hat{d} from like observations in Texas, for
17 virtually every stratum, and we thought we were observing either
18 the t_{xh} or the n_h for those strata in Louisiana, although we
19 heard today that maybe we've got to go back and look at that and
20 see if we got the numbers right for either the area or the -- I
21 guess it was really the discussion was about the artificial
22 reefs.

23
24 Anyway, for the artificial reefs, we used a mean per unit
25 estimator, and we just used the \hat{n}_h , the universe sizes for
26 those strata, in Louisiana applied to the substituted Texas
27 data.

28
29 Actually, because of that switcheroo there, I didn't feel like
30 it was appropriate to combine the Louisiana variance with the
31 variances of the rest of the Gulf of Mexico, and so I just made
32 a variance estimate for everything but Louisiana, because we
33 were reusing data, and so it wasn't -- You can't count that as
34 extra sample size, and so, anyway, that's why, in the Table 7,
35 there is no estimate of variance, or CV, for the Gulf-wide,
36 because the additive variance formula would not be correct, and
37 you would need to look at a covariance, and you could probably
38 figure out what that is, but I didn't. Okay. That was
39 Louisiana.

40
41 Now I'm going to talk a little bit about variance estimation,
42 and there's been a lot of discussion about the fact that the
43 variance estimates may be biased low, due to two things that
44 have been brought up, and that is ignoring measurement error and
45 autocorrelation between the observations.

46
47 I'm going to take both of these and talk about why I don't
48 think, in some cases, they're as big of a problem as they might

1 have been represented, and so the first one deals with
2 measurement error.

3
4 Under certain simple measurement error models, the measurement
5 error actually is included in the variance from noisy
6 observations, and so our observations themselves are noisy, and
7 so, when you look at the variance of those noisy observations,
8 it actually, under certain models for measurement error,
9 correctly incorporates that additional source of variance in the
10 sample variance of the noisy measurements, and so I'll talk
11 about that in a little bit more detail in a minute.

12
13 The other one about autocorrelation is this thing that we
14 discussed a lot at the end of Rob's discussion, and they said,
15 well, one thing you could try is to not cut up the transects,
16 and that's what I did. I didn't cut up any transects, and so
17 that's already been done, and so that's not going to take -- If
18 my estimates are okay, then that's actually the variance that
19 was computed in that way that was suggested, and so, anyway,
20 that's that.

21
22 Let me go into a little bit more detail about the measurement
23 error and see if you guys buy this. The reason that measurement
24 error variance is captured in the measurement-error afflicted,
25 as I have put it, observed values, the noisy observed values, is
26 similar to the reason, for you samplers out there, that variance
27 for multistage sample design can actually be estimated almost
28 unbiasedly with only looking at the between-PSU variance.

29
30 In other words, if you have -- Let's just be concrete and say we
31 have a two-stage design, and we know that the real variance of
32 an estimator from a two-stage design, where you first -- Like if
33 I had -- Well, if I'd had a transect, and I had just picked a
34 few observations from the transect, that would have been a two-
35 stage design, and I would have had a source of variability from
36 the transect-to-transect variability, and I would have had a
37 second source of variability, because I can only estimate the
38 total for the transect, whatever it is I'm measuring, and so
39 that has noise in it too, and so the real variance -- If you
40 write down the variance, and not the estimated variance, but the
41 real variance, of the estimator of a two-stage design, it has
42 two pieces.

43
44 One piece reflects that variability of the PSUs, or primary
45 sampling units, and the second piece captures the variance
46 within the PSUs. However, you actually can't estimate those two
47 pieces separately, because you never get to see the truth. If
48 you have sub-sampled a transect, if I had 100 grids in it and I

1 picked ten of them, and I made an estimate of the total from
2 those ten, that's not the truth.

3
4 That's not the true total for the transect, and so that is an
5 estimate, and so, when you actually compare those estimates with
6 each other, if you have two PSUs and you're looking at the
7 variability between them, but you have only estimated the totals
8 in each, you actually incorporate some of that second-stage
9 variability into the first stage, what you think is the first
10 stage, variance of the observed estimators. For those of you
11 who have a copy of Cochran on your desk, you can look at Section
12 10.4 and see him discuss that at length.

13
14 That is true if the first stage of a population correction
15 factor is small, and that's true for virtually everything,
16 because the Gulf of Mexico is big, and we don't sample a very
17 big fraction of it, and we don't have transects that cover a
18 very big fraction of it, and so that's why every sampling
19 software, every survey sampling software, from SAS to R,
20 everything, never -- There is a multistage design, and all it
21 does is to calculate the variance from the PSU to PSU variable,
22 and, in other words, it calculates basically sort of an S^2 -hat,
23 which is the sample variance, but not based on a real thing,
24 because you didn't see them, the real measurements, but rather
25 on the estimated measurements from the various PSUs.

26
27 Anyway, that sort of veered off into something that's going to
28 come up about a correlation again, but measurement error is
29 really kind of the same thing, because, when you observe a value
30 of abundance in a transect, but you've had to do some kind of
31 fast-and-loose stuff with gear and all this kind of stuff, and
32 it's not really the number, well, that observation has
33 variability in it.

34
35 I said that it doesn't matter at all under a simple measurement
36 model, and here is just the very simplest measurement error
37 model that exists, and that is, if you suppose that the
38 observation that you see is really a sum of two pieces, the
39 truth, which I'm calling Y_i here, and some sort of measurement
40 error that is zero mean, and, in other words, this model, I will
41 readily admit, doesn't incorporate bias into there, because I
42 have said that the mean of the epsilons are zero, which, if
43 there's bias in it, that's not going to be zero, but, anyway,
44 this is kind of a white-noise measurement error model.

45
46 Then the variance of Y_i -hat -- One further assumption is that the
47 truth and the error are uncorrelated with each other. If that's
48 true, then the variance of this thing that you see is σ_y^2

1 plus σ^2 , and so here's a picture trying to represent why it
2 is that, if you take the variance of the observed values, which
3 are noisy, you get something that is more variable than if you
4 were able to take the sample variance of the truth.

5
6 The first line up there, with those blue arrows, let's just
7 suppose those arrows point to the truth somehow, and maybe along
8 some number line or something, but, when I add measurement
9 error, these things wiggle. The blue lines, the arrows, wiggle,
10 and I don't really get to see that point right there, and,
11 instead, I see some point near it, and so forth, on all of them,
12 and so I went here and kind of wiggled and then just dropped an
13 arrow.

14
15 If you calculate the variance -- If these things are number
16 lines, and you calculate the variance of the red arrows, it's
17 bigger than the variance of the blue arrows, on average, at
18 least, and I have orchestrated it so that it's also true in this
19 picture, but, on average, if you just calculate s^2 , very luckily,
20 it inflates the variance that you get above σ^2 , and, in
21 fact, it inflates it exactly the right amount.

22
23 This is just the math version of that picture, which says, if I
24 average those observed values -- This is just a plain old sample
25 mean that you're introduced to in your first stat class, and the
26 variance is the variance of the observed units over N , but these
27 observed units have the variance of σ^2 plus σ^2 , and
28 so, if I calculate this thing that I'm calling S^2 -hat over N ,
29 it's actually an unbiased estimator of the actual variance, or
30 it estimates that inflated variance. All those estimates that
31 come straight out of SAS SURVEYMEANS are like this.

32
33 Now, here is, of course, the catch, is that not all of the
34 measurement error has this really simple model, and some of it
35 does, actually, because it's -- I mean, except that epsilon -- I
36 am guessing that all the epsilons have some sort of bias
37 associated with them, and so maybe the epsilon-I wouldn't have
38 an average of zero, but it would have an average of some B , and
39 that actually doesn't affect this variance.

40
41 If this is centered at someplace other than zero, you still get
42 a valid estimate out of your S^2 -hat of the variance, and what you
43 don't get is any sense of what the bias is though, and that --
44 But that's not variance. That is bias, and so, even if this is
45 off-center, even if the measurement error is off-center, you
46 still are okay on variance.

47
48 Some of the measurement error though probably isn't additive,

1 and so, if it's multiplicative, for example, it won't be exactly
2 this, but, actually, it will be not as bad as people think, and
3 it won't be exactly right if the -- Let's say \hat{Y}_i is Y_i times
4 some quantity, and that quantity has some randomness in it, then
5 this won't actually be true, but it still will produce a
6 variance estimate that is bigger than the one that I would have
7 gotten had I been able to see the truth, because, luckily, I
8 couldn't see the truth. I say luckily only in the sense that it
9 captures some of the variability.

10
11 One exception to this that occurred to me when Mary was talking
12 to the Alabama people is that the measurement error certainly
13 isn't of this form in Alabama for the reefs, the artificial
14 reefs, because, instead, where the measurement error comes in,
15 or at least one of the places the measurement error comes in, is
16 not here, but it's in the n_i , and so, in my mean per unit
17 estimator -- In my mean per unit estimator here, this n_h , I will
18 have to stick a hat on it, and now I do have -- So that's the
19 form of the measurement error for that, I mean the variance for
20 that, and it's not going to be like a sum of variance, and,
21 instead, it's going to be a little more complicated than that,
22 because that's a product of two random variables, but we can use
23 -- As she suggested, we can use the delta method and get a
24 variance for a product, and it's especially easy, because, as I
25 understand it, the two estimates there, the two random
26 variables, are independent of each other, and so that makes it,
27 I think, kind of easy to do that, and that's something that I
28 did not do, and it didn't occur to me until she said that, and
29 so thank you, but I can do it.

30
31 The other question, and now maybe this is clear now to everyone,
32 but I had made this slide before some of the later discussions,
33 and so, yesterday, there was a lot of discussion about neglected
34 autocorrelation in variance estimates from transects, and so
35 here's the question. Is there neglected autocorrelation when
36 estimates have been done the way that I suggested, and the
37 answer is no, there isn't any.

38
39 That's because the randomness comes from the selection of the
40 units and not from any modeling or anything like that, and the
41 transects are independently selected. By definition, they are
42 independent, and so, if you just look at the transect total to
43 transect total variability, you don't have to get into any of
44 that measurement error, and suppose that's not there in your
45 case, and so here's just a little example.

46
47 Let's say this some stratum in the Gulf of Mexico, and we've got
48 fish swimming around in there, and that piece of the stratum --

1 That stratum has 126 units in it, and so I don't know how many
2 fish are there, and I've forgotten, but, anyway, what I will do
3 is select some transects, and so there is my transects, and
4 suppose I plan on a sample of size three, and so the way the
5 transects were selected, as I understand it, was a random point
6 was selected that belongs to a grid, which means that every grid
7 has an equal chance of being selected, which makes it a simple
8 random sample, and then you just run your transect off that
9 grid, and you try to make them the same size, but maybe you
10 didn't, and so I have drawn them here like they're not, just to
11 show what happens.

12
13 I got five fish in one and zero in my other two. Now, clearly,
14 there is -- From the way this word was used yesterday, there is
15 autocorrelation in the transect. Well, there would be if I was
16 treating each one of these little squares as a sample, but I'm
17 not, and so that doesn't matter.

18
19 Anyway, this way this would work is, using the ratio estimator,
20 it would be the total size and area, 126 units, times this
21 density, which is simply the number of fish in every sampled
22 unit added up, over the number of squares, or I guess they're
23 rectangles, in every sample unit added up, and that gives me an
24 estimate of 20.3 fish in this stratum.

25
26 Actually, I do remember, and I think I made eighteen fish in
27 there, and so that wasn't too bad. However, when you calculate
28 the standard error, it's pretty bad. It's 175 with my sample
29 size of three, and it is because of this large variability from
30 zero to five that's reflected in the standard error, but,
31 anyway, the fact that the data are autocorrelated within
32 transects is not relevant, in this case, and so that's one that
33 you can quit worrying about.

34
35 Now, when would it matter? Well, if you split the transect in
36 half, or into the individual units, then you would have to worry
37 about it, because they weren't selected independently. Also, if
38 the size of the transect was correlated with the number of fish
39 in the transect, then the estimator itself would be biased,
40 actually, and so that means, if you go out to your transect
41 point and start running the transect, and somebody says, you
42 know what, we're not seeing any fish, and let's quit, well, that
43 would invalidate all that I just said, because you would -- The
44 two would be correlated.

45
46 The size of the transect and the number of fish would be
47 correlated, and so that wouldn't -- I mean, it's not really the
48 correlation that matters, but it's the fact that it's not pre-

1 designed, that you include less units than you were supposed to
2 have, on purpose, if the numbers are low, or high, whichever way
3 you did it. If you let the number of fish influence the size of
4 the transect, then that's a problem.

5
6 If there is a two-stage sample in which the transect grids are
7 sub-sampled, then the standard error of the final estimate would
8 be larger. Like, if I didn't look at all these grid points
9 right here, but just every other one or something, then I would
10 have that second source of variability, but, like I talked about
11 earlier, and I'm boringly long, I guess, you can actually
12 estimate -- If you just calculate the PSU-to-PSU variability,
13 that actually captures that second-stage variability almost
14 perfectly, if the finite population correction for the first-
15 stage units is very small.

16
17 Comments on other effects on estimated variance, this is about
18 pipelines, and I think there may be a few things that might be
19 correctable about the pipelines, and I think I maybe learned
20 something about the way the pipelines were sampled in the last
21 two days that might make me think about changing the variance of
22 this a little bit.

23
24 The thing that is discussed here is sort of a niggling issue
25 that I noticed when it was too late to fix it on my analysis,
26 but, as I understand it, the pipelines were selected with random
27 starting points, and then they go in both directions a certain
28 number of -- Not random starting points, but random selections
29 along the pipeline, and then you spread out in both directions a
30 certain prespecified length, unless you were within a half-
31 length of the planned transect length of the end, in which case,
32 obviously, you can't go all the way on one.

33
34 The way I read it, what they did was they went the regular
35 transect length, but in the other direction. What that means is
36 that the probability of selection for the places near the end of
37 the pipelines are small, smaller, than the probability of
38 selection anywhere else, and so there should be a different
39 weighting, but, in the file that I got, I couldn't tell which,
40 if any, were near the end of the pipeline.

41
42 I assume that there must have been some, or else there wouldn't
43 have been that careful description of how it was done if it was
44 near the end of the pipeline, but I couldn't identify which
45 ones, and I am guessing that it couldn't have been very many,
46 because these pipelines aren't very short, and so it would be
47 unlikely that you would get a whole bunch of them near the end,
48 and so there's only two ends to every pipe, right, and so it

1 would only be two, but, anyway, that's one issue that would
2 affect it.

3
4 The fact that you don't weight by the reciprocal of the
5 probability selection makes it a tiny bit biased, if that
6 happens very often, and it also affects the variance, but I
7 don't think this is a -- Unless someone corrects me, I don't
8 think this is a big problem.

9
10 The other problem that isn't written down here that might be a
11 problem, and maybe I need to hear from some of the people who
12 actually did the sampling a little more carefully, so I
13 understand it, is that, if the pipeline was chosen in a way that
14 was paired with some other sampling from some other stratum,
15 then that could induce a correlation, because that would make it
16 sort of a cluster, and so that might cause a bit of a problem,
17 and maybe I can ask a question when this is over with, to make
18 sure that I understand how to account for that. I think that's
19 all.

20
21 This, I also wrote before the nice discussion that -- Oh gosh,
22 now I've forgotten who did it, but someone gave about why
23 messing up your sample allocations, or sampling at a lower
24 sampling rate in one area than another, or maybe a sampling rate
25 that's so low that you don't get good estimates, and it doesn't
26 bias anything, but it just makes it have a bigger variance, but
27 I think we've covered that, and so that's it. I believe, with
28 that, I think I'm done.

29
30 **CHAIRMAN POWERS:** Thank you. Are there questions of Dr. Stokes?
31 Mary, Dr. Christman.

32
33 **DR. CHRISTMAN:** You knew that I was going to raise my hand,
34 right? I would like to discuss, Dr. Stokes, Table 7.

35
36 **DR. STOKES:** Okay.

37
38 **DR. CHRISTMAN:** It's page 89. I think it's 89 or 90. You said
39 that pyramids were actually sampled differently in Texas than
40 was indicated in the text, and so I'm assuming that means that
41 those number of structures there that you have up, the reason
42 that they're hugely different than Table 6 is because of that?
43 This has 12,800 structures, and the other table has 5,200.

44
45 **DR. STOKES:** What this is, it's an estimate of how many pyramids
46 are there that are made by selecting some grid squares and
47 counting the pyramids in those grid squares and inflating it the
48 number of grid squares in the area, and so this really is an N-

1 hat that is based on just a mean per unit estimator.
2
3 **DR. CHRISTMAN:** So what is this the sample size for?
4
5 **DR. STOKES:** That is the sample size of grid squares.
6
7 **DR. CHRISTMAN:** Okay. That's not clear, because it's based on -
8 - It's not based on structure or area.
9
10 **DR. STOKES:** Well, it's area, but it's grid squares. They're
11 all the same area.
12
13 **DR. CHRISTMAN:** Right. I think it needs to be clarified in your
14 table then, that the actual number of structures sampled is
15 larger than four.
16
17 **DR. STOKES:** Yes, and the number of structures is -- I guess
18 it's not in the table there.
19
20 **DR. CHRISTMAN:** The reason why I picked on poor Rob Ahrens so
21 much about clusters was because both of you have sample sizes
22 that indicated that you treated every observation, every
23 fifteen-second video, as an independent simple random sample.
24 Your sample sizes there should be the number of transects and
25 not -- For uncharacterized bottom, I'm referring to now, and not
26 the number of videos.
27
28 **DR. STOKES:** If that is correct -- I mean, I don't know. I
29 actually didn't get any -- I just got a list of numbers that
30 said these are the transects, and that's what came to me.
31
32 **DR. CHRISTMAN:** Right, but you know how many transects you used
33 in your estimate, your ratio of means estimate, and so you could
34 put that number there.
35
36 **DR. STOKES:** Right.
37
38 **DR. CHRISTMAN:** It would make me feel a lot better, because,
39 otherwise, if you don't discuss transects in your description of
40 the writeup, it's unclear that you used the actual full
41 transects, which explains why your estimates of standard error
42 tend to be slightly lower, because you did actually use the full
43 data for the whole transect, which helps.
44
45 **DR. STOKES:** Yes.
46
47 **DR. CHRISTMAN:** The next question I have was the sum with the
48 pipelines, and you have 15,618 as your sample size, which you

1 sure as heck didn't use, I hope.
2
3 **DR. STOKES:** Let's see. Let me look at my pipeline data.
4
5 **DR. CHRISTMAN:** It's just the bottom of Table 7, and that's all
6 that I'm referring to.
7
8 **DR. STOKES:** Let me look at Table 7 again. This is the column
9 for sample size?
10
11 **DR. CHRISTMAN:** Yes, the 15,618.
12
13 **DR. STOKES:** That's actually not sample size, and it's area.
14
15 **DR. CHRISTMAN:** No, it's number of individual fifteen-second
16 videos, I believe.
17
18 **DR. STOKES:** I don't know how many fifteen-second videos -- I
19 mean, I had a list of numbers, and I thought they were the
20 observed numbers for that transect, because I did question that.
21
22 **DR. CHRISTMAN:** The other table indicates there were twenty-
23 seven pipelines sampled.
24
25 **DR. STOKES:** What other table? Rob's table?
26
27 **DR. CHRISTMAN:** Yes. Table 6.
28
29 **DR. STOKES:** I actually never saw Rob's table until the thing
30 was --
31
32 **DR. CHRISTMAN:** You captured some of the problems that I had,
33 which was, namely, that, when data were collected in a cluster
34 sample design, it should be treated as a cluster sample design.
35
36 **DR. STOKES:** Right. I mean, I am virtually certain we did that,
37 and I believe that N represents the smaller units, but we
38 treated them as the transects.
39
40 **DR. CHRISTMAN:** Yes, and you must have used the entire transect,
41 because your standard error is much lower. I mean, it's one-
42 fourth the standard error that Rob got, because Rob treated them
43 as a simple random sample, and he did not use all 15,600 videos.
44
45 **DR. STOKES:** He should have got a smaller standard error if he
46 used the --
47
48 **DR. CHRISTMAN:** No, because remember he only used a subset. He

1 only used every fortieth, and you used all.
2
3 **DR. STOKES:** So the sample was only one-fortieth as big, but --
4
5 **DR. CHRISTMAN:** Right. Exactly.
6
7 **DR. STOKES:** Okay. Got it.
8
9 **DR. CHRISTMAN:** So that's the difference there. The other thing
10 that I was a big confused about is, for the artificial reefs in
11 Louisiana, could you cover that a little bit again, because
12 Rob's estimate was 6,700,000, and your estimate is almost eleven
13 million, and you had said something about Louisiana being
14 treated differently because there was a substitution.
15
16 **DR. STOKES:** We just basically had no information about
17 artificial reefs in Louisiana, and so all we did was just take -
18 - Greg and Tara identified for us artificial reefs in Texas that
19 were similar, supposed to be similar, based on habitat, and we
20 simply took the average of those and then multiplied it against
21 how many artificial reefs in the various categories are believed
22 to be -- What I was told to exist in Louisiana.
23
24 It's just a simple -- Thinking that we knew how many were in the
25 frame for the three types of reefs in Louisiana times data that
26 didn't come from Louisiana. It was times means from a subset of
27 Texas.
28
29 **DR. CHRISTMAN:** So then you didn't use the average over all the
30 depths, and you used the average within each depth zone.
31
32 **DR. STOKES:** Yes.
33
34 **DR. CHRISTMAN:** That's why it's a different value. Okay. The
35 last thing was that I wasn't referring to measurement error when
36 I was referring to some of the issues that I had. I was
37 referring to exactly what you mentioned towards the end, which
38 is that you're using the product of two random values, in at
39 least two instances, and I cited two instances, the number of
40 artificial reefs and when you have an estimate of species
41 composition that is the average composition, and you also have a
42 variance associated with that average from your sampling.
43
44 You used Leo Goodman's 1960 paper, who lays out exactly how to
45 estimate variance of products of independent -- Also, he
46 discusses dependent products, and so it would be quite possible
47 to do that, just to get a sense -- There are so many sources of
48 uncertainty here, and my feeling is this is like drops in a

1 bucket.
2
3 That doesn't make big difference, but it's one drop in a bucket,
4 and, at some point, the bucket fills up, and so my concern is
5 that, where we can address variance, we should at least
6 determine whether it has an impact or not.
7
8 **DR. STOKES:** Yes, that's a good idea.
9
10 **DR. CHRISTMAN:** I wanted to keep in mind that, while I agree
11 with you that, yes, in and of itself, this one is not a big
12 deal, and this one is not a big deal, in the aggregate, they
13 could be serious. I totally agree with everything you said,
14 otherwise.
15
16 **DR. STOKES:** Well, that's good.
17
18 **DR. CHRISTMAN:** Obviously, and it's statistics. I should agree
19 with you, but I just wanted to point out that my concern is the
20 constant drip, drip, drip that's adding up, and we can't even
21 measure it. Where we can measure it, we ought to at least get a
22 sense of the impact, and you using the clustering design aspect
23 shows exactly the sort of effects that it has, and so that's --
24
25 **DR. STOKES:** My CV was quite a bit bigger, I think, than Rob's.
26
27 **DR. CHRISTMAN:** Well, in some cases, and, in other cases, it
28 wasn't.
29
30 **DR. STOKES:** I mean the aggregate. The aggregate I think was a
31 difference between --
32
33 **DR. CHRISTMAN:** The aggregate is bigger, then you didn't include
34 Louisiana, and so -- They did the pseudo-replication of samples.
35 Well, not pseudo, but the replication of samples and then
36 treating them as though they were actual measurements. Thank
37 you. I appreciate everything.
38
39 **CHAIRMAN POWERS:** Thank you. Are there other questions at this
40 point? Dave Eggleston.
41
42 **DR. EGGLESTON:** Hi, Lynne. Thanks for a very clear
43 presentation. I was the one that was kind of harping on some of
44 the spatial autocorrelations, and I wasn't necessarily -- I
45 realize the samples within the transect are not independent, and
46 that wasn't so much the issue, but, when I look at these sort of
47 density maps, these sort of bubble maps, and we've seen some in
48 the presentations, and there's on Figure 18 for Texas for the

1 uncharacterized bottom, and you see these clusters of density,
2 and so that's what I was thinking in terms of, and I thought
3 that -- To me, it looks like there's definitely spatial
4 coherence.
5
6 I mean, you see a lot of big density dots right outside of
7 Corpus Christi, it looks like, and some of the other areas, and
8 so I was just concerned about not capturing that spatial
9 autocorrelation at the scale of that uncharacterized bottom
10 strata, and I thought it was interesting to try to characterize
11 that sort of spatial coherence and see how that potentially
12 matched up with potential bottom features.
13
14 **DR. STOKES:** Well, all I can say is that this patchiness of the
15 spatial distribution still doesn't affect -- As long as you pick
16 them at random, and you don't alter the length of the transect,
17 it still doesn't affect the variance, the variance estimate, and
18 it doesn't make it biased in any way, and so I don't know what
19 else to say about that, but, if you're talking about some
20 different source of autocorrelation than that, you need to
21 explain it to me better, because I don't get it.
22
23 **DR. CHRISTMAN:** Do you want me to jump in?
24
25 **DR. EGGLESTON:** Yes, please.
26
27 **DR. CHRISTMAN:** You're referring to the fact that, if you look
28 at the spatial surface, if you look at the variation over space,
29 there's clearly some sort of trend, like inshore is denser than
30 offshore type of thing, or more dense up north and less dense as
31 you move south.
32
33 **DR. EGGLESTON:** Right.
34
35 **DR. CHRISTMAN:** From a design-based perspective, it doesn't
36 matter. What really matters is whether your random sample, or
37 even a non-random sample, in the case of the UCB, actually grabs
38 the variation sufficiently. As long as it does -- In their
39 case, they did a pretty good spatial coverage, except for
40 between the two bays there, that one area that didn't have much
41 sampling.
42
43 **DR. STOKES:** But, you know, randomness -- Sometimes things that
44 -- Randomness looks kind of non-random.
45
46 **DR. CHRISTMAN:** You don't want it to look --
47
48 **DR. STOKES:** That's right, and so, just because there's some

1 missing, that probably means it's really random, if it kind of
2 looks odd to you, because, if it was too sort of spread out
3 evenly, odds are it's not random.

4
5 **CHAIRMAN POWERS:** We need to kind of hone-in on this discussion,
6 and I think we're kind of losing -- Dave, has your question been
7 answered.

8
9 **DR. EGGLESTON:** Yes. I'm fine. Thanks.

10
11 **CHAIRMAN POWERS:** Okay. Luiz.

12
13 **DR. BARBIERI:** Thank you. I just wanted to echo what Dave
14 Eggleston said, and thank you for this very, very clear and
15 helpful presentation. If you could go to I guess the previous
16 page of the report there, and I guess it's -- I am trying to get
17 to that Table 6, and it's page 84 of the report, and I just
18 wanted to understand, in terms of the sample sizes, based on
19 what you just explained, if you could walk us through.

20
21 **DR. STOKES:** This isn't my table, and so I don't know.

22
23 **DR. BARBIERI:** I see. What I am trying to understand, just so
24 you get an idea of my question, is, for example, for
25 uncharacterized bottom, that big number there of samples, 6,435,
26 this, I believe, came out of seven transects, I believe, or
27 maybe more than that, but it was definitely not even close to
28 6,435, and so what is really the sampling unit here that we
29 could and should be using for this sampling of uncharacterized
30 bottom, and how do we get to that sample size there?

31
32 **DR. STOKES:** Well, again, that's not my sample size, and so I
33 don't know.

34
35 **DR. STUNZ:** Mr. Chairman, I can answer that question, if you
36 would like.

37
38 **CHAIRMAN POWERS:** Please do.

39
40 **DR. STUNZ:** Luiz, I think what you're asking about is why is it
41 6,400 there, and, if you go down to Table 7, and, sorry, but I
42 don't remember what the difference is, but --

43
44 **DR. CHRISTMAN:** It's the same value in Table 7.

45
46 **DR. STUNZ:** It is the same value in Table 7?

47
48 **DR. CHRISTMAN:** It was 140 transects of UCB plus the C-BASS

1 transects, and I don't know how many that is.

2
3 **DR. STUNZ:** If you go down to Table 7, I can explain this, I
4 think, and I can't remember what's in Table -- Lynne is 3,538,
5 right, and the difference there is, in discussions early on with
6 Lynne, and Lynne may not even remember this, because it was
7 early in the process, but Steve Murawski and Jay, obviously,
8 worked in Texas, and this discussion we had about multiple gear
9 within the same strata came up, and, because Jay's overlapped
10 Steve's, Lynne recommended, or maybe we discussed or we thought
11 it was appropriate, only to use Jay's data for her analysis and
12 not to complicate it with another gear in that strata, because
13 that was sort of the only place that that occurred. That is why
14 you see a sample difference there.

15
16 **CHAIRMAN POWERS:** Thank you.

17
18 **DR. BARBIERI:** Okay. That explains it, Greg. Thank you, and
19 thank you, Lynne.

20
21 **DR. STUNZ:** There may be other things like that, because,
22 obviously, as Lynne mentioned, it wasn't like we precluded them
23 from talking, but these were independent estimates of their own,
24 of us talking, and so they looked at things very differently,
25 and so it's not like one was right or one was wrong or
26 something, but it was just that's how they perceived that was
27 the best way to approach this problem.

28
29 **CHAIRMAN POWERS:** Okay. John Hoenig.

30
31 **DR. HOENIG:** I just wanted to make sure that Dave Eggleston's
32 question was answered to his satisfaction about spatial
33 autocorrelation, and, basically, what I wanted to say is, if you
34 have a map, and there are broad trends across that map, and you
35 have spatial autocorrelation, if you were to take a transect and
36 say this transect happens to be high abundance, what does that
37 tell me about the next transect?

38
39 If the next transect is say a fixed distance away, then you
40 would have autocorrelation, but, if it's selected randomly from
41 all possible locations, then the fact that the I transect was
42 high doesn't tell you anything about at all about the I-plus-one
43 transect, whether that's going to be high or low, and so you
44 basically, by randomization, you break up the spatial structure,
45 and then you don't have to worry about it. I don't know if that
46 helps you, Dave, or not, but that's kind of why the random
47 sampling of transects makes the transects independent.

1 **DR. EGGLESTON:** Thanks, John. I got that, and I guess I was
2 thinking more -- I was kind of excited about learning what the
3 spatial scale of coherence is in some of those random samples,
4 to then couple that with what the bottom features might be that
5 are explaining those patterns.

6
7 **DR. CHRISTMAN:** That's certainly possible, yes.

8
9 **CHAIRMAN POWERS:** Excuse me. Several people are talking, and
10 can we -- The way I left it, John Hoenig was talking. Are you
11 finished, John?

12
13 **DR. HOENIG:** I was just saying it's very interesting to learn
14 about the spatial structure, and you can do that by looking
15 within a transect, about how things vary along the transect, but
16 that's a separate issue from looking at a collection of
17 transects selected randomly.

18
19 **CHAIRMAN POWERS:** Okay. Thank you. Dave, did you want to
20 respond?

21
22 **DR. EGGLESTON:** No, other than great explanation, and I think
23 the short version was it's a random sampling approach that has
24 identified spatial structure in the data.

25
26 **CHAIRMAN POWERS:** All right. Thank you. All right. There is
27 no other questions now, and Ryan had indicated that we were
28 being directed to have a session of public comment. How one
29 operates that, I will leave it to Ryan to lead us through it.

30
31 **MR. RINDONE:** We've given them all your cellphone number to text
32 you when they're ready to talk.

33
34 **CHAIRMAN POWERS:** Perfect. I will answer it forthwith.

35
36 **MR. RINDONE:** Thank you all very much, and so instructions are
37 being put on the screen right now for participants to be able to
38 raise their hand, if they have something they would like to ask
39 of the review panel here, and please feel free to do so, and
40 we'll limit folks to about three minutes for asking questions or
41 making any comments. Kellie Ralston.

42
43 **PUBLIC COMMENT**

44
45 **MS. KELLIE RALSTON:** I am Kellie Ralston, representing the
46 American Sportfishing Association, and I wanted to thank the
47 committee for allowing us a few minutes to address you all, and
48 I know you've had a long couple of days, and more to come, and

1 so I certainly appreciate this opportunity.

2
3 The last two days have really been, I think, a great review of a
4 truly groundbreaking study, and I don't think we've ever seen a
5 fisheries assessment of this scale and scope that has had this
6 kind of funding, and that could potentially serve as a template
7 for other studies, like the one that's coming forth in the South
8 Atlantic, as well as potential modification to the way NOAA
9 Fisheries conducts all of its surveys in the future, and I know
10 that Clay has made that comment at council meetings before.

11
12 Certainly I'm not a statistician, and I don't fully understand
13 all of the details that you all are addressing to offer comments
14 on, but I do kind of have some broad take-aways that I would
15 appreciate you all considering.

16
17 One is good science is critical to good management in fisheries,
18 and we certainly appreciate Senator Shelby recognizing the need
19 for more funding and better data to be able to move forward with
20 the Great Red Snapper Count. Our fisheries are worth billions
21 of dollars and, therefore, worth significant money on the
22 science side of things.

23
24 As far as this specific study, science is iterative, and we
25 learn from what we do to inform and improve our future efforts,
26 and, given the scale and scope of the Great Red Snapper Count,
27 you would expect there to be lots of lessons learned and lots of
28 opportunities to address other issues as you move forward, but
29 that doesn't mean that it isn't good science, and that's why we
30 have the best available science category and not just best
31 science in the Magnuson-Stevens Act.

32
33 With that, I would encourage the committee to review this
34 project with your scientific expertise, as you have been, but
35 also kind of in the scope of this broader context, and, with
36 that, I will close, and I appreciate the time. Thank you.

37
38 **MR. RINDONE:** Thank you, Kellie. Jeff Angers.

39
40 **MR. JEFF ANGERS:** Hi, everyone. My name is Jeff Angers, and I'm
41 the President of the Center for Sportfishing Policy. I want to
42 thank all of you for devoting these first two of four days that
43 you all are devoting this week on this committee. I think
44 Kellie's comments were really quite on point, and I want to join
45 all the points that she made.

46
47 This really is an unprecedented look at this fishery, and it
48 explains so much of what stakeholders have seen on the water,

1 and the recreational fishing community in the Gulf region has
2 confidence in the Harte Research Institute and the leadership of
3 the Great Red Snapper Count. It is impressive by any measure,
4 and I know there will be a lot of deliberations.

5
6 I would encourage this committee to don't let the perfect be the
7 enemy of the good. There are always questions with new science,
8 and we want you to honestly evaluate, but we hope this committee
9 will find that this massive project that's been undertaken by
10 most of the brightest minds in marine sciences represents a
11 tremendous step forward in our understanding of this stock and
12 that it truly represents the best science that we have on the
13 true range and population of red snapper in the Gulf of Mexico.
14 Thank you very much.

15
16 **MR. RINDONE:** Thank you, Mr. Angers. Is there anyone else who
17 would like to provide any comment? Michael Drexler.

18
19 **MR. MICHAEL DREXLER:** Thank you, Ryan and the Chair. My name is
20 Michael Drexler, and I'm with the Ocean Conservancy. I too want
21 to applaud everyone on this enormous effort, and I think the
22 science being developed here is unprecedented, and it will
23 undoubtedly give us a lot of insight into the red snapper stock
24 assessment.

25
26 I think, given the issues raised here, we would urge the SSC to
27 give this review sort of the weight of a full stock assessment,
28 and we have a very well-defined stock assessment process to
29 include information like this that fundamentally changes our
30 understanding of the stocks, which is a research track
31 assessment. The magnitude of the changes being considered, and
32 the scope of the uncertainties discussed here, I think warrant
33 that, and so we would encourage the SSC to move this into a
34 SEDAR process assessment, so we can understand how this
35 integrates with the stock.

36
37 On a technical note, I wanted to ask a question, or provide a
38 comment. On the counting of artificial reefs in Alabama, I
39 think it's probably not going to sway the results a huge amount,
40 but, in talking to some -- In conversations, I understand that
41 the materials of the artificial reefs in Alabama may degrade
42 over time, and, looking at the dates of the surveys to count
43 these artificial reefs, it dates back quite a while, and so I
44 don't know how to quantify that or if it's a valid point, but it
45 may be worth considering how some of these chicken coops or
46 other materials may degrade over time, in the span of these
47 surveys, which are then used to essentially extrapolate by the
48 number of artificial reefs, and so thank you for the opportunity

1 to comment, and thank you to the SSC and researchers here for
2 this great body of work.

3
4 **MR. RINDONE:** Thank you, Michael. Ted Venker.

5
6 **MR. TED VENKER:** My name is Ted Venker, and I'm the Conservation
7 Director for the Coastal Conservation Association, and I really
8 just wanted to echo earlier comments. I really appreciate the
9 tremendous time and effort that Greg and his team have put into
10 this, and also to everyone who has invested the time, the
11 reviewers on this effort, and, really, it's a tremendous amount
12 of work for you guys, and it's largely going to go unrecognized,
13 but it's incredibly vital, and so thank you, all, for your time.

14
15 I am wildly unqualified to comment on the technicalities of what
16 you all are discussing, but I did just want to bring it back to
17 the theme that I remember from my grade school science classes,
18 which was don't ever let the perfect be the enemy of the good,
19 and so, if this is progressing to further our knowledge of the
20 red snapper population, I would encourage, just as general
21 advice from a layperson, to recognize that none of the minutia
22 that we're discussing today, that has been brought up, is likely
23 to change the fact that we're talking about orders of magnitude
24 difference in what we thought was in the Gulf of Mexico with
25 what Greg and his team are showing.

26
27 That was all that I would like to bring up, and I know that's
28 probably very rudimentary, but I did want to share that it's an
29 important study, and it's impressive to think of all the time
30 and effort that everybody has put into it, and I just wanted to
31 make sure that we're looking at it in the big picture, and so I
32 appreciate it, Ryan, and thank you, all.

33
34 **MR. RINDONE:** Thank you, Ted. I think Dr. Hoenig has a comment
35 for Michael Drexler, or a response to a comment.

36
37 **DR. HOENIG:** Thank you, Michael, for your thoughtful comments.
38 You're absolutely right that, over time, chicken coops degrade,
39 and also, over time, people throw more artificial reefs
40 overboard, so that the inventory that we have of those cells
41 that we surveyed gets out-of-date.

42
43 We can get at the rate of disintegration of chicken coops and
44 things by looking at how many did we go to visit and found they
45 were no longer there, and I don't have that information at my
46 fingertips, but that's something that we can look for. The part
47 about new ones coming in that we weren't aware of is harder, and
48 the only way to get at that would be to revisit some cells and

1 re-map them, and it's not as high a priority for us as mapping
2 additional cells.

3
4 All in all, it's very fortunate that Sean Powers, a few years
5 ago, decided to start mapping those cells. Otherwise, we would
6 have been without a sampling frame to choose from, and so I just
7 wanted to say that you're absolutely right that this is more
8 work, and it's just a matter of finding the funding to continue
9 it.

10
11 **MR. RINDONE:** Ms. Bosarge.

12
13 **MS. LEANN BOSARGE:** Thank you, Ryan. I just wanted to commend
14 everybody, Greg and all your group, and I guess -- I mean, I
15 knew it was a huge undertaking, but I don't think I realized
16 exactly how huge of an undertaking it was. It's amazing work,
17 and I commend staff for setting this up logistically, so that
18 everybody could collaborate at the same time and give comments
19 and answer questions, and so just a kudos to everybody,
20 everybody involved.

21
22 The only comment that I would make is that I'm super excited
23 about some of the new technologies that were used, really
24 innovative ways of getting at what's out there, and I hope, in
25 the future -- I know we don't have a lot of time here, and so
26 some of it's kind of high-level, but even like using the
27 acoustics in the western Gulf for the uncharacterized bottom,
28 and that's pretty innovative.

29
30 We received a high-level presentation on it that showed a few
31 screenshots of what we call bottom machines in my world, but,
32 anyway, and how you tried to take that and filter it, and I
33 would love to see more info on that, maybe the quantitative side
34 of it. How you take that and come out with that number of fish
35 is really amazing, and so we would love to learn more about that
36 in the future, way down the line, when you have the chance, and
37 so thanks to everybody, and I can't wait to hear more.

38
39 **MR. RINDONE:** Thank you, Ms. Bosarge. Are there any other
40 people out there that would like to make a comment? Seeing
41 none, thank you, Dr. Powers.

42
43 **CHAIRMAN POWERS:** Thank you. I would make one general comment
44 in response to several of the comments that were made in the
45 public comment, and that is I think it's clear to all of us that
46 this endeavor to estimate the abundance of the Gulf of Mexico --
47 It's going to be an integral part of the stock assessments for
48 some years to come, and it provides an awful lot of opportunity

1 to estimate things that you don't normally think about, like
2 perhaps even natural mortality and issues like that.

3
4 I don't think any of us are negative about the usefulness of
5 this. Obviously, when we get talking about details, it sounds
6 very critical, but, in the same respect, I think we will end up
7 with a better product as we go forward, and I would hope that
8 the public realizes that that's essentially our goal. Thank
9 you.

10
11 Now, we have reached pretty much our time for this evening, and,
12 without objection then, I would cut off the meeting, and we
13 would return again tomorrow at 9:00 a.m. Eastern Daylight time.
14 Thank you very much, and I think it's been a very productive
15 day.

16
17 **MR. GILL:** Mr. Chairman, is it your intent to start the agenda
18 tomorrow morning with Greg Stunz's portion of the agenda and the
19 follow-on discussions that were intended for today's
20 participation?

21
22 **CHAIRMAN POWERS:** Yes.

23
24 **MR. GILL:** Thank you.

25
26 **CHAIRMAN POWERS:** A large part of it will be details of the
27 discussions like we've had today, and I would imagine, in some
28 cases, some things will be relitigated, so to speak, as we go
29 forward, but, toward the end, I will want some summing up, in
30 terms of the consultants, and then also some direction, in terms
31 of the SSC, how we might go.

32
33 Ryan had made the comment about individuals voting on things,
34 and I'm not sure, in this section of the meeting, we really have
35 to vote on anything, and it's sort of irrelevant when we do
36 that, but, basically, we're going to have to decide, either at
37 the beginning of the next meeting or the end of this one, how we
38 want to proceed with this estimate, in terms of carrying it
39 forward to catch advice. Ryan.

40
41 **MR. RINDONE:** Thank you, sir. According to the terms of
42 reference, one of the responsibilities of the review panel,
43 which includes the non-co-PI members of the SSC and the
44 independent reviewers, is to determine whether the Great Red
45 Snapper Count is a representative estimate of absolute abundance
46 and that that estimate is reasonable, as is its variance, as it
47 pertains to red snapper in the Gulf, and so that determination
48 is something that is being asked of the review panel, to be made

1 in this first-half of the meeting, the part that's actually the
2 peer review portion of the meeting.

3
4 Whether or not to use the data from the Great Red Snapper Count
5 in an interim analysis and beyond that for informing management,
6 it would happen under the SSC at the latter part of the meeting.

7
8 **CHAIRMAN POWERS:** Yes, I agree, but, when we typically go
9 through this best available information kind of debate, we're
10 usually looking at it as a whole, for a whole stock assessment.
11 In this particular case, there may be certain things we want to
12 use out of the estimate and certain things we don't want to use,
13 and, obviously, I think we need to get some guidance from that
14 from the consultants, and then also in terms of the SSC's own
15 opinion about that, as we go forward. Thank you. With that,
16 may we retire for the evening? Yes, we may, and so I will see
17 you in the morning then.

18
19 (Whereupon, the meeting recessed on March 31, 2021.)

20
21 - - -

22
23 April 1, 2021

24
25 THURSDAY MORNING SESSION

26
27 - - -

28
29 The Meeting of the Gulf of Mexico Fishery Management Council
30 Standing and Special Reef Fish and Socioeconomic Scientific and
31 Statistical Committees reconvened via webinar on Thursday
32 morning, April 1, 2021, and was called to order by Chairman Joe
33 Powers.

34
35 **CHAIRMAN POWERS:** Good morning, everybody. This is Joe Powers,
36 again, your illustrious Chairman, and we're about to embark on
37 Round 3. Basically, this morning is we want to finish this
38 stage of the meeting, the basic review.

39
40 On the agenda is a series of presentations that's being led by
41 Dr. Stunz, Greg, and I would be giving the floor to him, and I
42 will allow him to kind of decide when we would open up for
43 questions, and, obviously, if anybody wants to interject, feel
44 free to do so.

45
46 At the close of those three series of discussions, we'll have
47 the overall discussions and further questions, if needed, from
48 the SSC and the consultants, and then we'll have some -- We'll

1 be asking for some conclusions, at this stage of the game, from
2 the consultants, and then the SSC has to decide how we want to
3 proceed with this information, and so that's the game plan for
4 this morning, and so, with that, I would welcome everybody.

5
6 For the Central Time Zone people, it's eight in the morning.
7 For wherever else somebody may be, I'm not sure, and so let me
8 give the floor then to Greg Stunz, and we'll proceed according
9 to the agenda. Thank you.

10
11 **REVIEW OF GREAT RED SNAPPER COUNT PROJECT (CONTINUED)**
12 **DISCUSSION, CONCLUSIONS, AND KEY TAKEAWAYS**
13

14 **DR. STUNZ:** Thank you, Mr. Chairman. You should be looking at
15 the same red snapper slide that we've been looking at for quite
16 a while, and just to -- As the agenda goes together and things
17 develop, I think I can -- Because, obviously, we want to get to
18 the meat of the matter, which is the deliberations, and all of
19 these sort of what have appeared as separate presentations I
20 think I can do in a very short presentation this morning that
21 kind of ties it all together.

22
23 Of course, we'll be here to answer questions and contribute, but
24 I don't think we need another kind of death-by-PowerPoint kind
25 of thing, and so I think I can just summarize a lot of this, in
26 terms of where we are in our team and then turn it back over to
27 the crux of the matter. With that, I will go ahead and get
28 started, if it's okay, Mr. Chairman.

29
30 First, I just want to say thanks for the review panel,
31 particularly the independent reviewers here, that allow us
32 improve our work. Clearly, as a lot of the public is attending
33 here, this is really how the peer review process works, albeit
34 not quite as public, but we're used to that, and that's how we
35 ensure the best science available, is going through this peer
36 review process.

37
38 As I look at the screen, many times throughout this meeting, and
39 there's 140 people involved, and, of course, the general public,
40 as well as just all of us that are deep involved in the process,
41 and we would never see that, probably, at a SEDAR workshop,
42 where most of this would normally occur kind of just -- While
43 it's open to the public, very little interaction like that
44 occurs, and that's probably because we're dealing with such an
45 iconic species with such a whole profile and management
46 surrounding that.

47
48 Anyway, this process really gets at the core of what we all are

1 governed under, the broader scientific method and that process
2 of expanding -- As we get new scientific information, we expand
3 our knowledge base, always leaving opportunity to continue to
4 expand and improve on that, and that's really where I think
5 we're at.

6
7 I can't help but put my councilman hat on just a little bit
8 during this whole process, to just remind folks why we're even
9 really here and what is that reasoning, and that's really
10 because of some very crucial, pressing management needs that are
11 really driving the pace of this process.

12
13 Certainly our team is trying to be very responsive that, and,
14 believe it or not, we actually volunteered for this process, as
15 generally a courtesy, and, believe me, I'm smiling right now as
16 I'm saying that, but, seriously though, we feel, as our team,
17 that we have a professional obligation as scientists to
18 facilitate management, in terms of understanding what this
19 project really means and how it could best fit into this
20 management structure that we work under.

21
22 Specifically, in this case, we're evaluating this for
23 incorporation into this short-term interim assessment, which
24 could curb some of these pressing management needs that I was
25 referring to, of course ahead of a formal stock assessment and
26 SEDAR process, but that's years down the line, and we don't have
27 time for that for some of these needs.

28
29 I want to emphasize that all of this is occurring well ahead of
30 our sponsor review date who sponsored this program. This isn't
31 a council-driven process, and it's not a NOAA-driven process,
32 and it's driven independently, and so that process is June 1,
33 and so our team has worked -- We have really put our
34 professional and, in many cases, private lives on hold,
35 temporarily, to get this to the review team as fast as we could,
36 because we knew the dire straits that some of the management is
37 in.

38
39 With that, I think I'll really kind of start the real
40 presentation component of that, but at least maybe that sets the
41 stage some.

42
43 I want to start off that no study is perfect, not one that's
44 ever been done, and certainly one of this magnitude that
45 especially you can capture all the uncertainty and variance,
46 and, in many cases, for a study like this, it's just not
47 possible, obviously, to do that.

1 Clearly, there were a variety of opinions on how much of that
2 variance was captured, and I think Dr. Stokes did an outstanding
3 job yesterday of really summing that up, the real pro, her, and
4 especially Mary Christman and others on the review team that can
5 really help us understand that better.

6
7 Certainly, is that perfect? Well, absolutely not, and no study
8 is without some level of uncertainty and bias, and I think
9 everybody certainly recognizes that. In fact, ironically, one
10 of the alternate interim analyses that we'll review later today,
11 and not dealing with this study, and dealing with the bottom
12 longline study, just has the whole same suite of uncertainty and
13 bias issues, and so I would like folks to kind of keep that in
14 mind as well, although we're -- Because this study is really
15 unprecedented and relatively groundbreaking, we're, obviously
16 receiving a high level of scrutiny, and the project should, and
17 we should pay attention that, as the scientific team, and
18 respond to that, which I think you're already hearing that
19 that's happening, or you will hear that that's happening, based
20 on a lot of the things that were brought up and small changes.

21
22 Many of those changes are easily, easily done, and it will
23 greatly improve what we're doing here, and so I want to just
24 talk about what we did here.

25
26 We assembled just the leadership team here, but the team in
27 general, the best minds in the business. I mean, this is as
28 good as it gets, to work on a project that many said just simply
29 could not be done, and so their teams, as well as all the
30 investigators, were able to pull off what we consider quite a
31 monumental undertaking.

32
33 We held true to the RFP, and that's important to us. It may not
34 be important to the process here, but it's important to meeting
35 our sponsor's goals and what their objectives are, and so I feel
36 that we met those objectives and goals clearly.

37
38 We held generally true to our design backbone. Certainly, we
39 had to make modifications to that that were necessary to
40 accommodate regional concerns, and we had to rely on years of
41 expert sampling and experience in those regions by those
42 investigators to adequately carry that out, and so we modified
43 that, obviously, where necessary, and we've been spending a lot
44 of time talking about that.

45
46 Really, to I guess pose the discussion terms, and, of course,
47 this is spelled out in the report as well, towards the end, as
48 well as key takeaways, and what are the big points here, and

1 that is, you know, what is the direction of the estimate, in
2 terms of any types of biases, and it's conservative, and likely
3 underestimates that abundance, for a variety of reasons that
4 we've been talking about.

5
6 Principally, detectability leads to underestimation, whether
7 you're talking about species ID counts, acoustics, et cetera.
8 This mapping is, obviously, a challenge, and we knew that. We
9 were well aware of that going in, but certainly future work can
10 improve that, by improving the mapping, when you don't know your
11 habitat types with certainty.

12
13 We, obviously, talked some about known populations occur outside
14 of the defined study area, and future studies need to go assess
15 that, and what does that look like, and what does that mean to
16 management, but it also leads to some underestimate in our
17 population, but not necessarily within the zones that we were
18 talking about, but those that occurred outside of our specified
19 depth ranges.

20
21 Then, obviously, this discussion we had, and Kai really led a
22 lot of this, I think, in terms of the need for rigorous
23 calibrations and what we could and couldn't do in other studies,
24 and, given the diverse habitats and regional differences, that's
25 almost going to require separate major studies of their own, to
26 really identify what are the best ways to go about that, because
27 I really feel, and I think our team does too, that it's going to
28 be difficult to get around gear challenges, and, like we started
29 out, there probably is never going to be a magic bullet that
30 just does it across all the regions, all the areas, and all the
31 habitats, given that variability.

32
33 What are the key takeaways from the team? Well, we feel
34 strongly that it provides a valuable and useful estimate of red
35 snapper, particularly for this interim assessment. We certainly
36 have work that we could do to improve that, and we appreciate
37 the team pointing that out, so we can address those, and, just
38 like we would do in pretty much any study, we're happy to work
39 through that.

40
41 It really shows that that is how the sausage is made in the
42 science-making process, and, at the end of the day though, it
43 expands our knowledge based on red snapper, and the perfect
44 example is some of the challenges that we had in Louisiana. Dr.
45 Gallaway is coming in right behind us with his Louisiana snapper
46 count, which will further improve upon that region, which we
47 would like to address a little bit better, but that's why we
48 lead through the scientific method, to leave room for some

1 doubt, so we can come in behind that and improve what we've got.

2
3 Obviously, the large number of fish that occur over this
4 uncharacterized bottom and that high abundance leads us to
5 really warrant additional study in that area, and hindsight is
6 20/20, as many of us have discussed, and so we need a better
7 understanding, not only of age structure on that habitat and how
8 the fishery exploits that outside of this process, but we need
9 to revisit all those relief anomalies that we found and better
10 characterize what those are and what the distribution looks
11 like.

12
13 We need to look at fine-scale movement, because of major
14 management concerns, how much exchange as well as fishing effort
15 is going to occur over that area, as well as just movement among
16 artificial and natural-reef habitats, and then, of course, not
17 only mapping of that uncharacterized bottom, but, of course,
18 mapping in general.

19
20 Then I won't get into all of this now, but the report provides a
21 lot of it, and some I've already talked about, and many others,
22 in terms of, like any good study, we would have a lot more
23 questions at the end than you probably started out with, or
24 needs that would be addressed, and so I guess my portion I would
25 just sort of end here.

26
27 Many of said, including some of the management leadership, that
28 the absolute abundance is really a holy grail sort of piece that
29 allows management to do all sorts of a variety of management
30 options that may not be available, necessarily, with indices of
31 abundance and that sort of thing. Where our team feels clear is
32 we show that this study advances our knowledge base and will
33 improve management for red snapper.

34
35 I want to open it up, and there are several of our team members
36 here that may or may not want to say a few words, or follow-up
37 on anything that I may have missed or that they would like to
38 say, and so I would do that now, Dr. Powers, and then I would
39 really -- I think, at that point, we can turn it back over to
40 your team, after anyone else would choose to comment.

41
42 **CHAIRMAN POWERS:** Thank you. We will open it to the floor, or
43 to the PIs that wish to make comments at this point, if any. We
44 will begin with Will, Dr. Patterson.

45
46 **DR. PATTERSON:** I wanted to thank the review panel and the SSC
47 for the amount of time and effort they've put into reviewing
48 this work. It's clear that they took their charge seriously,

1 and we are -- We as investigators on this report and this
2 project will benefit immensely from their insights, and, as the
3 final draft of this gets submitted to Sea Grant and publications
4 come from this, it will be greatly improved by their
5 participation, and it's very unusual to have this many sets of
6 eyes looking over things that you've done, and so I think it can
7 only benefit the final product.

8
9 Obviously, this was a huge commitment of resources and taxpayer
10 money, and we took our charge seriously, and so I'm happy to see
11 the amount of review that went into this, has gone into it at
12 this point, and I'm glad to have the opportunity, before the SSC
13 members who were part of the team need to remain quiet here at
14 the end. I'm just really appreciative for that level of review.

15
16 The second thing that I wanted to say has to do with this idea
17 of uncertainty, and I wanted to have a chance to say it at the
18 beginning here, before, again, this sort of silent period for to
19 answer questions for the SSC members, and there have been
20 components of what's been discussed here that have to do with
21 precision and other components that have to do with bias.

22
23 I would just ask the SSC members, when they are considering
24 these issues of precision and bias, not to lump them sort of
25 generically into a category of uncertainty, which we sometimes
26 do, but, instead, if we're talking about uncertainty, if
27 something seems uncertain, then we talk about it as bias or
28 precision issues, and so it's easier for us to track and try to
29 capture the sentiment of what's being expressed.

30
31 The last thing is, if I was sitting in the room, and not a
32 member of the report, and just as a member of the SSC that was
33 reviewing this and potentially commenting on things today, my
34 reaction might be that management is management, and this is
35 science, and so, obviously, this isn't going to be reviewed in a
36 vacuum.

37
38 There are serious management implications in the near-term and
39 the long-term, and I think the most important thing, as a
40 scientist, is that we get it right, and as right as possible,
41 and so I would ignore, as much as you can, any pressure or
42 potential to think about what the management implications of
43 this might be, but instead focus on the science, review the
44 science, and that should be your main focus here. Thanks.

45
46 **CHAIRMAN POWERS:** Thank you. Steve Murawski.

47
48 **DR. MURAWSKI:** Thanks, Dr. Powers. I appreciate the opportunity

1 to make a few short comments. I really want to support the
2 comments of both Greg and Will. This is a very complex set of
3 analyses, and each individually could be the subject of a peer
4 review, but what we've done is tried to combine, basically, a
5 bunch of mini-surveys into a larger population assessment, and,
6 therefore, it's highly complex, and each of these is subject to
7 sort of different considerations.

8
9 Will made the point about the notion of bias versus sampling
10 uncertainty, and I would sort of expand that to say, look, we
11 have this whole issue of sampling uncertainty, which is the
12 underlying variability in the data we collect, but we have an
13 enormous issue of process uncertainty, and I think therein lies,
14 I think, the challenge of integrating any set of indices, and I
15 would say this is an index of population abundance.

16
17 One of the things that came out clear to me, in doing this work
18 and contributing to the analyses, is that there's some really
19 complex things going on in the series of analyses that
20 constitute this report, and I would not discount the importance
21 of the tagging data. The tagging data show a very high
22 exploitation rate of red snapper in the fishable population, the
23 population that is close to population centers and fishing on
24 structures where the animals are abundant.

25
26 Even those estimates are inconsistent with the current stock
27 assessment, which has an exploitation rate substantially below
28 30 percent for the population as a whole, and I think one of the
29 things that I think this study points out is that there's a well
30 of cryptic biomass that is not part of what we call the fished
31 population, right, and it may be larger than we thought, but,
32 nevertheless, of the fishable population, there is an issue
33 here.

34
35 I think it kind of begs a larger issue, and that is, looking at
36 the population assessment model for red snapper, you all might
37 want to contemplate some type of meta-population analysis that
38 incorporates spatially-explicit fishing, and so that's a little
39 down the road, but I think the analyses that this study have
40 provided give you at least part of the picture that you can
41 start to contribute to this larger assessment model.

42
43 My point of view, the data that were collected as part of the
44 uncharacterized or unclassified or mud bottoms or whatever, it's
45 interesting, because that area is subject to a lot of the
46 current relative population indices that go into the current
47 assessment, right, the non-full-weighted population estimates
48 coming from fishery-independent surveys.

1
2 For example, the groundfish survey goes through all of those
3 areas, and it's really impressive how few of the large adult red
4 snapper are actually caught in those surveys versus what we were
5 able to actually put our eyeballs on, and so, clearly, the Q for
6 those large fish is very low for the groundfish survey, and so
7 it kind of begs the issue of, in the longer term, what is going
8 to be the survey capability that would index that subset of the
9 population, and so that's something for the agency to deal with,
10 but, overall, I agree with Greg.

11
12 Many of these things revealed in this particular study are a
13 starting point, and this is not an endpoint, and we all
14 appreciate the dialogue, with not only the independent
15 consultants, but also the SSC.

16
17 Being a veteran of many contentious population reviews for stock
18 assessment, I can say that, actually, this has been quite
19 collegial, and none of us take offense about the back-and-forth
20 of this enterprise, this scientific process, and so all I can
21 say is it's all much appreciated, and all the comments that you
22 have are feeding back into the science programs that all of us
23 on the academic side are conducting, and so, with that, thank
24 you very much, and I will turn it back.

25
26 **CHAIRMAN POWERS:** Thank you, Steve. Sean Powers.

27
28 **DR. POWERS:** Thanks, Joe. I just, again, want to echo the
29 thanks to the reviewers and to the SSC members. It is a high
30 level of scrutiny that the study receives, and it should
31 receive. As Will pointed out, it's a huge investment of
32 taxpayer money, and we really appreciate all the comments, and
33 there is no doubt that our report and estimates will be improved
34 by incorporating and exploring many of the suggestions that the
35 review team has given us.

36
37 To one of Steve's points, I agree that the task of combining a
38 bunch of regional or mini-studies is not easy, but I do want to
39 point out that that is particularly true for the artificial
40 reefs, and, to some degree, the natural reefs, where
41 investigators chose very different approaches, in many areas.

42
43 Obviously, we used depletion and the ROV surveys, and others
44 used hydroacoustics and ROV surveys and a variety of methods,
45 but realize that where most of the number of snappers is coming
46 from is on that uncharacterized bottom, and that is largely the
47 same methodology.

1 Steve did most of that, or it had similar towed sleds, and so I
2 agree that the complexity of putting some of those mini-studies
3 together is difficult, but realize that's largely for the
4 artificial reef component, which is a small fraction of our
5 total estimate.

6
7 The issue of variance came up, and I agree with the comments of
8 separating bias and precision, but there is variance in our
9 calculations, and that's totally understandable, but the
10 population, from site-to-site, is very variable, but realize
11 that most of our data and assessments that we deal with greatly
12 underestimate that variance.

13
14 I think we are coming closer and closer to actually truly
15 capturing those variances, and the stock assessments often cap
16 the CVs, because the models don't tend to converge unless you do
17 that, and they do that for the catch data as well as some of the
18 survey data, and so keep that in mind when you consider the
19 variance that we have come up with, and I think it's much
20 improved. It's not perfect, but it is getting closer to
21 actually capturing a real variance that we can use.

22
23 Finally, in a perfect world, we would be able to proceed with a
24 revision of this project and report as we have, and then that
25 would be included and reconciled, to some degree, with the stock
26 assessment, and clearly we can do that in the research track
27 assessment.

28
29 However, there is the reality that, because the public knows the
30 results, and we share information much more freely and timely
31 than any other time, that I do have sympathy for the managers,
32 who will have to manage the stock with the public having the
33 knowledge of this study, and I think, obviously, that's why we
34 have the further analysis that the council has asked for. I
35 think, while science should proceed, as science does proceed,
36 realize that the management body also has a responsibility.
37 That's it, Joe.

38
39 **CHAIRMAN POWERS:** Thank you. I think you were speaking as much
40 to the public about the management responsibility, because I'm
41 sure the SSC is well aware of our role in this, and one thing
42 that I would mention as well, as we go forward, kind of tying in
43 with what Will Patterson said, is this -- He discussed it in
44 terms of precision versus bias and those sort of things.

45
46 I too believe that we have to kind of parse our advice, and not
47 necessarily have an overall yea or nay, but kind of what are the
48 things we should go forward with now with these estimates and

1 then what are the things that we should allow to kind of evolve
2 over the next six months or year or so on. One other question
3 that I have is Greg Stunz mentioned that the final report for
4 your contract, I guess, would be June 1, and is that true?

5
6 **DR. STUNZ:** That's correct, Joe.

7
8 **CHAIRMAN POWERS:** Presumably, in that process, you will be using
9 some of our advice, collectively our advice, to improve upon
10 those estimates, and I guess, just in terms of my own
11 indication, to me, that would mean kind of revisiting some of
12 the strata-by-strata sorts of issues that came up at this
13 meeting.

14
15 **DR. STUNZ:** Joe, that's actually something -- I mean, I guess we
16 sort of anticipated it, but not really, and, in a normal
17 process, we would have never had this opportunity, and,
18 especially for a project of this magnitude, it is great that we
19 have an ability to do that after this.

20
21 As one of our team mentioned, we have so many eyes looking at
22 this, and we really have a very good advantage, I guess if you
23 want to call it that, to really refine what is needed sort of
24 thing, outside of this interim process that we're in, to be
25 available for when we get down to the research track assessment.

26
27 Dr. Powers, also, and I don't know -- Dr. Stokes, Lynne Stokes,
28 is trying to raise her hand, and I don't see her on there, and
29 she just texted me that she's -- If we could please recognize
30 her.

31
32 **CHAIRMAN POWERS:** Yes. Go ahead, Dr. Stokes.

33
34 **DR. STOKES:** I actually have a document that I could share, and
35 I don't know if it would be helpful, and I will just talk about
36 it until I can figure out if there's a way for me to share it,
37 but I took the -- This relates to the changes that we can make
38 on the variance estimation.

39
40 **MR. RINDONE:** Dr. Stokes, I am sorry to interrupt. If you have
41 a document that you would like to share, and you want to send it
42 to us, we can get it put up on the screen, by making you the
43 presenter, but we would also need a copy of it, just for the
44 administrative record. Sorry for the interruption.

45
46 **DR. STOKES:** That's okay. Does somebody else want to -- Maybe,
47 if there's someone else to speak now, I can do it that way.
48 Maybe I will just talk, because I think that's going to take too

1 long for me to try to share it, but, anyway, I tried to figure
2 out -- Yesterday, there were some really good suggestions about
3 how to incorporate the uncertainty of some of the estimators
4 into the variance expression.

5
6 One of the suggestions from Mary that would work for Alabama and
7 Mississippi is to use the variance, a standard method that is
8 the variance of a product of random variables, instead of just
9 ignoring the variability in the number of reefs that were
10 estimated, and so I actually did that.

11
12 I worked out the formula last night, and so that shows it's not
13 very hard, because I could do it quickly, but I didn't have the
14 data to estimate it. However, the calculation shows that the
15 order of magnitude of the error is smaller than the variance
16 itself.

17
18 In other words, the change in the variance will be a lower order
19 of magnitude than the variance, and so I don't believe that this
20 is going to be a big adjustment, at least in Alabama and
21 Mississippi, and that's the one I did. I presume the one in
22 Texas -- I haven't worked that out yet, and it depends on the
23 structure of the estimated characteristic. Of course, in
24 Alabama, it was the N, the number of reefs, and so it's very
25 clear how that enters into the estimation of the total.

26
27 I don't know enough about the way the estimation of -- I forget
28 what the word was, but the array of the -- Of the percent of red
29 snapper or something like that in the videos, and I don't know
30 exactly how that entered into the calculations, and so I would
31 have to see the structure of the estimate that was made, but my
32 assessment is that it would be also a lower order of magnitude.

33
34 The reason for that is that the estimator -- The variance of the
35 thing that you observe is quite large, because it's multiplied
36 by the number of, in the case of Alabama, artificial reefs, but
37 the variance of that estimator is made from a sample of many
38 observations, and so that's where the reduction in the order of
39 error for the change in the variance comes from. I have
40 formulas that I did that I can send if anyone is interested, and
41 so I will do that after I sign-off. Thanks.

42
43 **CHAIRMAN POWERS:** Thank you. All right.

44
45 **DR. HOENIG:** Can I respond to that for a sec?

46
47 **CHAIRMAN POWERS:** You may respond.

1 **DR. HOENIG:** In Mississippi and Alabama, we did use the exact
2 formula for the variance of a product, and that's Goodman's
3 formula from I think 1960, to get the variance of the amount of
4 reefs, and that -- So, for each stratum, when we report the
5 number of reefs, the variance of that does include that formula.
6 When we combined across strata, we had to weight the strata by
7 the abundance of reefs, the number of reefs, and, there, I
8 believe we treated the fraction that was in each stratum as a
9 known constant, rather than putting in the variance. We can
10 modify that and put in that variance.

11
12 **CONSULTANT/SSC DELIBERATIONS**
13

14 **CHAIRMAN POWERS:** Okay. Thank you. All right. Where we are,
15 we're kind of at the point here. One of the things that strikes
16 me is that there's lots of debate about details, but the real
17 crux of how this gets translated into scientific advice for
18 catches for 2021 is essentially how to handle the
19 uncharacterized bottom.

20
21 My questions, as we go forward, is we've -- Much of the
22 conclusions that I have felt that we've come to, in terms of the
23 estimation of the variance of the estimates for the unclassified
24 bottom are probably underestimated, but I haven't heard any
25 discussion about whether the estimates of those are biased low
26 or high for that strata, the uncharacterized bottom.

27
28 I think we need to think of it in terms of that. A lot of the
29 other issues about Alabama and Mississippi are important in
30 terms of, quote, unquote, getting it right as we go forward,
31 but, in the larger scheme of things, in terms of what we might
32 do today and tomorrow, in terms of the catch advice, they are
33 relatively small.

34
35 I think it would be -- As we go forward, we need to think of it
36 in those sorts of terms. Steve Cadrin wants the floor, and I
37 think we're also at the point where we will be asking for the
38 consultants to kind of sum up, and I'm not sure if they're
39 prepared for that yet, but let me recognize Steve Cadrin, and
40 then we'll go forward.

41
42 **DR. CADRIN:** Thank you, Chair. That's exactly along the lines,
43 is the wrap-up, and I think I agree with your main points, as
44 far as going forward, and so I do have a quick summary of my
45 review, if you think now is the time to do that.

46
47 Again, compliments to the investigators, and thanks to our
48 Chair, Dr. Powers, for herding more than a hundred cats for what

1 I think has been a collegial, productive meeting, but I also
2 recognize that the most challenging decisions are yet to come.

3
4 My draft review is online and available, and that addresses each
5 term of reference, and it gets into a lot of the details that
6 we've been talking about, but, for the sake of developing
7 consensus conclusions, I think there are three main aspects of
8 my review for the group's consideration.

9
10 The first is the underestimation of abundance, from assuming 100
11 percent detection, and I have remaining concerns about the
12 underestimation of variance, and the third main point, I think,
13 is the application in an integrated assessment. Chair, I can
14 quickly summarize each of those together or separately,
15 depending on how you want the discussion to go.

16
17 **CHAIRMAN POWERS:** I think, at this stage, if people are
18 prepared, then I will go consultant-reviewer-by-consultant-
19 reviewer, starting with you, and you can proceed however you
20 want to do that, and so those three items are fine with me. One
21 other question though is you referred to the review being
22 online, and have you modified it since the primary review before
23 the meeting?

24
25 **DR. CADRIN:** I have not.

26
27 **CHAIRMAN POWERS:** Okay. Thank you.

28
29 **DR. CADRIN:** I will take a step back and, once again, give
30 credit to the investigators. I really appreciate the logistics
31 and the problem-solving that were needed for such a large-scale
32 field study, applying advanced technologies to derive an
33 absolute estimate of stock size, literally how many fish are in
34 the ocean.

35
36 I am really glad to hear about continuing studies to address
37 some of the concerns that we've discussed this week, and I
38 really don't think the full value of this study will be
39 determined by this peer review this week. I suspect, years from
40 now, this will be viewed as a major contribution to fisheries
41 science.

42
43 Toward the conclusions and the recommendations for this week,
44 the main points, I think, as we've discussed in Phase 1 and
45 Phase 2, the stratified design is well justified, and I
46 understand the need for these posterior analyses that deviate
47 from the original design. I understand that they were
48 necessary, because of the challenges faced in implementing, but

1 we also need to recognize that they may impose some bias, and I
2 think underestimate the variance.

3
4 The first major concern I have is assuming 100 percent
5 detectability. The paired observations that we have seen from
6 the experiments off of Florida show that the -- When they
7 compare the optic and acoustic sampling, that optics detected
8 more red snapper, and the initial estimate was nine-times more,
9 and I think, if they changed the spatial scope, that comes down
10 to four-times more, but it shows that the two major sampling
11 methodologies have different detectability, and assuming 100
12 percent detectability, for one of the gears that has lower
13 detectability, is going to underestimate the abundance.

14
15 That has different effects on different strata in different
16 regions. As I understand it, the eastern estimates were more
17 based on optics, and the western estimates were more based on
18 acoustics, and so, when we go forward to apply these, and we use
19 the Gulf-wide estimate of abundance, I don't think that each of
20 those regional estimates are additive, because I think they have
21 different biases.

22
23 Fortunately, the SEDAR 52 assessment does have some broad-scale
24 spatial structure, so that we could use the eastern estimates
25 separately than the western estimates, and so, again, I'm a bit
26 concerned about the detectability.

27
28 While I'm on a roll, I will just go forward with my other two
29 major points. The next is the estimate of variance, and I will
30 give full disclosure, first of all, that I'm not a statistician,
31 but, second of all, that my first impression of reading the
32 report was that an 11 percent CV for the estimate of an absolute
33 abundance, across such a large area, a heterogenous area, with
34 all the challenges we've talked about, just doesn't seem
35 realistic.

36
37 From the perspective of an integrated stock assessment, where
38 the CV is really important to determine the statistical weight
39 of the information relative to the fishery catch series, size
40 and age composition, other indices -- From my experience, even
41 the best, well-designed and implemented small-scale surveys
42 don't have such a low CV, and so I realize that that's my
43 implicit bias in reviewing this, is that I'm having trouble
44 buying 11 percent, just on face value.

45
46 In my review, I was looking for reasons why that might be so
47 low, why the variance might be underestimated. For the
48 stratified random calculations, I am concerned about the zero

1 strata, those seventeen and fifty-four strata that had a mean
2 density of zero and a variance of zero. They don't contribute
3 to the stock-wide abundance estimate, but they have considerable
4 influence on the stratified variance, and they bring it down.

5
6 The strata are considered to be red snapper habitat, and so the
7 true density is greater than zero. The true variance is greater
8 than zero, and so those mean equals zero and variance equals
9 zero stratum results are really resulting from densities that
10 are below detection limits, rather than it being true zeroes,
11 and so I am concerned that those are biasing the stratified
12 variance low, because of the detection limits of the sampling
13 gear.

14
15 For the ratio estimator, I understand Dr. Stokes' explanation of
16 how observation error actually increases the variance estimates,
17 but, as I understand them, those proofs assume that the
18 measurement error is white noise, and a mean of zero, and I'm
19 really concerned that several measurement errors were not white
20 noise.

21
22 One example would be assuming 100 percent detection when that
23 implicitly assumes that there is no red snapper in the acoustic
24 dead zone, and so any red snapper in that zone, and presumably a
25 variable number of red snapper in that zone, make the estimate
26 of variance less than the true variance, and I think there are
27 several other important aspects of the estimation that are
28 assumed to deterministic that are not white noise, that constant
29 detection efficiency, the area selected, the imputed density for
30 unsampled strata, species composition, age at length, acoustic
31 signal processing, number of artificial reefs. There are a
32 number of deterministic decisions that were made that I am
33 concerned are contributing to an underestimate of the variance.

34
35 Then, finally, and I've already touched on it, is considering
36 the results in an integrated assessment. From my perspective,
37 with the information that I have reviewed, I don't think the
38 estimates of stock-wide abundance can be used directly for stock
39 assessment, because of these difference in detection between
40 optic and acoustic.

41
42 I really think the most appropriate integration would be to
43 consider abundance in the eastern regions, hopefully with a more
44 credible variance, and I think a larger CV would give it more
45 appropriate weight in the model, and then, perhaps, in the
46 western regions, considering those abundance estimates to be
47 lower biomass constraints. Chair, those were the remaining
48 three issues that I have, and I would be happy to discuss them

1 at whatever length you would like.

2
3 **CHAIRMAN POWERS:** Thank you. I think the way we'll proceed is
4 ask the SSC if they have any comments or questions relative to
5 your comments, and then, after that, then we'll proceed to the
6 next consultant. Mary, I would put you up next, but, first, let
7 me sort of paraphrase a little about what you said, so that
8 other people understand.

9
10 In particular, what you're saying is -- You made the comment
11 that you shouldn't use the absolute estimate, and, basically,
12 what you're saying is the Gulf-wide absolute estimate, in a
13 stock assessment. Correct me if I'm wrong.

14
15 **DR. CADRIN:** That's correct. It's the stock-wide.

16
17 **CHAIRMAN POWERS:** It needs to be parsed up into a framework that
18 more fits what is known about the stock, and it will involve
19 spatial sorts of strata, and my guess is that the whole
20 east/west may be revisited as well, as you go forward, and how
21 best to spatially stratify it, given this set of information,
22 and so I just wanted to make that clear. You're not denigrating
23 the estimation process, but rather using it as an aggregate.

24
25 **DR. CADRIN:** For clarification, that's absolutely correct, and,
26 in my report -- Thanks to the Southeast Fisheries Science Center
27 for sending me the Stock Synthesis results, but there's a
28 difference in perception of the east/west balance of the stock,
29 where, in the Great Red Snapper Count, they're relatively evenly
30 distributed. In the Stock Synthesis model, there's a big
31 difference between them, and I think we've got to try to
32 reconcile that difference.

33
34 I guess it could be because there is different natural mortality
35 scaling for the different regions, and there might be different
36 catch bias or other things, but we really need to wonder why the
37 assessment is giving us a much bigger biomass in the west than
38 in the east, where the Great Red Snapper Count is giving us more
39 balance. I suspect that's because of the underestimation of
40 abundance from acoustic methods that are primarily affecting the
41 west.

42
43 **CHAIRMAN POWERS:** Thank you. John Hoenig, did you have a
44 question or a comment to Steve?

45
46 **DR. HOENIG:** I don't really disagree with what Steve said, other
47 than a perspective on the conclusion. You can poke all kinds of
48 holes in this project results, talking about bias and

1 variability, but I think it's kind of important to try to keep a
2 perspective as to how are other survey results treated in stock
3 assessment forums, and so the standard by which Steve seems to
4 be holding us is that it's not perfect and it can't be used,
5 but, if you look around the world, at hydroacoustic surveys and
6 so on, where they are getting biomass and treating it as
7 absolutely abundance, I think then you kind of have to think,
8 well, wait a second, is this somehow inferior to what's being
9 used around the world, and I think it's not.

10
11 There is no mandate that you have a level playing field and you
12 compare our results to results all around the world, but I think
13 that, in terms of concluding whether this is useful as an
14 estimate of absolute abundance, I think that it actually is
15 credible and is comparable to what is used for abundance
16 estimates elsewhere, and that was my comment.

17
18 **CHAIRMAN POWERS:** Again, I believe these are the kinds of things
19 that would be debated within the stock assessment format, about
20 how best to integrate these sorts of information. The whole
21 idea of the assessment models is to take the data as they are
22 collected and use that within the model, and so, in my mind, the
23 model will be restructured because of these sets of data, and,
24 this whole debate about whether you can estimate absolute
25 abundance, those are things that you might be able to test
26 through the modeling, as we go forward.

27
28 **DR. CADRIN:** Maybe I should check if my audio isn't working or
29 if John's isn't working, but I did not say that these results
30 are not perfect and so they cannot be used, and I don't know
31 where John got that from what I said or what's in my report, but
32 that is almost opposite of what I'm saying.

33
34 What I said was I would be -- Rather than using the stock-wide
35 abundance estimates, I would use them by area in the assessment,
36 and I would try to account for the different detection of the
37 regional estimates separately. Some we might be able to use as
38 estimates, and some might have constraints, but just to clarify,
39 and I think it's important, I am not recommending that these
40 results cannot be used in an assessment, and I'm not really sure
41 how that came through.

42
43 **CHAIRMAN POWERS:** Thank you. Kai Lorenzen.

44
45 **DR. LORENZEN:** I was going to say the same thing, actually, and
46 I think what Dr. Cadrin is saying is that the estimates in the
47 western Gulf and the eastern Gulf may not be entirely
48 comparable, and that has to be taken into account. That doesn't

1 mean that -- So they shouldn't be used as one single estimate in
2 an overall assessment, but that doesn't mean that they can't be
3 used in some way.

4
5 **CHAIRMAN POWERS:** Thank you. Any other questions for Dr.
6 Cadrin? All right. Dr. Christman.

7
8 **DR. CHRISTMAN:** Good morning, everybody. I want to echo Steve's
9 comments. Part of the problem with my review, to-date -- Let me
10 get back up. I want to echo Steve's comments, and, also, say
11 that I am just so impressed with the amount of work that's been
12 done, and I'm not the least bit surprised that we're sitting
13 here arguing over it, which is good. I mean, that's actually a
14 good thing.

15
16 My issues, of course, relate to the statistical analyses, and I
17 have some details. For example, maybe someone can clarify for
18 me, but I feel as though there was some post-stratification,
19 such as taking the pipeline data and converting it into three
20 sub-strata, and the same with the Florida regions, that were
21 done post hoc, based on the belief that fish abundance varied by
22 pipeline size or region off of Florida, and, if that's the case,
23 I would be inclined to not do that sub-stratification, because
24 the sampling design did not use that stratification, and, as a
25 consequence, you are artificially reducing variance.

26
27 I am not sure if there is somebody here who can explain to me
28 whether those were planned, although not part of the original
29 design, or whether they sort of occurred after the fact. Can
30 anybody address that?

31
32 **DR. MURAWSKI:** One of the things that we found was that, in
33 actually doing the work, the different sizes of pipelines became
34 more apparent to us, and so the original scheme did not stratify
35 by pipeline size, but, since there did seem to be some
36 differences, that was another factor in that, and so we did
37 consider that in the analysis.

38
39 **DR. CHRISTMAN:** Steve, are you saying that, once you got out
40 there, you noticed that more fish were on the bigger pipelines?

41
42 **DR. MURAWSKI:** No, not necessarily, but that there was this
43 obvious difference in the diameters of the pipelines.

44
45 **DR. CHRISTMAN:** Right, but the reason for stratification would
46 be that you believe that the counts varied by pipeline size as
47 well.

1 **DR. MURAWSKI:** I think we did some analysis to show that that
2 was true.

3
4 **DR. CHRISTMAN:** See. There's the problem with using that post
5 hoc then.

6
7 **DR. MURAWSKI:** Right.

8
9 **DR. CHRISTMAN:** So that sort of overstratification would lead to
10 an underestimate of variance, for sure, and also possibly bias
11 in the estimates, because now you are basing the strata on the
12 value, the observations, and not directly. I mean, you're not
13 sitting there saying, oh, look at this abundance, and I'm going
14 to put it in this category, but you're using a surrogate for
15 that, which concerns me a bit, and I couldn't tell you how it
16 affects the results without knowing more details about the data.

17
18 **DR. MURAWSKI:** Neither could I, but I understand the point.

19
20 **DR. CHRISTMAN:** I also wanted to point out that, at the end of
21 the day, two sets of analyses were performed on the same data,
22 and not exactly the same data, because, as I understand it, Dr.
23 Stokes removed the C-BASS from the Texas UCB, and the change in
24 the artificial reefs in Texas also, and so, as a result, you
25 would expect that there would be some differences in the
26 estimates, but my problem is that these are not independent
27 studies that would produce weight of evidence.

28
29 In the case of Ahrens' analysis, he did not follow the sampling
30 design for the transects, and, in the case of Dr. Stokes, she
31 did follow it, but not completely, for at least the Texas UCB
32 hydroacoustics analysis, and so the one that would be the more
33 appropriate result would be Dr. Stokes at this point, mainly
34 because of the determination that there were cluster samples and
35 they had to be addressed, and so that's just a minor point.

36
37 The other point, and this relates more to dissemination of the
38 information, but the table that's at the beginning of the
39 document, and I believe it's Table 1, which shows the estimates
40 for the different main strata, habitat by region, I believe --
41 As we know, this table is already being used out there by
42 different entities, because this document is available.

43
44 What I would recommend is that this table be amended to include
45 the confidence interval endpoints for each of these estimates,
46 because, otherwise, people believe that, yes, there is actually
47 six million fish out there, as opposed to saying, no, it's
48 somewhere between four and eight million, and so, at a minimum,

1 I would recommend that the variance be acknowledged anytime
2 you're disseminating this information.

3
4 I agree that the variance is underestimated. I don't want to
5 get into the gory details here, but there are still some small
6 issues that I will address in my report that you will have in a
7 few days that are just -- They are statistical issues that I
8 don't think we need to address now, because Dr. Cadrin very
9 clearly characterized the fact that we do underestimate variance
10 and that that needs to be addressed, and so I would certainly do
11 that.

12
13 On a separate note, part of the problem that I had with this
14 report was just total confusion as to what was actually done,
15 because so much information was missing that was provided during
16 these two days, and so I would highly recommend that the report
17 be modified to, one, address errors that are in the document.

18
19 If you look at my review, I put a table in there that showed how
20 different the sample sizes were depending on where you looked,
21 and so, at a minimum, I think there needs to be clarity as to
22 what was actually done, and that's not very clear in the
23 document, but, overall -- I know it sounds like I'm nitpicking,
24 but, overall, this is an extraordinary project, and I'm very
25 impressed with it. I just wish we could have more sources of
26 variance included, and so I will shut up and let Rob explain why
27 his is good.

28
29 **CHAIRMAN POWERS:** Rob, or Dr. Ahrens.

30
31 **DR. AHRENS:** Thank you, Chair, and thank you, council and the
32 review team. I just wanted to provide some input, for
33 clarification for Mary, and the stratification of the C-BASS
34 data was done prior, or at least, for me, done prior to looking
35 at the data, and so it was a priori.

36
37 I assumed that, given the size of the pipelines, there would be
38 differences in the abundance, just given the size and then the
39 physical structure that they would create, but that's certainly
40 -- The removal of that stratification could be done, although it
41 might be worth noting that the one pipeline, the big pipeline,
42 that runs across Florida is probably quite different from the
43 ones that exist in the other regions of the Gulf.

44
45 **DR. CHRISTMAN:** Rob, I just want to confirm. You're saying that
46 you did not data dredge when you were choosing the pipeline
47 sizes?

1 **DR. AHRENS:** No, I did not data dredge. Now, the -- After
2 seeing particularly the zeroes that existed in the southern
3 Florida, I made the decision to put in the line at Tampa Bay and
4 to add the extra strata to Florida, and that, of course, could
5 be removed, and that would be an easy change to the analysis
6 there.

7
8 **DR. CHRISTMAN:** I think it should. Speaking of zeroes, one of
9 the points that Steve Cadrin made was that it was problematic
10 that you had strata that were zero -- That all the observations
11 were zero, and, hence, the variance was zero.

12
13 One of the points I wanted to make is, if you look at those
14 strata, for the sample sizes that you had for those strata,
15 they're often extremely small, and, when you have really rare
16 events, like one out of a thousand locations would actually have
17 red snapper, those sample sizes are never going to capture that,
18 and I am not sure what my recommendation would be for addressing
19 that, except maybe collapsing strata, but I'm not sure that
20 would be appropriate, and I would need to think about that some,
21 but I just wanted to mention that one of the problems with those
22 zero strata is they are often small sample sizes, which
23 compounds the problem.

24
25 **DR. AHRENS:** Yes, and I agree with you 100 percent on that.

26
27 **DR. CHRISTMAN:** I didn't mean to interrupt you.

28
29 **DR. AHRENS:** No, I'm done.

30
31 **CHAIRMAN POWERS:** Okay. Thank you. Jack Isaacs.

32
33 **DR. ISAACS:** Good morning, everybody. I really wanted to thank
34 Mary for bringing up something about this table that I found a
35 little disturbing, or maybe disturbing is overdoing it.
36 Unsettling maybe, and that is the lack of confidence intervals.

37
38 This table would suggest a level of precision that is absent
39 really in any type of science, and I think it would benefit
40 greatly from exactly the things that she talked about of the
41 sample size and some estimate of a variance and inclusion of
42 that to include the confidence intervals. This is an amazing
43 project, and I have greatly enjoyed reading about it. Thank
44 you.

45
46 **CHAIRMAN POWERS:** Thank you. Mary, have you finished your --

47
48 **DR. CHRISTMAN:** Yes, I have.

1
2 **CHAIRMAN POWERS:** Okay. Thank you. I have a question, or one
3 of interpretation, and, the way I am interpreting this, it's
4 that we are estimating, on the unclassified bottom, a
5 substantial abundance, substantially larger than what we
6 thought, and so my question is -- I mean, right now, that
7 estimate, the 110 million versus forty-one million, three-times
8 whatever that was, and so my question is, is there some reason
9 that, from a -- As we go forward in terms of interpreting this
10 information, how -- Can we say that the unclassified bottom, the
11 point estimate, is a reasonable point estimate?

12
13 We recognize all the issues that we've brought up, and there are
14 certainly issues about the variance, but I'm talking about the
15 point estimate, and one of the things that struck me was some of
16 the concerns about bias, in terms of a point estimate, I
17 believe, and correct me if I'm wrong, may be alleviated by using
18 the ratio estimate. From an interpretation standpoint, the
19 ratio estimate isn't all that much different than the other, and
20 so I would like some comment on that, if you've thought of it in
21 that context, Mary, or anybody.

22
23 **DR. CHRISTMAN:** Well, I just wanted to say that the ratio
24 estimator should give you similar results to the -- In terms of
25 the point estimate itself for abundance, and I think our issue
26 here is that the uncharacterized bottom represents so much of
27 the area of the study, and that is why these estimates are so
28 high.

29
30 That reminds me of a comment that I did want to make that I
31 forgot to make, which was one of things is, when you compare the
32 110 million to what the last stock assessment came out with,
33 which was like thirty-six million or something, are they the
34 same universe?

35
36 In other words, did this study actually sample over the same
37 region that the stock assessment data inputs were being
38 collected? For example, I am just familiar with like the
39 Florida stuff, and so that would be mostly natural, I believe,
40 and I don't think they did it -- At least not the last time that
41 I was involved, that they did an artificial reefs or
42 uncharacterized bottom, except coincidentally, and so I would be
43 a little careful when doing those kind of comparisons.

44
45 Back to the point estimates, I don't expect that the point
46 estimates would be very different. The variances are very
47 different though, largely because of the way the data were
48 collected for uncharacterized bottom in at least some of these

1 locations.

2
3 **CHAIRMAN POWERS:** Thank you. Some of the issues about where the
4 assessment data are collected, versus where -- Typically where
5 the assessment data are collected versus where the survey data
6 were collected, that's discussed in a bit more detail in the
7 NMFS documents that we're going over this afternoon and
8 tomorrow, I think, but, basically, most of the information that
9 goes traditionally into the assessment comes from fisheries-
10 related sorts of information, which is focused more on the
11 natural bottom and artificial reefs. Mary, did you want to
12 comment further?

13
14 **DR. CHRISTMAN:** No, I did not.

15
16 **CHAIRMAN POWERS:** Kai Lorenzen.

17
18 **DR. LORENZEN:** Dr. Powers, you invited general comment, and,
19 from what I understand so far, it would seem, to me, that the
20 point estimate is probably -- For the uncharacterized bottom,
21 it's probably unbiased, or slightly biased low, and the variance
22 is probably a lot larger than is currently expressed, and that
23 would be my summary.

24
25 I wanted to point out one other thing though as we start looking
26 at the different habitat types and so on, and so it seems that
27 we often seem to settle into this thinking that, well, the stock
28 assessment did a good job at estimating the fish on structure,
29 and then there's this whole biomass that is somewhat
30 disconnected from that on the uncharacterized bottom, and that's
31 a possible hypothesis, but I wouldn't -- I am not completely
32 buying it yet, and the reason is the fact that what we have on
33 the structure is very similar to what the stock assessment has
34 estimated.

35
36 It may be a lucky coincidence, and think about the fact that,
37 since we haven't had those intercalibrations for the different
38 methods -- Probably, once that is done, we will end up with a
39 new and somewhat different estimate of abundance on structure,
40 and, at the same time, the biomass on the uncharacterized
41 bottom, we know from the NMFS bottom longline survey, actually
42 behaved very similarly to the biomass on structure, in terms of
43 changes over time, and so it may not be that disconnected, and,
44 instead, what we might be looking at, for example, is the
45 natural mortality rate, for example, that we're assuming in the
46 stock assessment might be a little low.

47
48 If we change that, we end up with a different abundance estimate

1 as part of the stock assessment, of course, and so I would be
2 cautious about jumping to a conclusion as to what this
3 difference means. Thanks.

4
5 **CHAIRMAN POWERS:** Thank you. Any other questions or comments to
6 Mary or from Mary? John Hoenig.

7
8 **DR. HOENIG:** I just wanted to make a point about post-
9 stratification. There is two kinds of post-stratification,
10 legitimate and illegitimate. Legitimate post-stratification is
11 if, a priori, before doing the study, you know you want to
12 stratify by something, but you can't, because you don't have a
13 sampling frame that identifies the identity of the units.

14
15 For example, you might be saying I have a list of voters, but it
16 doesn't say if they are male or female, but I want to know the
17 answer by gender, and so I will take a simple random sample, and
18 then I will divide them into males and females and ask my
19 question, and that does not cause bias, and it can give you more
20 precision, if in fact gender explains some of the variability.

21
22 Mary was talking about post-stratifying after the fact by
23 looking at the data, and she is right that, if you look at your
24 data and see what explains the variability and then decide that
25 that's really what you meant to do all along, you will
26 underestimate the variance, and that gets particularly bad if
27 you look at a whole bunch of possible explanatory variables and
28 then you find one that seems to account for the variability, and
29 so you pretend that that's what you wanted all along.

30
31 You might say that looking at the results and dividing Florida
32 into different strata is an example of that, and Rob said, yes,
33 I can undo that, and that might be worth looking at, to see how
34 much that changes things, but, looking at the pipelines and
35 saying they're small, medium, and large, and maybe I will
36 stratify by that, that's not going on a fishing expedition, and,
37 if you didn't have the size of the pipeline beforehand, it's
38 kind of logical that that's what you would do.

39
40 If you did have it beforehand, and you didn't think to stratify,
41 then that could be a problem, especially if you're looking at
42 the results and seeing that, oh, okay, pipelines matter, size of
43 the pipelines, and so I will stratify by that.

44
45 I suspect that the variance reduction that you see is not
46 artificial, and I think it's probably real, mainly because I
47 think size of the pipeline probably matters, but there is a
48 danger, as Mary points out, and I just don't think it's quite as

1 bad as she indicated.

2
3 **CHAIRMAN POWERS:** All right. Thank you. Mary, to respond?

4
5 **DR. CHRISTMAN:** I just wanted to mention, John, that Rob did in
6 fact confirm that they had a priori belief, and it was the case
7 that you described of the voters with gender, and so I was not
8 implying that he was causing problems, but I just wanted to
9 confirm that he in fact did that a priori.

10
11 **CHAIRMAN POWERS:** Thank you. All right. Dave Eggleston.

12
13 **DR. EGGLESTON:** Good morning, everybody. I guess, first off, I
14 just want to thank Ryan Rindone and Carrie Simmons for the
15 opportunity to participate. As I mentioned in my report, I'm a
16 marine ecologist, and so I'm not a statistician or a stock
17 assessment scientist, but I do work on spatial dynamics of
18 exploited species.

19
20 I've really been impressed with the overall attention to detail
21 by the scientists and the monumental scale of the study and the
22 expertise of the team, and, actually, the coordination, in terms
23 of the need to be flexible and adaptive as new knowledge was
24 gained.

25
26 I want to make some comments on the process, just for folks that
27 are listening, and so, basically, Greg Stunz provided a brief
28 overview to the three of us external reviewers, and then we dove
29 into the reports and wrote up sort of draft reports, and then
30 we've had the past now going on three days of presentations.

31
32 The presentations were excellent, and they were well organized
33 and clear, and that was important for me, because -- I am going
34 to get to some of the details on how to, I think, modify the
35 report to make it more readable and more understandable, but the
36 presentations over the past few days, and the resulting
37 discussions, have been really important for my interpretation.

38
39 For example, in reading the report, I tended to get off the
40 rails a little bit when the random forest model occupancy
41 stratification was stated as low and high, but then, later in
42 the report, it was low, medium, and high, and then high in
43 Florida was then reclassified as hardbottom, and so I think I
44 got off the rails a little bit, in terms of concerns that I had
45 about random sampling and weighting of the strata and spatial
46 autocorrelation, and so those are areas that I raised in my
47 draft report.

1 The discussions that we've had over the past two days have
2 addressed those issues, and I now have a much clearer
3 understanding of the sampling, and so, last night, I revised my
4 report and eliminated those concerns, but I raised some other
5 issues.

6
7 Anyway, I think the important thing is that this process, I
8 think, has been appropriate for getting it right, as best as we
9 can, and just to go back to Steve Murawski's comment earlier,
10 and, I mean, this is a very complex set of studies and study
11 design, and so I think that the getting it right piece is very
12 important, but also in terms of modifications to the report that
13 are going to help other reviewers.

14
15 What I am going to do though is actually take a step back and
16 talk big-picture, and then I will get down to more details, as I
17 make further comments, and I think it was interesting, because I
18 had written up some of these general comments before the public
19 feedback yesterday from a lot of the stakeholders, and their
20 feedback really resonated with me, just thinking about the
21 investment by taxpayers and the return on that investment.

22
23 I think that my experience has been, in fisheries when the
24 stakeholders don't feel like they're part of the process, it
25 leads to problems, and so we see, for example, illegal fishing,
26 when you can get away with it, and so I think it's hard to put a
27 price tag on the, I guess, public outreach aspects of this
28 project, in terms of making stakeholders feel like they're part
29 of the fisheries management process, and so I think that's
30 something that should be highlighted, and it is highlighted in
31 the report, but I think it's -- From a taxpayer perspective, I
32 think it's really important to have the stakeholders feel like
33 they're part of the process.

34
35 The other is just sort of the lessons learned with respect to
36 methods and sampling design. So, basically, we've got this
37 increased expertise, in terms of not only calibration of these
38 different methods, but also training of new scientists, and so
39 this is going to save future studies a significant amount of
40 money. Again, it's hard to put a price tag on it, but, when we
41 talk about doing a similar great red snapper count, or amberjack
42 count, in the South Atlantic, we're going to save a significant
43 amount of money, based on the lessons learned, I think, from
44 this particular study.

45
46 The last area, in terms of sort of value added, and that's been
47 alluded to in many of the presentations, is just the biological
48 information that's been generated and the new areas of research

1 that are going to be spawned.

2
3 For example, just the -- Again, the uncharacterized bottom and
4 these benthic anomalies that may be holding fish, and, again,
5 I'm a spatial ecologist, and so that's why I kept focusing in on
6 what are the potential spatial dynamics of this population, and
7 it's a really important thing to get a handle on, because my
8 concern is that, if these uncharacterized bottom areas are
9 serving as sort of de facto reserves for the brood stock, it
10 would be good to know something more about the spatial dynamics.
11 As we know, location matters, in terms of fisheries.

12
13 Lastly, I would encourage the scientific team to think about a
14 special issue in something like a journal like *Transactions of*
15 *the American Fisheries Society*, because I think it's not only
16 going to be an important resource for others, but I think it's
17 going to be an important baseline. I mean, we know we're seeing
18 mangroves taking foothold in the northern Gulf of Mexico, and so
19 what is that mangrove community going to look like in fifty or a
20 hundred years, and are we going to see a transition from red
21 snapper to gray snapper, because of that?

22
23 I think, again, big-picture, I think there's a tremendous amount
24 of positive information that came out of this study, and so now
25 I want to kind of focus in on the report itself, and, again, I
26 really appreciated the team's identification of the sampling
27 biases and the potential for integration with management, and I
28 agreed with the future research recommendations, and I
29 appreciated the overall collaborative tone with respect to
30 informing the stock assessment models, but not superseding them.

31
32 As I mentioned in my initial draft report, I think it would help
33 the reader to place the age-two-plus red snapper in the context
34 of the broader life history or broader life cycle of red
35 snapper, and I think there needs to be some type of life history
36 diagram, this sort of typical circular life history schematic in
37 the report that would depict things like spawning locations and
38 times and settlement habitats and ontogenetic habitat shifts.

39
40 That's important, because, again, as Mary and others have
41 mentioned, the public has gotten ahold of this report, and so
42 it's important, I think, as an educational tool, to educate
43 folks on these complex life history strategies and the
44 importance of some of these spawning areas as well as nursery
45 habitats.

46
47 The other thing that really helped crystalize my understanding
48 of this, I think, complex sampling design were the presentations

1 yesterday by Rob Ahrens and Lynne Stokes. For example, Rob
2 basically, in his presentation, had a series of sort of block
3 sets of text which basically highlighted the approaches that
4 were taken in each type of strata in each sort of region or
5 state.

6
7 For example, I felt like, in some respects, while there was a
8 general description with text at the beginning of the report
9 that talked about the sampling design, I felt like I almost
10 parachuted into the trees without having a map of the forest,
11 and so I really got into the details of the methods and the
12 calibrations, but I'm still not 100 percent clear on the
13 sampling design.

14
15 What I would suggest, in terms of a revision to the report,
16 would be to have some type of sampling design roadmap, in a
17 simple form, that describes the initial sampling design, in
18 terms of where the population estimates were derived from, and,
19 for example, in UCB or artificial structures or known higher
20 bottom or pipeline, and, again, I think Rob really nailed it
21 yesterday, in terms of his presentation.

22
23 Then I think another roadmap on the changes to the sampling
24 design and the analysis plan, and I think, again, what
25 crystalized it for me was Lynne Stokes' presentation, where I
26 understood the estimation process much more clearly, and I
27 understood how the estimation process was handling a lot of the
28 potential variance. Those are, I think, two areas that would
29 help the report.

30
31 The other thing that I think was causing some trouble, which I
32 know Luiz Barbieri and I kept going back to Tables 6 and 7, is
33 that, again, I think it would help, and I mentioned this
34 yesterday, but it would help to have an appendix table that
35 shows the different strata, the different footprints of the
36 strata, but, also, it shows the weighting, so that somebody can
37 go back and actually, with a simple calculator, kind of estimate
38 some of those population estimates on their own, just to
39 understand the process.

40
41 For example, it also threw me off the rails in looking at Table
42 7, where this was this sort of mix of either mean density, fish
43 per hundred square meters, or the fish by structure, and so that
44 needs to be much more clearly delineated.

45
46 I have gone through the report, and I've taken a lot of notes
47 during this meeting, and so I'm going to add -- Like I said,
48 I've basically already revised my draft report, and I guess,

1 just to wrap-up, Ryan Rindone, yesterday, put it to us that,
2 basically, we're basing our decision on the best available
3 science, and so, in my mind, this is the best available science
4 that suggests that that absolute estimate of abundance is, I
5 think, in the realm of what's realistic, but probably definitely
6 an underestimate, based on the lowered efficiency of
7 hydroacoustics certainly in the western part of the Gulf of
8 Mexico, as well as the point that Steve Cadrin made earlier
9 about the fact that strata that has zeroes probably had fish and
10 just were undersampled.

11
12 Then, yes, I mean, obviously, I'm going to defer to the
13 statisticians and stock assessment modelers on how to improve
14 the variance, but, obviously, it seems like there's some
15 opportunity to refine it, and so I think, with that, I will
16 probably just stop and see if there are any questions, and so
17 thank you, Chairman.

18
19 **CHAIRMAN POWERS:** Thank you, Dr. Eggleston. Lynne Stokes, did
20 you have a question of Dave?

21
22 **DR. STOKES:** No, and this is just -- Thank you for recognizing
23 me, but this is just a clarification, or maybe a
24 misunderstanding, of something that I heard in Mary's summary,
25 which is that she seemed to indicate that she thought that I had
26 treated transects differently in Florida and Texas, and I did
27 not. They were taken -- The sampling units were taken as
28 transects in both places. That's all.

29
30 **CHAIRMAN POWERS:** Thank you. Greg.

31
32 **DR. STUNZ:** Thank you, Mr. Chairman. I just wanted to thank the
33 review team for all the thoughtful comments and to assure you
34 that our team will take these very seriously and build that into
35 the report.

36
37 Steve, a few things on that number that you commented on, and
38 something that we noticed as the team about the differences in
39 eastern and western, as it related to the prior stock
40 assessment, and with typically -- So everyone is aware, thinking
41 a lot more fish in the west than the east, and, numbers-wise,
42 that does appear to be the pattern, but, if you looked at
43 biomass, which we have not calculated, and that wasn't a task
44 under consideration here, but it certainly needs to be done, I
45 think that west-east relationship would still hold up, in terms
46 of biomass, because we simply have much bigger fish out in the
47 west, as those snappers are recolonizing the east from
48 overfishing. Yes, that's an interesting side outcome, but it's

1 something important, obviously, for management purposes, for
2 those folks to consider.

3
4 Mary, I hear you very loud and clear on the report
5 modifications, and so we will definitely take those, and I did
6 want to comment that this report -- It's for a variety of user
7 groups, from legislators all the way down to scientists at our
8 level of detail, and that's quite the challenge, to build a
9 report at that many levels, and so all of your suggestions will
10 be greatly taken as we try to do this one-size-fits-all sort of
11 thing.

12
13 Then, Dave, Dr. Eggleston, I really appreciate you bringing up
14 the public outreach component. While that was not part of our
15 terms of reference here, unfortunately, that was a major
16 component in this project, led by Dr. Drymon, and we're
17 extremely proud of the outcome of that.

18
19 In terms of the public, I don't think -- I may have mentioned
20 this, but I don't believe there was a national newspaper
21 anywhere in the U.S. that did not cover this project at some
22 level, particularly as it related from the tagging component of
23 this, and it just took off like wildfire, and our social media
24 would be reaching a quarter-of-a-million people a day on certain
25 posts and that sort of thing, and so was important, not because
26 of what we're discussing here today, but it's important broadly,
27 for many of the reasons that you pointed out, and others, and so
28 thank you for bringing that up.

29
30 I think your life history figure is an excellent idea, and we'll
31 definitely do that, as well as, now that we've had all of this
32 discussion back and forth with Tables 6 and 7 and all the strata
33 and footprints and weightings and so on, we'll make sure the
34 team is clearly accounting for that as well in the report, and
35 so, largely though, I really appreciate all your comments, and
36 we'll take those and make those as we finalize this process.
37 Thank you, Mr. Chairman.

38
39 **CHAIRMAN POWERS:** Thank you. Mary, you had another question or
40 comment relative to Dave?

41
42 **DR. CHRISTMAN:** I just wanted to respond to Greg. Believe me, I
43 completely appreciate how difficult it is to put all of this
44 information together and try to do it in a way that you can
45 capture every different kind of reader who is likely to look at
46 this, but I think what I would recommend then would be that all
47 the gory details that people like me love go into appendices,
48 and maybe just do it -- Like, for statistical methods, build it

1 like *Science Magazine* does.

2
3 For the statistical methods, you would describe it in general,
4 and then give me the gory details in an appendix, and so that
5 might be one way around this issue of trying to be all things to
6 all readers, but, at any rate, I really appreciate all the work.
7 Maybe a little bit finer reading of the details, so that the
8 sample sizes are the same throughout and things of that nature.

9
10 **DR. STUNZ:** Yes. Thank you, Mary, and we'll make sure that we
11 address that explicitly.

12
13 **CHAIRMAN POWERS:** All right. Thank you. I mean, essentially,
14 what we've tried to -- The SSC has tried to mimic a SEDAR review
15 process by collapsing it into two days, and what we were looking
16 for is the same kind of detail that would typically go into a
17 SEDAR review. Ultimately, I think we've gotten there, or close
18 to it, and this will evolve as time goes on, and so I think,
19 even though this isn't the normal process by which we deal with
20 reviews, I think this has been constructive in many ways.

21
22 At this point, we're going to be transitioning to the real
23 bottom line, in terms of how the SSC wants to proceed.
24 Basically, what is our advice to ourselves, as we go ahead, in
25 terms of making catch advice? I am going to make a couple of
26 comments, and then we're going to take a fifteen-minute break.

27
28 One of the things is that, typically, we go through and we have
29 motions, and people vote on the motions, and I would really like
30 if we can come to a consensus on how we can proceed, and,
31 obviously, that's up to individuals, but I think perhaps we're
32 close to it, and it would make much more sense, in terms of
33 providing advice.

34
35 Again, the issues are under the rubric of best available
36 science, but, beginning with Will's comments at the beginning of
37 today, we're really talking about what to use going forward for
38 this ad hoc analysis for catch advice for this year and what
39 should we use, what we can't use, and so on, and so let's think
40 of it in those sorts of terms. With that, and I am not taking
41 any questions at this point, and let's take a fifteen-minute
42 break and come back and proceed accordingly. Thank you.

43
44 (Whereupon, a brief recess was taken.)

45
46 **CHAIRMAN POWERS:** As I mentioned before, we are at the stage of
47 making a recommendation for how we want to -- How the SSC is
48 going to proceed this afternoon. Basically, this has been

1 couched in the introduction by Ryan Rindone as determining best
2 available data.

3
4 I would prefer to be a little more specific than that about what
5 we want to carry forward, and one of the things that we might
6 consider is basically not worry too much about the legalese of
7 what best available science is, but rather here is an estimate
8 of X, Y, and Z, and we would want to take that forward in
9 evaluating catch, catch advice, for 2021, later on, and so
10 that's the kind of approach that I was thinking about, but I
11 will certainly hear other opinions. Kai Lorenzen.

12
13 **DR. LORENZEN:** I agree, and I think what we should do is we
14 should go through the terms of reference, at least briefly, and
15 sort of characterize our review of the Great Red Snapper Count,
16 but I think we neither can, nor have to, make a determination of
17 best available science on this, and the reason is that, of
18 course, an abundance estimate by itself is not sufficient for
19 catch advice, and so we need to combine this information with
20 information that will allow us to judge what the sustainable
21 take is.

22
23 To do that, we need to combine information from the Great Red
24 Snapper Count, if we want to take that forward, with information
25 that is essentially derived from the stock assessment, and we
26 should then judge best available science for the combination of
27 information from those two sources that will give us catch
28 advice.

29
30 In fact, I think we might be putting ourselves into a difficult
31 position for later on if we decide on best available science for
32 the Great Red Snapper Count by itself, because we, obviously,
33 still need to use information from the stock assessment.
34 Thanks.

35
36 **CHAIRMAN POWERS:** Thank you. Greg, a point of clarification?

37
38 **DR. STUNZ:** Yes, a point of clarification. Some of my team is
39 asking me, and some are obviously on the SSC, and I assume
40 you're fine with us sticking around, those that aren't, but are
41 we, I guess, released, or are you going to need things from
42 other members? I'm trying to just get some guidance on what
43 you're going to need from us.

44
45 **CHAIRMAN POWERS:** At this stage, this is a true SSC meeting, I
46 guess, and, of course, it's a public meeting, and anybody can
47 listen in, and I can't tell people to stick around, but,
48 obviously, if somebody has a question or something relative to

1 one of the PIs, I would encourage them to ask that, but, beyond
2 that --

3
4 **DR. STUNZ:** Okay. Well, we should have expertise on the SSC to
5 field probably any questions that come up, and I will just ask
6 my crew to be on standby, should anyone have specific questions
7 that we could readily address or something.

8
9 **CHAIRMAN POWERS:** Okay. Thank you. Ryan.

10
11 **MR. RINDONE:** Thank you, Dr. Powers. As a function of the
12 review, the reviewers, which is the independent consultants and
13 the non-PI SSC members, do need to make a determination about
14 the study itself, as is specified in the background there, that
15 the primary objective of this review is to determine whether the
16 absolute abundance estimate and its variance is reliable and
17 consistent with input data and population characteristics for
18 red snapper in the Gulf.

19
20 The three independent consultants have weighed-in on this, and
21 you had talked about coming to a consensus, what I thought was
22 about this, prior to the break, and coming to a consensus
23 statement, or something like that, to offer to the council, with
24 respect to the Great Red Snapper Count and its appropriateness
25 for its estimate of absolute abundance and its variance would be
26 very informative, not only to the council, but to the SSC in its
27 deliberations moving forward, as it considers catch advice.

28
29 Before the SSC meeting formally begins, where we start talking
30 about the interim analysis and everything after that, I think
31 that this does need to be completed, in order to complete the
32 review of the project.

33
34 **CHAIRMAN POWERS:** I thought that's what I had just outlined, but
35 apparently you did it much better than I. Harry. Let's go to
36 Doug while Harry gets fixed up. Doug Gregory.

37
38 **MR. GREGORY:** Thank you. I am reluctant to make a decision this
39 week, and this is a lot of information, and it's complex, and
40 it's very important. We got the document three weeks ago, and
41 we got the underlying data presentations just this week, and
42 it's been overwhelming for me. I've got a statistics
43 background, but that was many years ago, and so I would be
44 reluctant to draw any definitive conclusions about this study at
45 this time. Thank you.

46
47 **CHAIRMAN POWERS:** Harry. We're still waiting for Harry. Given
48 Doug's comment, it's unlikely that we will have a consensus

1 then, and so we will proceed as Ryan indicates, and, Ryan, do
2 you have a comment relative to that?

3
4 **MR. RINDONE:** Yes, sir, and, I mean, understanding that there
5 may be disagreement amongst SSC members and reviewers about the
6 different nascent points of the report, that's totally fine, and
7 to be expected. I mean, when any manuscript is reviewed, there
8 are obvious differences between the different editors of a
9 manuscript prior to it being accepted or not for publishing, and
10 so that's all fine, and we'll do our best to characterize those
11 differences as you guys discuss this.

12
13 We have gone ahead and done that for the comments provided by
14 the three independent consultants up to this point, and their
15 comments will be best captured in their reports, which will be
16 delivered to the council by April 10, and we will, obviously,
17 post those for everyone to be able to review at that time.

18
19 For the purposes of this review, while we have everybody here in
20 one virtual spot, to the extent to which these discussions can
21 take place, that would certainly benefit the review, to coming
22 to some determination, and then, as you guys have made clear, it
23 doesn't have to be an all-or-nothing, and I think the
24 consultants all led with that approach, that it doesn't have to
25 be an all-or-nothing, and that there's an awful lot that is
26 going to do a great deal to advance our understanding of the
27 species, but it's up to you guys, as a complete review body, to
28 make that decision.

29
30 **CHAIRMAN POWERS:** All right. Harry, are you viable yet?

31
32 **MR. BLANCHET:** I am now. Thank you. Sorry about that.
33 Something got hung up, but I had one or two questions about the
34 project itself that I did not ask during the program. The first
35 was on the pipelines, and I was hoping that the PIs would still
36 be available to respond to it, and one of the things is why was
37 there no pipelines less than eight inches in diameter considered
38 as part of the study?

39
40 **CHAIRMAN POWERS:** Why don't you say your other question too,
41 while we get somebody together to answer it?

42
43 **MR. BLANCHET:** The other was more in terms of a comment, and
44 several people have made or alluded to it, especially Kai, and
45 the outstanding question at this point really seems to be what
46 is that interaction between that biomass in the uncharacterized
47 bottom and the biomass on structure.

1 Certainly, in the western Gulf, for years and years, we have
2 seen what I have informally called a hurricane effect, in that
3 you can go to that oil rig that everybody in the world goes to
4 fish on, and it's pretty well plumb-out of snapper, and you can
5 go back after a hurricane, and it fills back up, and so there
6 are some mechanisms, in terms of exchange rates between those,
7 but, at least to me, they seem to be at least highly variable,
8 and maybe driven by oceanographic or tropical systems,
9 oceanographic currents, other variables that might be difficult
10 to characterize, in a projective sense.

11
12 That seems like that -- I was really hoping, because this is as
13 good of a set of minds as we're going to have on the subject,
14 but how do we approach that type of a subject, to get a good
15 handle on that exchange rate?

16
17 **CHAIRMAN POWERS:** At this stage, I'll take that as a comment,
18 and I'm not sure that we are prepared to answer that, and, in
19 terms of the size of the pipelines, if somebody wants to
20 interject, feel free, but, in the meantime, Kai, I think you
21 have the floor.

22
23 **DR. LORENZEN:** Thank you. I wanted to sort of support Ryan's
24 point, and also to Doug's point that we're not looking at a yes-
25 or-no answer at this review, but we're looking at, essentially,
26 summarizing our discussion, and the actual decision point will
27 then come in the next stage, and, there, we'll have to consider
28 basically the combination of information from this survey and
29 the stock assessment that we have to make in order to arrive at
30 management advice, and I was wondering whether that is -- If not
31 making a yes-or-no decision about this point, but literally
32 characterizing our discussion, would allay your concern. Thank
33 you.

34
35 **CHAIRMAN POWERS:** Thank you. If that's the case, then we need
36 to just -- Those terms of reference that need to be addressed,
37 we need to just go down the list and see how we respond to them,
38 and so if we could do that. I have a couple of people, and I'm
39 going to stick with the SSC members at this point. Doug
40 Gregory.

41
42 **MR. GREGORY:** I thought the joint SSC/technical review team
43 discussion of the study was concluded, and we were going to
44 start talking about the assessment stuff, and, since the review
45 team has not even completed their recommendations, I don't see
46 how we can make conclusions or recommendations on the terms of
47 reference, until we have the full information. All of that
48 seems premature, but I'm eager to go forward with the SSC

1 agenda. Thank you.

2
3 **CHAIRMAN POWERS:** All right. My understanding is that we are,
4 we as an SSC, are asked to provide some comments and advice
5 about the Great Red Snapper Count. Ultimately, what we want to
6 know is what information we can take from the Red Snapper Count
7 to take forward for this afternoon for the implementation of
8 management advice.

9
10 There is a list of things there, but it basically comes down to
11 the abundance estimates and the variance estimates and so on,
12 and how we might want to parse that up. That's my
13 understanding, and so my objective then was can we make either a
14 consensus or a motion or whatever, but a recommendation saying
15 something that the Red Snapper Count, the estimates of X, Y, and
16 Z are useful and should be evaluated in determining catch advice
17 levels for 2021, and, essentially, that's the bottom line, as I
18 see it. How, procedurally, we get there, I will defer to Ryan.

19
20 **MR. RINDONE:** That sounded a lot like a motion, Dr. Powers. I
21 was going to clarify something for Mr. Gregory and for anyone
22 else that may have similar uncertainty. Please be certain that,
23 as I previously stated, the combination of the non-PI SSC
24 members and the independent consultants constitutes the review
25 team for this project at this meeting.

26
27 It's not, well, let's wait and see what the consultants come up
28 with, and they have told you guys their thoughts at this point,
29 and they will detail those out in their final reports, but they
30 have definitely made it clear where they stand on this, and they
31 are a component, but not the only component, of the review team.
32 The review team consists of all of you, to make this
33 determination, based on the terms of reference.

34
35 **CHAIRMAN POWERS:** All right. Benny Gallaway.

36
37 **DR. GALLAWAY:** I am going to ramble a bit, because I'm having a
38 wide range of thoughts, and the first is this study has received
39 tremendous publicity and is out there in the public community,
40 and I heard the let not the perfect be the enemy of good several
41 times yesterday, and I kind of feel like it's premature that
42 this information is out, but I think several things about the
43 report need to be cleaned up and addressed before I can render
44 an opinion.

45
46 I see, I think, the recognition of the significant biomass over
47 uncharacterized bottom is significant, but it's not new. That
48 habitat, and that population, has been protected since Reef Fish

1 Amendment 1 in 1990, and it's made a big difference, I think, in
2 the ultimately rebuilding success of the population.

3
4 I'm concerned about several things that need to be cleaned up
5 that we've discussed, that I won't go into, but Greg, or Dr.
6 Stunz, is well aware of those, and they're working on it, and
7 they'll get those cleaned up, and I would like to see that.

8
9 I remain concerned about the samples, the size of the samples,
10 that are being used to extrapolate to large areas. When I see
11 some of the samples, like a thousandth-of-one-percent,
12 extrapolated to huge areas, I have problems with that, and I
13 think I'm not ready to make a decision at this point.

14
15 I think this report has really made a contribution, and don't
16 get me wrong, and I think it's very valuable in a lot of ways,
17 but I think it needs more careful review. It hasn't received,
18 for example, the extent of review that typically goes into a
19 review workshop for a stock assessment, and so I'm still
20 struggling with addressing issues in my own mind, before I'm
21 ready to speak to how this report should be used. Thank you.

22
23 **CHAIRMAN POWERS:** Thank you, Benny. So your position then,
24 ultimately, and this is how I'm interpreting the ramifications
25 of it, is that, at this stage, we should not be making --
26 Utilizing this information to adjust catches for the 2021 year,
27 and, if that's the case, then we would fall back to what was
28 referred to as the traditional interim assessment approach that
29 the Center put together, has put together, and, I mean, that's
30 how I am interpreting the ramifications.

31
32 **DR. GALLAWAY:** I think that's pretty close to what I'm thinking.

33
34 **CHAIRMAN POWERS:** Okay. Thank you. Luiz.

35
36 **DR. BARBIERI:** Thank you, Mr. Chairman. I don't disagree with
37 the main points that Benny just made regarding applicability of
38 the results to management at this point, where we are, the
39 results of this study, but I also wanted to make some points
40 about the review process itself, and Ryan Rindone already
41 covered some of those.

42
43 I mean, I think that this review process was put together to
44 somewhat mirror what is done through the SEDAR original review
45 process, and it's trying to abide by what are the criteria that
46 need to be there from National Standard 2.

47
48 If you think about the fact that, whenever we have CIE reviews

1 of stock assessments, that review workshop is chaired by an SSC
2 member, and there are SSC representatives at that workshop that
3 will serve as reviewers, together with the CIE reviewers.

4
5 Now, here, the only difference is that, instead of having just a
6 few SSC members, we have the entire Standing, Reef Fish, and
7 Socioeconomic SSC. Now, we received the report, and we
8 received, during the last couple of days, all of these
9 presentations, and we have the preliminary, pretty much
10 accomplished, review reports from the consultants, the
11 reviewers, and so I don't really see why we should not complete
12 a review here, now, because I think it's going to be confusing
13 for the council, going forward at its next meeting and trying to
14 deal with this, without really understanding what the SSC's
15 decision here was.

16
17 There is always more that we can learn about this project or the
18 analysis needed or how additional review could be made, but, at
19 this point, I feel that this process was put in place, and it
20 has been planned and noticed as a review of this project, in the
21 way that it would provide scientific advice to management, and I
22 think we are there, and so I just wanted to put that out there,
23 Mr. Chairman.

24
25 **CHAIRMAN POWERS:** Thank you. Kai Lorenzen.

26
27 **DR. LORENZEN:** I am thinking -- I mean, the crunch is what, Joe,
28 you mentioned, and it's really the last part of the TOR, where
29 we have to say, well, is this is a representative estimate of
30 abundance, and is the variance representative, or realistic, and
31 that's really, I think, the main decision we have to make.

32
33 There are a lot of detailed points here in the TORs that
34 essentially can be populated from the consultants' reviews, and
35 perhaps discussed, but I think the crunch is that. I think, if
36 we can see can come to a consensus on that point, then it would
37 more or less determine how we move forward, and maybe we should
38 see if we can do that upfront. Thanks.

39
40 **CHAIRMAN POWERS:** Thank you. Clay Porch wants to interject,
41 hopefully a clarification.

42
43 **DR. CLAY PORCH:** Thank you, Chair. I appreciate you letting me
44 speak, even though I'm not a member of the SSC. I did just want
45 to ask the SSC to be careful not to set the bar too high for
46 best scientific information available. As I think you're aware,
47 the NS 2 Guidelines give you several criteria for determining
48 whether something is best scientific information available, and

1 you consider the relevance and inclusiveness and objectivity and
2 transparency and timeliness and peer review.

3
4 It doesn't say that it has to be anywhere near perfect.
5 Ultimately, you need to make a determination for catch advice
6 based on either the previous stock assessment, which, of course,
7 is now also out-of-date, or using the Great Red Snapper Count
8 information, and so you're going to have to do one or the other.
9 The question is basically which estimate of abundance is likely
10 to be most accurate and not whether the Great Red Snapper Count
11 checks every box that you would want it to.

12
13 I do think that caution is warranted, and so I am completely
14 onboard with the comments that Benny and Luiz and Doug and
15 others have expressed, but, as you will see with the Center
16 presentation, when we get to it, there are some ways to address
17 that. Either we can use a P*-type approach with an expanded
18 variance, or there's other means. We can assume a certain
19 fraction of the fishing effort can occur in that uncharacterized
20 area and moderate the catch advice that way.

21
22 We can also look at maybe more conservative reference points for
23 the ABC advice, and not for the OFL, and what I mean by that,
24 for instance, is the stock assessment estimated a smaller, but
25 highly-resilient, stock, on a per capita basis. What it appears
26 we have now is a huge cryptic biomass, as Steve Murawski had
27 pointed out earlier, and so, instead, we have probably a less-
28 resilient stock, in a per capita basis, but a huge reservoir
29 that was seeding the population in the fished areas.

30
31 There's ways to account for that, probably using a less-
32 aggressive reference point, like F 40 or 45 percent would be
33 appropriate for ABC advice, but we have all of that in the
34 Center presentation, and I think it will be clearer once we get
35 to it.

36
37 Just, again, I wanted to clarify that best scientific
38 information available doesn't mean that it has to be perfect.
39 The question is, is it better, likely to be more accurate, than
40 the previous stock assessment. Thank you.

41
42 **CHAIRMAN POWERS:** Thank you. We are well aware of the
43 presentations coming and the discussion, and so we'll keep that
44 in mind. Doug Gregory.

45
46 **MR. GREGORY:** Thank you again, and I will try to be more clear.
47 What Clay is saying is basically what I'm thinking, and maybe I
48 am being too persnickety here, but the first two days, and a

1 little bit of this morning, was the review of the Great Red
2 Snapper Count. I am looking at the terms of reference, and the
3 SSC is not mentioned there, and I assume that was for the
4 technical team.

5
6 When we made our motion back in January, I think we envisioned
7 having the council conduct a review workshop that included some
8 SSC members with particular expertise, and I don't think we
9 envisioned this joint meeting that we've had, and so it's like
10 we've completed this first part, and it's not up to us to bless
11 or reject this study, and it is what it is, and it's -- I
12 applaud it like everybody else has, but our job is to see how
13 this information can be incorporated into an interim assessment,
14 or is it so complex that it should wait for a research
15 assessment, a research track?

16
17 I just don't see us spending time going over the terms of
18 reference again, and that could take up the rest of the week, to
19 try to answer all those questions, but let's move forward to see
20 -- It's there, and we can use the information, and we can look
21 at what National Marine Fisheries Service has done, as far as
22 trying to incorporate it into an assessment, and determine there
23 what can be used or not for the assessment purposes, and so I'm
24 not rejecting the study, but I am just saying we need to move
25 on.

26
27 If you look at the terms of reference for the SSC meeting, it's
28 all about the assessment, and so there's two distinct meetings
29 here, and I just feel like we're in the second meeting. Thank
30 you.

31
32 **CHAIRMAN POWERS:** I think there is a bit of a dichotomy here,
33 and I am sure that Ryan can weigh-in again, but, essentially,
34 the bottom line is do we want to utilize some part, or all, of
35 the Great Red Snapper Count in this afternoon's discussion to
36 make catch recommendations for 2021, and, I mean, to me, it's
37 pretty -- That's the bottom line, and some of the other detail -
38 - When we talk about the terms of reference, again, I have some
39 confusion about what was terms of reference for us, the SSC, and
40 what was terms of reference for the consultants. Ultimately,
41 the bottom line is do we utilize some or all of this data as we
42 go over things this afternoon and tomorrow.

43
44 **MR. GREGORY:** To that point, Mr. Chair, how can we do that until
45 we get to that discussion point and get to those presentations?
46 We have yet to see how they are being incorporated, and we can
47 make a decision then, and I don't see how, a priori, we can say
48 this part we can use and that part we can't. Thank you.

1
2 **CHAIRMAN POWERS:** Well, that's a point. Ken Roberts.

3
4 **DR. ROBERTS:** Thank you, Mr. Chairman. I ask your tolerance,
5 and I have to step away here for a couple of hours, and so
6 probably when you're discussing something that I want to make a
7 comment on, and so I am the sole manager of a trust, and we have
8 a meeting in about thirty minutes, and two hours will be taken
9 up, and so I may miss some of the discussion.

10
11 Anyway, my point is that I think the studies are good enough to
12 inform the council, with some confidence, about the direction
13 that they should be going, in terms of increased harvest,
14 increased availability to the user groups of red snapper. I am
15 not sure that is debatable, and we seem, to me, to be arguing
16 more about how far one would go. In other words, how much you
17 can move in the direction of utilizing more fish and then how
18 quickly you could do it.

19
20 To me, my view of things is the direction is really clear, from
21 the report. How fast one would go and how far one could go are
22 actually the critical things, and I was pleased to see Dr.
23 Stunz's last thing on moving forward about research
24 recommendations for future studies, and I think those research
25 recommendations would more likely be fruitful if they focus on
26 not the direction, but how quickly and how much speed -- How far
27 you can go as we move forward.

28
29 I don't think that will come unless there's a pretty clear plan
30 laid out for filling in some of these gaps, particularly what
31 Benny was talking about earlier, about the acoustics and some
32 oceanographic things, which are totally missing in the report,
33 and how we organize, as a nation, to get this group of people
34 continued working on this project and making those kinds of
35 research gains to answer the question of how quickly and how far
36 can we go in releasing more fish to the user groups.

37
38 It was a tremendous effort by NGOs and scientists and whatnot to
39 get the first appropriation, and I don't know, and I'm not
40 involved in it right now, but I'm concerned that that same
41 energy and inertia is missing for Stage 2, and I think, if the
42 council knew that that was being organized, and likely to be
43 funded, that certain aspects of this group could be continued
44 and focused over the next several years, and that would be of
45 great use for the council to know, also. I thank you, Mr.
46 Chairman, and I'm sorry to have to leave for a couple of hours,
47 but I don't really have any choice. Thank you.

1 **CHAIRMAN POWERS:** Thank you. John Mareska.

2
3 **MR. MARESKA:** Thank you, Mr. Chairman. I sent a motion to
4 **Jessica, and she could put that up on the board.** I agree with a
5 lot of the sentiments that have been expressed, and I feel like
6 we have done a review, and I don't think there's going to be a
7 review with the research track, and I think it was pointed out
8 that this is -- I am trying to stay away from the best
9 scientific information available statement.

10
11 It was a very detailed and well-designed study. Yes, it's not
12 perfect, and I think, as Clay was pointing out, there are things
13 that can be done to improve it, but I am hoping this motion kind
14 of wraps up some of the sentiments that have been expressed, and
15 I hope it finds the spirit of kind of what you were alluding to
16 a few minutes ago, and, if you want to hold off on this and let
17 some other people speak to it, I'm fine with that as well.

18
19 **CHAIRMAN POWERS:** Thank you, John. Before we get into
20 discussion and asking for a second, I want to make clear a
21 couple of items there. One of them is you refer to the interim
22 analysis, and, by our terminology, to me, the interim analysis
23 is where you adjust the CPUEs, that second form of analysis, and
24 so I want to make clear what you're referring to there.

25
26 I don't think you're referring to that. Basically, the interim
27 analysis doesn't use the GRSC population estimate, and so I
28 think what you're referring to is just sort of what we're doing
29 in the interim and not, quote, unquote, the interim analysis.

30
31 The second thing that I would make a comment about is the
32 modifications to the variance, and it's unlikely that we're
33 going to see those before June, essentially, and I'm not sure
34 how we might deal with that, and so, if you want to comment on
35 that, and then we'll go forward with your motion and ask for a
36 second. Thank you. John.

37
38 **MR. MARESKA:** Yes, and the interim was exactly as you expressed.
39 It's what we would potentially look at in the second part of
40 this meeting as an SSC, and the changes, I guess, to the
41 variance and corrections by the investigative team would be more
42 for incorporation into SEDAR 74, rather than this interim catch
43 advice that we'll be building on, hopefully, in a while.

44
45 **CHAIRMAN POWERS:** Okay. Thank you. Can I ask for a second?

46
47 **MR. BLANCHET:** I will second that.

1 **CHAIRMAN POWERS:** Thank you. Ryan, do you have some procedural
2 guidance, hopefully?

3
4 **MR. RINDONE:** Yes, and this is procedural guidance. Whether to
5 use the Great Red Snapper Count population estimate and its
6 variance in the interim analysis would be something that would
7 be completely under the purview of the SSC.

8
9 For the sake of this review though, determining whether the
10 population estimate and its variance, after being modified as
11 recommended by this review panel, be incorporated into SEDAR 74
12 is something that could be recommended by the review panel, and
13 that would constitute some satisfaction of the terms of
14 reference. Again, we're trying to punctuate this review by
15 having some sort of either consensus or majority statement about
16 the work that's been done, considerate of the comments that have
17 been made about the changes that are necessary and the responses
18 from the project team with respect to those reviewer comments.

19
20 As far as whether to use this information for informing catch
21 advice, that's still the SSC's decision exclusively, and that's
22 not something that the independent consultants are involved in,
23 and that responsibility, under Magnuson actually, falls
24 exclusively to the SSC, to recommend catch advice to the
25 council.

26
27 Here, and, Mr. Mareska, I don't know if you want to consider any
28 modifications to your motion, just from this procedural
29 guidance, but consideration of the interim analysis here I think
30 might be procedurally premature, but, as far as the rest of the
31 motion is concerned, I think that's appropriate under the guise
32 of the terms of reference and what we have asked of and directed
33 the review body, which is all of you, to consider.

34
35 **MR. MARESKA:** Right, and so I think what I was just trying to
36 get at was the fact that we would be reviewing this interim
37 catch advice that was derived from the estimates of the Great
38 Red Snapper Count, and so I can do some wordsmithing to fix that
39 situation right there.

40
41 **CHAIRMAN POWERS:** Okay, John, and hopefully Harry will agree
42 with this too, but why don't you kind of go back and revise
43 this, and not necessarily on the screen, because there were
44 several other people that wished to talk, and I suspect they're
45 not really addressing this motion, per se, and so let me go
46 ahead to them while you revise that, as you see fit, if that's
47 okay. Dave Chagaris.

1 **DR. CHAGARIS:** Thank you. I just wanted to take a minute to
2 kind of express where I stand on this, but, first, I do want to
3 congratulate Dr. Stunz and the research team on executing such a
4 large-scale and complex study.

5
6 We knew, going into this, that there were many pitfalls and
7 challenges, but you all made it through from start to finish,
8 and you really can't overstate the breadth of knowledge that has
9 been gained from this process and this study, and it will be a
10 foundational study for fisheries research and monitoring in the
11 Gulf and beyond, and so congratulations on that. Thanks to the
12 research team and the reviewers for the last couple of days. It
13 was very productive and very informative.

14
15 For me, perfection was never a bar for acceptance. I mean, I'm
16 comfortable with a healthy amount of uncertainty and error,
17 because it's inherent in everything that I and we do, but, in
18 several cases, I feel the estimates are far from perfect. In
19 some regions, or strata, the best we can say is that the
20 estimate is likely in the ballpark, as no data were collected,
21 and, in other cases, the statistical analysis was deemed
22 inappropriate, or major assumptions weren't demonstrated to be
23 met.

24
25 In that regard, I don't feel that we've seen the final estimates
26 yet, and I think we should allow the team time to incorporate
27 feedback from this review process and revise the analysis
28 accordingly, and also tighten up the report, which others have
29 suggested.

30
31 As to the bias and the abundance estimate, I generally agree
32 with the research team that decisions made in the study likely
33 led to an underestimate in densities. However, there are areas
34 where abundance could be biased high. For example, if our
35 habitat proportions, or our reef counts, are not correct for
36 species and age compositions and that were not actually
37 representative.

38
39 As to the precision, I do agree with most that the CV of 11
40 percent is an underestimate, but I also don't think that it will
41 completely blow up when the data are re-analyzed, and this issue
42 of CV is important for the assessment model, and I'm interested
43 to see how the abundance estimate squares with all of the other
44 data streams that we have on red snapper.

45
46 I mean, remember that we cannot detach ourselves from the
47 assessment model, and we need it to determine stock productivity
48 and productivity-based reference points, and also for making

1 catch projections, and so I honestly don't think the book is
2 closed until we see it integrated into the assessment model,
3 and, ideally, that could be explored sooner than later, and even
4 outside of the assessment process, and Dr. Cadrin has provided
5 some good suggestions on moving forward with that.

6
7 I anticipate that, with the new recreational landings that the
8 model will be able to accommodate this higher abundance estimate
9 without sacrificing fits to other data or violating some of our
10 assumptions about life history and population dynamics.

11
12 Then, lastly, I just wanted to say that we are reviewing this
13 information with the backdrop of providing tactical management
14 advice in this interim analysis. Personally, I don't feel the
15 results are ready for that yet, and maybe they will be in a
16 matter of weeks or months, but we should also be thinking about
17 how this information can factor into the strategic decision-
18 making and our thought process, the thought process for this
19 committee, which I think is what Dr. Porch was alluding to.

20
21 For example, we'll be seeing some projection scenarios and ABC
22 advice, and I'm sure we'll see a range of different scenarios,
23 and what we have learned, over the last couple of days, might
24 factor into which of those scenarios we select, or, for
25 managers, whether or not they want to take more risk or be more
26 precautionary, now that we have this new information behind us.
27 That's all I have to say for now. Congrats, again, to the
28 research team, and thank you for the last couple of days.

29
30 **CHAIRMAN POWERS:** Thank you. Jim Nance.

31
32 **DR. NANCE:** Thank you, Dr. Powers. I appreciate being able to
33 be here the last two days and listen to all these presentations,
34 and I think this is, in my mind, one of the best research
35 efforts I have seen over my years.

36
37 The things that I wanted to point out, I think this study has
38 shown, very well, that there is a large -- There seems to be a
39 large, cryptic abundance of red snapper that is not fished, the
40 magnitude of which I think is uncertain, and that's why I am
41 having the problem.

42
43 I think the magnitudes that are being shown are uncertain, but I
44 think they're certainly usable, and that's kind of where I'm
45 coming from. I think the study is well done, and the -- I think
46 it has portions that we can use to inform the assessments and be
47 able to look at catch from the assessments, with some
48 incorporation of the data from this study, and so thank you.

1
2 **CHAIRMAN POWERS:** Thank you. Before I get to Camp, it seems
3 that we're getting caught up in procedural things about what's a
4 review and what isn't, and what the terms of reference were and
5 what is not, and I am inclined to say this is an SSC process,
6 and we can make scientific recommendations as we see fit.

7
8 If there is a terms of reference that we are unable to do, or
9 unwilling to do, then that's our prerogative, and so,
10 ultimately, what we're really being asked for is not necessarily
11 -- I mean, we've gone through this review, and the record of it
12 is going to be extremely useful for both future assessments and
13 also for the research team, as they develop their reporting of
14 this in June, or sooner or later.

15
16 What we are really being asked by the council is not all the
17 details about what constitutes best available information, but
18 it's basically should we utilize this information to modify
19 catch advice, and, if so, do that, and that's essentially the
20 bottom line, and so, in a sense, in my mind, if we just stopped
21 the meeting right here and went on to the SSC meeting, where we
22 have a presentation of actually implementing these population
23 estimates, in several different forms, into the projections for
24 2021, then we would make a decision at that point about whether
25 that's the best available information to provide catch advice
26 for 2021. I think, in some ways, we're making this a lot more
27 difficult than it really needs to be, and so that's my rant for
28 the morning, and next up was Camp Matens.

29
30 **MR. MATENS:** Good morning, gentlemen. Dr. Powers, thank you
31 very much for recognizing me. I really can't comment about the
32 scientific aspects of this, and shouldn't, but what I would like
33 to comment on is, if one of the goals of this exercise, this
34 whole exercise, is to make a decision vis-à-vis the 2021 season,
35 as a former council member, I can say that they're going to be
36 under the gun.

37
38 We just have a short period of time here to either give those
39 people something or not give them something, and, if we can move
40 forward, I would encourage us to do so.

41
42 The second, kind of a smaller thing, is there's been discussion
43 about the fish on pipelines are not being prosecuted, and, at
44 least where I am, those fish are prosecuted, and we know, as a
45 fisheries group, particularly where the pipeline junctions are,
46 where one pipeline crosses another, and those are hot spots, and
47 valve stations. Those are hot spots.

1 Now, I don't know if the commercial guys prosecute those or not,
2 because, with their thirteen-inch limit, they may not want to
3 fool with those bigger fish, but that's where the bigger fish
4 are. Further, when you go to an oil rig, particularly an oil
5 rig in relatively deep water, yes, the snapper are on the
6 bottom, but there's a bunch of small snapper mixed into them.

7
8 If you want to target larger fish, they're going to be at
9 intermediate levels, mostly at thermoclines. When you get under
10 a thermocline, if you're diving, it looks like a big mirror, and
11 you can't see through it, and those fish know that, and they're
12 in there. A lot of big fish are doing that, and they're in
13 there, and so thank you very much for allowing me to bring this
14 forward, and I applaud everyone here for all the work that
15 they're doing to try to make this happen. Thank you.

16
17 **CHAIRMAN POWERS:** Thank you. John Mareska.

18
19 **MR. MARESKA:** Mr. Chairman, I just sent the modified motion to
20 Jessica. Hopefully it addresses all the concerns, procedurally,
21 that Ryan pointed out.

22
23 **CHAIRMAN POWERS:** Thank you.

24
25 **MS. MATOS:** I haven't gotten it yet.

26
27 **CHAIRMAN POWERS:** Okay. While we're waiting then, Benny
28 Gallaway.

29
30 **DR. GALLAWAY:** I wanted to say that I really appreciated Clay's
31 comments on how these population estimates might be viewed and
32 utilized in the stock assessment. We haven't seen that
33 presentation, or that paper, yet, and so I appreciate your
34 comments.

35
36 **CHAIRMAN POWERS:** It's not really a stock assessment. Excuse
37 me. I interrupted you, Benny. Go ahead, Benny.

38
39 **DR. GALLAWAY:** The major findings of the study said that there's
40 a large, cryptic population over uncharacterized bottom, and I
41 concur with that, and I just don't know if we -- When you say we
42 want to use the Great Red Snapper Count estimate in the stock
43 assessment, will that be viewed as the exploitable stock is
44 three-times larger than we thought, and so will the expectation
45 be that the catch rates should be increased by a factor of
46 three? These kinds of things -- I am not quite sure how they
47 will be dealt with, and so that's part of my rationale for
48 wanting to know more as to how we would use this information.

1
2 **CHAIRMAN POWERS:** This is why I went into my rant about parsing
3 up this meeting this way. Like I said, I feel the review has
4 been excellent and has provided information, and we understand,
5 as much as we are going to understand at this point about what
6 the results are, and then the next question is how do we
7 integrate information into the catch advice?

8
9 From the council's perspective, it's that integration into the
10 catch advice that would be considered, quote, unquote, best
11 available information. Is this the motion? Okay.

12
13 **MR. MARESKA:** I just hope it makes it clear that it would be
14 used in 74, and, yes, the SSC agrees that we should review the
15 interim catch advice derived from the Great Red Snapper Count.

16
17 **CHAIRMAN POWERS:** Harry, do you still want to second this?

18
19 **MR. BLANCHET:** Yes.

20
21 **CHAIRMAN POWERS:** Okay. Thank you. Again, you have several
22 "and" in there, and I want to make sure which "and" is referring
23 to what, which phrase is referring to what. My concern, again,
24 is the incorporating modifications to the variance. At this
25 point, any modifications to the variance is not going to be
26 included in interim catch advice that we're going to do for the
27 next few days, and as long as that's understood.

28
29 **MR. MARESKA:** Yes, that's understood, and I probably need a
30 comma after "investigative team".

31
32 **CHAIRMAN POWERS:** Okay. Is there any more discussion on this
33 motion? Of course, these estimates will evolve, and the
34 research will evolve, as SEDAR 74 goes through the process.
35 Doug Gregory.

36
37 **MR. GREGORY:** I have a question for John. The way this reads,
38 literally, is that the population estimates that are in this
39 draft report are suitable as-is, without review or modification.
40 That's the only part that gives me heartburn. If the motion
41 read something like the SSC finds the Great Red Snapper Count
42 study suitable for integration into the SEDAR 74, incorporating
43 modifications to population estimates and variance, blah, blah,
44 blah, blah, and so I just want to be clear what you're really
45 saying here, because, literally, that gives me heartburn. Thank
46 you.

47
48 **MR. MARESKA:** I am open to any wordsmithing corrections you

1 would like to put in there, but the corrections by the
2 investigative team may be a lot of the issues that were raised,
3 where people had concern, and I think the investigative team
4 said they were going to go back and look at the data, or re-run
5 some things, and so, if those things are done, then the
6 resulting report that comes out in June hopefully would
7 incorporate that, as well as the variance estimates around the
8 population estimates. I am trying to general, and I'm not
9 trying to be specific, Doug, and so please incorporate any
10 suggestions you have in there.

11
12 **MR. GREGORY:** Well, let me try. Don't change the original
13 motion, and let's just go beneath it and start. **The SSC finds**
14 **the GRSC study suitable for integration into SEDAR 74,**
15 **incorporating modifications to population estimates and**
16 **variance.** That's the only change I would make, if you want to
17 highlight what we inserted, and that might make it easier. Any
18 objections to that?

19
20 **MR. MARESKA:** I do not. Harry?

21
22 **MR. BLANCHET:** I'm good with that.

23
24 **CHAIRMAN POWERS:** All right. Is there any other discussion in
25 there?

26
27 **DR. ANDERSON:** Don't we need to say, "if it incorporates", or
28 "when incorporation" of those things? It's conditional.

29
30 **CHAIRMAN POWERS:** Where did you want to --

31
32 **DR. ANDERSON:** I would say if it incorporates the modifications
33 to population, if or when, as recommended. You can take out the
34 "as", I guess. I am missing something, please tell me.

35
36 **CHAIRMAN POWERS:** Okay. All right. Again, I would really like
37 -- To me, this is something that essentially we've already
38 agreed to, in general framework, from people's reaction to this,
39 and the SEDAR 74 will evaluate this information, with or without
40 this motion. Well, we'll go on there. Benny Gallaway.

41
42 **DR. GALLAWAY:** Let me just read this a little more. Go to
43 someone else, and I will get back to you.

44
45 **CHAIRMAN POWERS:** Okay. Kai Lorenzen.

46
47 **DR. LORENZEN:** I mean, I find it too vague, in terms of that
48 "incorporating modifications", because we haven't actually

1 specified those modifications, and we have merely given
2 suggestions as to how certain things could be improved, and I
3 also don't think that -- I mean, certainly, as you pointed out,
4 we don't actually have to address SEDAR 74, because that will be
5 done, in any case, separately, and I don't think that we need to
6 judge suitability at this stage, and I actually have sent a --

7
8 I would suggest a substitute motion that actually simply states
9 our overall sort of review of these estimates, which, if that
10 passes, I think it would address that part of the TOR, but it
11 wouldn't, at this stage, make a judgment on incorporation. Do
12 you want me to read it?

13
14 **CHAIRMAN POWERS:** Yes, please.

15
16 **DR. LORENZEN:** The review team (external consultants and SSC)
17 considers that the Great Red Snapper Count provides a
18 representative estimate of abundance for the eastern Gulf and
19 likely a lower bound for the western Gulf. The review team also
20 considers that the true uncertainty in both estimates is
21 substantially larger than implied by the 11 percent CV stated in
22 the report and that the estimate for uncharacterized bottom is
23 particularly uncertain.

24
25 **MR. GILL:** Second, Mr. Chairman.

26
27 **CHAIRMAN POWERS:** All right. This is a substitute motion, and
28 so the discussion is related to that, relative to the first one.
29 Dave Chagaris.

30
31 **DR. CHAGARIS:** Thank you. My comment, I guess, was originally
32 on the previous motion, but I think it's still relevant here,
33 and my concern was that what is implied by the last statement of
34 the previous motion about being suitable for consideration into
35 interim catch advice. My concern was that that sort of commits
36 us to accepting some interim catch advice without actually
37 seeing how it's used, and so I do like this substitute motion
38 better, because I think it addresses our consensus on the actual
39 study itself.

40
41 **CHAIRMAN POWERS:** Thank you. Luiz.

42
43 **DR. BARBIERI:** Thank you, Mr. Chairman. I agree with what Dave
44 Chagaris just said. I'm on the same page there with him on
45 this, but I still have significant concerns, and I'm going to be
46 brutally honest here, but I do feel that what came out of -- The
47 estimates that came out of the uncharacterized bottom have --
48 The uncertainties there have exceeded what makes it suitable to

1 be considered for management advice.

2
3 It doesn't mean that all of that work was wasted and that
4 knowledge wasn't gained and progress wasn't made or that that
5 work is not valid scientific work, but it's simply the fact that
6 we review and assess information and analysis that is used for
7 management advice according to what we consider tolerable levels
8 of uncertainty.

9
10 I feel that, in that case, the small sample sizes, the very,
11 very low sampling fraction, that, for all valid reasons, have
12 prevented this study from being completed in the way that you
13 have enough sampling to characterize those habitats, and, to me,
14 that generates concerns.

15
16 We as an SSC, in the past, have rejected full stock assessments,
17 and we have rejected projections from the Science Center, not
18 because we don't believe in our Science Center data or analysts,
19 or because the analysis was just plain wrong, but it's because
20 the uncertainty in the estimates we felt exceeded what we felt
21 was necessary for it to be suitable for management advice, and
22 that's my level of discomfort with the estimates that are coming
23 out of the uncharacterized bottom, because, for all sorts of
24 practical reasons, sample sizes had to be very small.

25
26 The area coverage of that sampling program had to be kept very
27 small, and, in my view, what we have as uncertainty estimates
28 coming out of that stratum are way, way below what they should
29 really be. Thank you.

30
31 **CHAIRMAN POWERS:** Thank you. I will repeat my mantra.
32 Essentially, what the presentations being made by the Center
33 this afternoon is, if you believe the population estimate is
34 this, then these are the ramifications. If you believe it's
35 that, these are the ramifications. If you believe it's a third
36 thing, these are the ramifications, and one of those is the
37 overall GRSC estimate.

38
39 I would much -- I would have much preferred that we agreed to
40 some sort of substitute motion like this, that this review has
41 been extremely, extremely helpful to the scientific process, and
42 then move on to how we're going to integrate it into the catch,
43 but, again, I am ranting. Harry Blanchet.

44
45 **MR. BLANCHET:** Actually, I'm good with that substitute motion
46 that you just provided, the substitute substitute. My concern
47 with the substitute that's on the board is the western Gulf.
48 The estimates for the western Gulf are driven very much by the

1 estimates for the unclassified bottom, and, since there's a
2 limited number of samples in the western Gulf, and a lot of that
3 area was imputed, rather than sampled, I am not sure that we can
4 say that it is likely a lower bound for the abundance in the
5 western Gulf.

6
7 I don't know that we really have a good grip on that very large
8 number that was estimated for the western Gulf in the
9 uncharacterized bottom. I think there's a lot out there, but I
10 don't know that that is a lower bound.

11
12 **CHAIRMAN POWERS:** Thank you, and, again, because of the detail -
13 - Well, Lee Anderson asked for the floor.

14
15 **DR. ANDERSON:** Thank you, Mr. Chairman. I have to say that my
16 points have been raised earlier, and I think I approve of the
17 substitute motion better than the other one, and now I will be
18 quiet.

19
20 **CHAIRMAN POWERS:** I am skipping over Benny, because you said you
21 wanted to -- I'm not sure if you still want to talk.

22
23 **DR. GALLAWAY:** I was just wanting to say that I certainly agree
24 with the comments that Harry just made regarding the lower bound
25 for the western Gulf, both for the reasons that he stated and,
26 further, the hydroacoustic studies performed around the large
27 structures typical of the western Gulf, and those have been
28 independently verified, or validated, by mark-recapture
29 estimates, which yield very similar estimates for the same
30 habitat, and so I think there's -- The other comments about the
31 uncertainty, he captured what I was ineloquently trying to say
32 earlier. Thank you.

33
34 **CHAIRMAN POWERS:** Thank you. Kai Lorenzen.

35
36 **DR. LORENZEN:** I just wanted to point out, again, that,
37 obviously, this motion does not either oblige us to use that
38 information or prevent us from it, and so it's really just
39 trying to capture the sentiment on the information, and,
40 obviously, I would be happy to accept friendly amendments, if we
41 can improve the characterization of what's going on in the
42 western Gulf. Thank you.

43
44 **CHAIRMAN POWERS:** Thank you. Jim Nance, with friendly
45 revisions, hopefully.

46
47 **DR. NANCE:** I am just going to say, and thank you, Dr. Powers,
48 and I like this substitute motion. The only question I have is,

1 is this an SSC motion, or are the external consultants also part
2 of this motion?
3
4 **CHAIRMAN POWERS:** I have no idea.
5
6 **DR. NANCE:** The way it reads -- So it needs to be changed, I
7 think, to the SSC considers.
8
9 **MR. RINDONE:** No, do not change it.
10
11 **DR. NANCE:** Don't change it?
12
13 **MR. RINDONE:** No.
14
15 **DR. NANCE:** Okay.
16
17 **MR. RINDONE:** The review team is the combination of the non-PI
18 SSC members and the external consultants. That is who would be
19 making the collective determination.
20
21 **DR. NANCE:** So they're going to vote on this also, Ryan?
22
23 **MR. RINDONE:** They would be included in that, yes.
24
25 **DR. NANCE:** Okay. Thank you.
26
27 **CHAIRMAN POWERS:** They have the opportunity to abstain, of
28 course. All right. John Mareska.
29
30 **MR. MARESKA:** I've got a little bit of heartburn with the
31 estimate of abundance for the eastern Gulf and a likely lower
32 bound for the western Gulf, and that seems kind of contradictory
33 to the report, which kind of indicated that everything was an
34 underestimate, and so if Kai would be agreeable to just making
35 it a representative estimate of abundance for the Gulf of
36 Mexico, and strike "for the eastern Gulf and a likely lower
37 bound for the western Gulf", and I think that may address some
38 of the concerns that Harry and others had.
39
40 **DR. LORENZEN:** If I can respond to that, I think my concern is
41 that, based on the reviewers' report and the calibration issue,
42 I would not be comfortable saying that it's representative for
43 the Gulf, and I am trying to address that by dividing it out
44 like this. Thanks.
45
46 **CHAIRMAN POWERS:** All right. Again, we're getting caught up in
47 the details here, where I don't think it's really important to
48 what we're really trying to do, but Bob Gill.

1
2 **MR. GILL:** Thank you, Mr. Chairman, and so a suggestion relative
3 to the --

4
5 **MR. RINDONE:** Bob, you fell off a cliff there.

6
7 **MR. GILL:** Sorry. I'm not sure what happened there. My
8 suggestion that I would like to proffer, as a friendly, if Kai
9 and I guess me agree with, is to replace the "likely lower
10 bound" with "a highly uncertain estimate".

11
12 **DR. LORENZEN:** I would be okay with that.

13
14 **MR. GILL:** As the seconder, so am I.

15
16 **CHAIRMAN POWERS:** Okay. Benny.

17
18 **DR. GALLAWAY:** Could you insert a "however", after "Gulf" and
19 between "the review team", where it reads: "However, the review
20 team also considers that", blah, blah, blah.

21
22 **CHAIRMAN POWERS:** Okay. Thank you. This is -- Are there any
23 other comments? If not, what I will ask is if there's any
24 objections, and then I will ask if there is an abstentions. Are
25 there any objections to this motion? No objections. Are there
26 any abstentions? The hands-up, do you wish to talk, or are you
27 saying that you're abstentions?

28
29 **DR. POWERS:** I am just saying that I abstain.

30
31 **CHAIRMAN POWERS:** Well, yes, and the PIs, I guess as a foregone
32 conclusion, you're abstaining.

33
34 **MR. MATENS:** Dr. Powers, I would really like to see a vote on
35 this.

36
37 **CHAIRMAN POWERS:** I thought we just did that.

38
39 **MR. RINDONE:** That's what this is, Dr. Powers. This is a vote.

40
41 **CHAIRMAN POWERS:** What we have now is no objections of the non-
42 PI members, right now, we have three abstentions, Camp, Judd
43 Curtis, and Doug Gregory.

44
45 **MR. GREGORY:** I'm not abstaining, but I just want to point out
46 that Mary Christman is not online, and so --

47
48 **DR. CHRISTMAN:** Yes, I am.

1
2 **MR. GREGORY:** Am I wrong?
3
4 **DR. CHRISTMAN:** I'm online.
5
6 **MR. GREGORY:** Okay. I'm sorry.
7
8 **DR. CHRISTMAN:** You just didn't see my name.
9
10 **CHAIRMAN POWERS:** All right.
11
12 **MR. MATENS:** I'm sorry, Dr. Powers, but I really object. I
13 really wanted to see a vote on this.
14
15 **CHAIRMAN POWERS:** I will defer to Ryan, but I considered this to
16 be a vote.
17
18 **MR. RINDONE:** Dr. Powers, this is a vote, but it would be
19 helpful though if those that are abstaining could say so. I
20 think, so far, we have Sean and Judd as saying that they
21 abstain, just since the other two -- If there are no objections,
22 then those persons would be in favor, and, if there are
23 abstentions, then those persons should be identified as such.
24
25 **DR. LORENZEN:** I thought we had established that the PIs
26 abstained, by definition, and so there would be -- Either we
27 have that as a statement upfront or we have to list all the PIs
28 as abstaining, I guess.
29
30 **MR. RINDONE:** There were only five of them, and we've heard from
31 two of them so far, and I believe the rest of them to also be on
32 right now. I think Dr. Leaf has his hand up as well.
33
34 **DR. LEAF:** Only to the fact that -- Kai just stated it quite
35 well, and so a blanket abstention or individual recognition,
36 either one.
37
38 **MR. RINDONE:** The only other two people to whom that statement
39 prior applied to were Will and Steven Scyphers.
40
41 **CHAIRMAN POWERS:** Okay. **My understanding is that the motion has**
42 **passed.** Do others wish to be recognized? Camp, do you wish to
43 be recognized?
44
45 **MR. MATENS:** Dr. Powers, thank you. Yes, I do. I really would
46 have liked to see a vote on this, and my vote would have been
47 no. However, since we've gone as far as we've gone, I wish to
48 be put in the abstain bracket.

1
2 **CHAIRMAN POWERS:** Well, no. If you said you voted no, then --

3
4 **MR. MATENS:** No, I didn't say that. I never got a chance to
5 vote no.

6
7 **CHAIRMAN POWERS:** I asked if there were any objections to this
8 motion.

9
10 **MR. MATENS:** Well, I'm not asking to move this back, and maybe I
11 just wasn't paying attention. However, my vote would have been
12 no, but, since we are where we are, I want to be in the abstain
13 category. Is that okay?

14
15 **CHAIRMAN POWERS:** I want you to vote however you want to vote,
16 either abstention, no, or yes.

17
18 **MR. MATENS:** In that case, sir, I vote no.

19
20 **CHAIRMAN POWERS:** Okay. Thank you.

21
22 **DR. LORENZEN:** We should record that, that it carried with one
23 objection.

24
25 **CHAIRMAN POWERS:** Yes. All right. Thank you. Ryan, did you
26 have anything to interject, procedurally, at this point?

27
28 **MR. RINDONE:** Just that the vote had actually already concluded,
29 but, if the vote is going to be recorded as it is, then we'll
30 record it carried as twenty-one-to-one with five abstentions,
31 and so this vote is concluded.

32
33 At this point, also, this would conclude the peer review portion
34 of the Great Red Snapper Count, insofar as that relates to the
35 participation of the independent consultants. Their
36 participation, formally, at this point, would be over. If they
37 feel like sticking around, they are more than welcome to do so.
38 I believe that Dr. Frazer had something that he wanted to add.

39
40 **DR. FRAZER:** Thanks, Ryan. I just wanted to extend a thank you
41 to all of the people that participated in this discussion,
42 including all the members of the Great Red Snapper Count, the
43 investigators there, the three reviewers, our independent
44 consultants, as well as all of the members of the SSC.

45
46 It was a very, very important discussion, and I appreciate the
47 constructive comments that were provided, and so, as was pointed
48 out, this work will certainly be of value in the longer term,

1 but it also has utility in the short term, and so, again, I
2 appreciate people recognizing that, and I'm sure that all of the
3 stakeholders that are involved as well, and are participating
4 and listening in, appreciate your efforts as well, and so I look
5 forward to the next part of the meeting, and I hope you all
6 enjoy your lunch.

7
8 **CHAIRMAN POWERS:** Thank you very much. Will Patterson wanted
9 the floor, recognizing that he's holding up lunch.

10
11 **DR. PATTERSON:** Sorry to hold up lunch. I just think it's
12 important that, in the report for this, the SSC is specific
13 about what they mean by eastern and western Gulf, because we
14 didn't produce eastern and western Gulf estimates in the report.
15 We have state-specific estimates, and so which states do they
16 mean by east versus west I think would be helpful for folks that
17 are trying to interpret the intent of the SSC here.

18
19 **CHAIRMAN POWERS:** Thank you. All right. We are scheduled for
20 an hour for lunch, and I would like to keep it at an hour, at
21 this stage, and so we'll come back at 1:15 Eastern Daylight
22 time, in which case we will initiate the other SSC meeting and
23 begin with that agenda, and so thank you.

24
25 (Whereupon, the meeting recessed for lunch on April 1, 2021.)
26

27 - - -

28
29 April 1, 2021

30
31 THURSDAY AFTERNOON SESSION

32
33 - - -

34
35 The Meeting of the Gulf of Mexico Fishery Management Council
36 Standing and Special Reef Fish and Socioeconomic Scientific and
37 Statistical Committees reconvened via webinar on Thursday
38 afternoon, April 1, 2021, and was called to order by Chairman
39 Joe Powers.

40
41 **CHAIRMAN POWERS:** Good afternoon. This initiates the bonified
42 SSC meeting, and do I have to re-read the verbiage that I
43 typically do at the beginning? If that's the case, I don't have
44 it in front of me right now.

45
46 **MR. RINDONE:** No, Joe. We're good.

47
48 **CHAIRMAN POWERS:** Okay. So the agenda essentially is -- Let me

1 just very quickly go through it. There's Approval of Minutes,
2 Scope of Work, and Ryan will remind us, Selection of the SSC
3 Representative, Review of the Great Red Snapper Count-Informed
4 Catch Analysis from the Center, the Review of the Interim Bottom
5 Longline Analysis from the Center and discussion and basically
6 how we want to integrate that information, followed by Public
7 Comment and Other Business.

8
9 I believe we have more or less agreed to this agenda earlier,
10 but are there any discussions about changing this agenda? I
11 would note one thing. Essentially, what we're being asked for
12 is the catch advice, and so, if we decided to utilize the GRSC-
13 informed catch analysis, after that presentation, then we
14 wouldn't really need to deal with the red snapper interim
15 analysis, because that's sort of an alternative there, but we
16 can cross that bridge when we get there. If there's no
17 objections, then we will consider the agenda as we have it here.
18 The verbatim minutes, any comments about the minutes for the
19 January 5 through 7 meeting?

20
21 **APPROVAL OF VERBATIM MINUTES AND MEETING SUMMARY: JANUARY 5-7,**
22 **2021 WEBINAR MEETING**
23

24 **DR. ANDERSON:** Move we accept.

25
26 **MR. GILL:** Second.

27
28 **CHAIRMAN POWERS:** We have a motion to accept, with a second by
29 Bob Gill. Any objection to approval of the minutes? I will
30 give people plenty of time. All right. Scope of Work, Ryan.

31
32 **SCOPE OF WORK**
33

34 **MR. RINDONE:** Thank you, sir. The scope of work here picks up
35 right here, where it says "SSC Meeting: Review of Red Snapper
36 Catch Analyses", and, of course, we're going to start though
37 with selection of an SSC representative for the April 12 to 15,
38 2021 Gulf Council meeting, which will be held via webinar, and
39 this SSC member will participate by providing information and
40 summary presentations to the council committees and the council
41 and answer any questions and provide insight to the SSC's
42 collective deliberations from this meeting.

43
44 You will also be hitting the highlights of the things that
45 weren't covered from the January 2021 meeting, which I will help
46 you identify, since that wasn't able to be covered during the
47 January council meeting, and, like Dr. Powers said, there's the
48 two catch analyses that have been completed by the Science

1 Center, the one that uses the Great Red Snapper Count and the
2 one that uses the NMFS bottom longline index, and, if the SSC
3 determines that it wants to use the Great Red Snapper Count one,
4 then it need not then review the NMFS bottom longline index.

5
6 The way that these are written in here is with them being
7 reviewed independent of one another and then the SSC making a
8 determination, but it's the SSC's prerogative to make that
9 determination about what they want to do for providing catch
10 recommendations to the council, whenever they want to do it, or
11 whenever you guys want to do it. Then, at the end of the
12 meeting, we'll take public comment, as we've started to make a
13 habitat of doing, and any Other Business items. Mr. Chair.

14
15 **SELECTION OF SSC REPRESENTATIVE FOR THE APRIL 12-15, 2021 GULF**
16 **COUNCIL MEETING**
17

18 **CHAIRMAN POWERS:** Okay. Thank you then. The meeting, I have
19 some conflicts, and it depends on the timing of that meeting,
20 and also the amount of time allotted, and so, at this point, I
21 don't want to make a commitment that I would be the council
22 representative, until I know a little bit more about the agenda,
23 but, in terms of time allocation, Ryan, most of it would be
24 related to this meeting?

25
26 **MR. RINDONE:** Yes, and most of it would occur on Tuesday, April
27 13, during with the Reef Fish Committee would be underway and it
28 would pertain to the review of the Great Red Snapper Count, and
29 I think Jess is pulling the agenda up now. Here we go.

30
31 It will be review of the Great Red Snapper Count project, which
32 is Tab B, Number 6, and it would start there with a presentation
33 and recommendations to convey, and, as background, it would be
34 the SSC summary report, which we are diligently working on, and
35 the final drafts of the independent consultant memos, which they
36 are diligently working on, and those would be provided as
37 background for that item.

38
39 Then you would have the modification of the annual catch limits
40 for Gulf red snapper, which Dr. Froeschke and the IPT are
41 diligently working on, and the SSC would talk about its review
42 of the catch analysis, which, if the SSC were to select say the
43 Great Red Snapper Count catch analysis, it would be that one.

44
45 Then the appropriate catch analysis report would be listed for
46 Tab B-7(a), and then the meeting summary that I mentioned before
47 would be also there for background. Then the last item, as it
48 relates this particular meeting, would be my document, and my

1 IPT's document, which is the modification -- The Gulf of Mexico
2 red snapper data calibration catch limits. You might be asked
3 some questions about that, but you're not asked to present
4 anything there.

5
6 Then you'll have, at the bottom, the remaining items from the
7 January 2021 SSC summary report, and, like I said, I will help
8 you identify -- Whoever it is, I will help you identify what
9 those items are.

10
11 **CHAIRMAN POWERS:** Okay. Let me ask for -- I know this is a moot
12 point, but I will ask for volunteers.

13
14 **DR. LORENZEN:** Joe, as Vice Chair, I would be -- I think maybe
15 we can tackle this together, and we'll see how your plans shake
16 out.

17
18 **CHAIRMAN POWERS:** Most of that Tuesday I think I can be
19 available, but, between the two of us, particularly because
20 there is -- Typically, what happens with these council meetings
21 is you end up having to be there for quite a while, anticipating
22 the schedules, and there's a lot of waiting, standing around
23 waiting, basically, which is sort of dead time. So, between the
24 two of us, I think we can figure something out, if that's all
25 right.

26
27 **MR. RINDONE:** I have no objections.

28
29 **CHAIRMAN POWERS:** Okay. Then let me find my agenda again. We
30 are at the presentations being made by the Center about the
31 GRSC-informed catch analysis, and there was some discussion
32 yesterday, with Carrie and John Walter, about another document,
33 and, between all the other things going on, I haven't seen if
34 it's there or if it's available or what, and I'm not even sure
35 exactly what's in it, but I knew it was supposed to be in the
36 context of this presentation. Can somebody advise me?

37
38 **MR. RINDONE:** Dr. Calay?

39
40 **DR. SHANNON CALAY:** There is a document that John Walter and co-
41 authors have been working on, which will describe our estimates
42 of the proportion of the red snapper stock that is exploitable
43 by the recreational and commercial fisheries. The presentation
44 is still pending internal review by Clay Porch, and so we do
45 expect to turn it in very soon, and it should be available
46 during this meeting.

47
48 **CHAIRMAN POWERS:** I'm not sure how helpful that is at this

1 point, but, anyway, we'll go on. Doug Gregory, do you wish to
2 be recognized?

3
4 **MR. GREGORY:** Thank you. I was just wondering, since the
5 interim index analysis for the bottom longline is the normal way
6 of doing things, and it's going to somehow -- They're not
7 independent thoughts, the two different analyses. Would it make
8 sense to have both presentations before making a decision, like
9 it is written, rather than, as suggested, that, if we like the
10 first one, we skip the second one? That makes me nervous, and
11 it seems to me that the interim analysis, with the index, is so
12 simple that it would be easier to do that one first even.

13
14 **CHAIRMAN POWERS:** I consider both of them pretty simple, but,
15 beyond that, yes, I have no problem with that, and probably,
16 given the breadth of options that we should consider, perhaps
17 that's the best way to go, and I don't have any strong feelings
18 about which to do first.

19
20 **MR. GREGORY:** I don't either, and it was just an idea.

21
22 **CHAIRMAN POWERS:** But I'm quite willing to go along with doing
23 them both. Kai Lorenzen.

24
25 **DR. LORENZEN:** That was my suggestion, too. I think we should
26 have both presentations before we consider where to go, because
27 I think they both provide important information. Thanks.

28
29 **CHAIRMAN POWERS:** All right. Thank you. Just because it was on
30 the schedule at this time, I would like to go ahead and do the
31 GRSC-informed catch analysis red snapper whatever, and I'm not
32 sure -- The presenter is Matt, Dr. Smith.

33
34 **REVIEW OF GRSC-INFORMED CATCH ANALYSIS**

35
36 **DR. MATT SMITH:** Good afternoon. My name is Matt Smith, and I'm
37 an Assessment Scientist from the Gulf and Caribbean Branch at
38 the Southeast Fisheries Science Center. My background, as it
39 pertains to red snapper, for those who don't know me, is that I
40 was one of the lead analysts for the last red snapper
41 assessment, SEDAR 52, and I'm one of the lead analysts working
42 on the upcoming research track assessment for red snapper.

43
44 Because of that, I was tasked with completing most of the
45 technical aspects for this, and, therefore, the presenter
46 responsibilities have fallen to me, but, as is the case with
47 most of the things at the Science Center, this was a group
48 effort, with a lot of people chipping in to try and get the work

1 done in the time that we had available to us.

2
3 Then, I guess, before I get underway with the presentation, I
4 would like to further echo what's already been said by many
5 people and just state how much the Science Center appreciates
6 the efforts of the Great Red Snapper Count PIs and their staff
7 in undertaking and completing a project of this scale, and,
8 further, how much we appreciate the time and effort of the SSC
9 and the review team to dig through all of that material over the
10 last couple of days and work to improve the product and
11 hopefully what we can do with it going forward.

12
13 Like many people at the Center, and around the country, we're
14 extremely excited about the prospects of this study and its
15 ability to improve red snapper management, as well as the
16 management of additional species down the road, as hopefully
17 follow-up studies and additional analyses are conducted. With
18 that, I will get into it.

19
20 I mean, obviously, we've been listening to these discussions for
21 the last two-and-a-half days, and we know why we're here at this
22 point, and that is that the Great Red Snapper Count has changed,
23 in a fundamental way, our understanding of red snapper abundance
24 and distribution and habitat utilization in the Gulf of Mexico,
25 and we're tasked now with trying to determine whether that
26 increase in abundance that was estimated by the Great Red
27 Snapper Count can support additional removals.

28
29 As we're familiar at the SSC, but for those maybe listening in
30 who aren't, the catch advice, in these situations, would
31 typically be determined through a full stock assessment, like
32 the upcoming research track that I mentioned. However, that is
33 just getting underway, and it's not scheduled to be completed
34 until probably the 2023 fishing season, at the earliest, and so
35 there wasn't time, obviously, to do all of that work before
36 2021, where we're trying to provide advice right now.

37
38 Clearly, red snapper is socially and economically important to
39 the Gulf, as are other fisheries, but this one kind of stands
40 head and shoulders above the rest, and it warranted at least
41 taking a crack at an interim approach to provide possible
42 alternatives for the 2021 and 2022 fishing seasons.

43
44 I put this slide together, and this is a kind of brief synopsis
45 of red snapper history, and, again, most of us are familiar with
46 this, but I thought it was a good place to start the discussion,
47 and these are model-derived outputs from SEDAR 52, which was the
48 last stock assessment that was done for red snapper, and, if we

1 start on the left, it's showing dead numbers of fish, and these
2 are age-zero-plus fish, and I will explain why I put the zeroes
3 in there in a bit.

4
5 The middle is dead biomass, in millions of pounds, and the right
6 is the spawning potential ratio trajectory for the stock, and so
7 what we can clearly see, if we start at the right, is that this
8 stock was believed to be heavily overfished back in the 1980s,
9 1990s, and 2000s, and it has rebuilt quickly in recent years,
10 thanks to diligent management and catch restrictions that have
11 been put into place.

12
13 If we look to the middle, we can get a sense of the removals
14 that were taking place at the time when the stock was dropping
15 so precipitously, and they were estimated to be at around
16 fifteen million pounds, and I don't put this in here to try to
17 establish that as a cap for what is sustainable for the stock,
18 because we know a large number of things have changed since that
19 time period, for example the artificial reef proliferation, the
20 rebuilding of spawning stock biomass that's been taking place
21 recently, in terms of more larger and older fish being available
22 to produce, presumably, more eggs, and then the other thing is a
23 large reduction in the shrimp fishery effort.

24
25 Then, if we go to the left panel, where I have the numbers,
26 that's why I decided to include the zeroes and the ones in this
27 figure, and it's just to illustrate the effect that the model
28 sees of that shrimp fleet, specifically in the western Gulf of
29 Mexico, in terms of removing a large number of young-of-the-year
30 fish, historically, and those removals have gone quite a bit
31 down with the reduction in effort from the fishery.

32
33 This is just to kind of establish where we're at, in terms of
34 the modeling thinking and what got us to this point, and not
35 necessarily to draw a baseline of what could be removed, but
36 just to reiterate the fact that we all know that this stock,
37 especially over the fishing grounds, can be severely depleted,
38 and we know that because it has been in the past, and so
39 appropriate caution is needed going forward, unless we want to
40 end up with a situation where we have very low CPUEs in the
41 places that people are accustomed to fishing.

42
43 As I was saying, the last accepted assessment was SEDAR 52, and
44 this was a standard stock assessment, which means, for those not
45 familiar with the lingo, that we did not do a full benchmark,
46 and we did not reinvestigate everything, but that we were
47 allowed to make certain changes, through a review process to the
48 assessment framework. It had a terminal data year of 2016, and

1 it was finished in 2018, and, at that time, it estimated that
2 the stock was not overfished, not overfishing, still undergoing
3 rebuilding, and it had an SPR of about 18 percent.

4
5 The projections for SEDAR 52 started in 2019, because that was
6 the year that we were aiming to give catch advice for, and OFL
7 was based off of a projection of the fishing mortality that
8 results in a 26 percent SPR at equilibrium, or F SPR 26 percent,
9 and the ABC was based off of a rebuilding projection, because,
10 as I stated earlier, we were still in a rebuilding plan for
11 this, and a P^* of 0.4, where F rebuild is the F resulting in a
12 26 percent SPR in 2032.

13
14 The model estimated an abundance, in 2017, of roughly forty-one
15 million age-two-plus fish, which, as we now are all acutely
16 aware is quite different from the Great Red Snapper Count
17 result, and the OFL and ABC were based on three-year averages,
18 the 2019 through 2021 catch advice, and came out to 15.5 million
19 pounds and 15.1 million pounds, respectively.

20
21 As we are all now very aware, the Great Red Snapper Count has
22 estimated a very different abundance and distribution of red
23 snapper than SEDAR 52 did, first and foremost, just in the sheer
24 number of two-plus fish, with 110 million compared to that
25 roughly forty to forty-one million in 2017 for SEDAR 52, but,
26 also, and this has been talked about a bit by people during the
27 previous couple of days, the distribution of the abundance of
28 those age-two-plus fish, where the Great Red Snapper Count had
29 estimated a roughly equal proportion east to west, and SEDAR 52
30 was putting the majority of these fish into the western Gulf of
31 Mexico. I believe it was also mentioned that these values skew
32 even more west if we look at biomass, because of the larger size
33 of fish, in general, in the western Gulf of Mexico.

34
35 The other thing, which, again, has been talked before, is that
36 the SEDAR 52 results are based on data collected mainly from the
37 current fishing grounds, and so, when we conduct a stock
38 assessment, we feed it landings information, which are,
39 obviously, fishery dependent, and we feed it composition data.

40
41 For most part, those composition data are taken from catch from
42 the fishery, and we feed it indices of abundance, among other
43 things, and those indices sometimes are fishery-dependent
44 entirely, and, other times, they are fishery-independent, and we
45 do have several independent indices, as was pointed out, that
46 cover large portions of the Gulf, including areas of
47 uncharacterized bottom, but they are evenly weighted and mixed
48 in with data that is almost exclusively, except for those

1 indices, taken from the fishery.

2
3 The model appears to be doing a decent job of modeling the data
4 it's given and the data that is derived from the fishery and the
5 fishing counts, and so what we're really left with, and this is
6 where we've all been heading with the last couple of days, is
7 can that additional abundance estimated from the Great Red
8 Snapper Count over structure, as well as artificial reefs and
9 whatnot, but, predominantly, we're talking about that abundance
10 over the uncharacterized, or unconsolidated, bottom, and can
11 that support more yield in the fishing grounds, and that's a
12 very difficult question to answer.

13
14 The Science Center was asked to provide some interim catch
15 advice, using those new abundance estimates, as well as the
16 traditional approach to be considered for catch advice in 2021.

17
18 The general approach that we took, that we laid out through
19 discussions with the SSC and council staff, was to basically use
20 most of the information in SEDAR 52, because that is the most
21 recent information that we have, and take the Great Red Snapper
22 Count numbers and basically use them instead of the numbers
23 estimated in SEDAR 52.

24
25 Once we started down that path, we quickly realized that the Fs,
26 and I'm sure there will still be discussion about this going
27 forward, but the fishing mortality rates estimated in SEDAR 52
28 were not directly applicable to the Great Red Snapper Count
29 numbers, and so, at that point, we set about to undertake some
30 spreadsheet projections, because we didn't have the SS framework
31 fully integrated and functional to conduct the projections
32 within in, and so we did some simple spreadsheet projections to
33 try to re-estimate those F at-age by region, to more
34 appropriately represent what would be seen with the different
35 abundance and distribution estimates that the Great Red Snapper
36 Count produced.

37
38 Once we had those key pieces, producing the catch advice was as
39 simple as using numbers-at-age, the F at-age, and a mean landed
40 weight to come up with catch.

41
42 The first thing we're going to get to, and Clay Porch alluded to
43 this when he chimed in a little earlier, was that we view what
44 we have done here today as a tool that the SSC can use, and we
45 do provide some specific advice at the end, but it's entirely
46 possible that you will want to see different variations of this
47 advice put together, and we are prepared to accommodate those,
48 as the requests are made, and hopefully do so in a short amount

1 of time.

2
3 The three main levers in the way this is set up that the SSC can
4 adjust to come up with catch advice are the numbers that go into
5 the equations, the F that goes into the equations, and then, as
6 we get further along, if we're going to consider variability,
7 which I know is a heated topic, we can also adjust the
8 variability in sort of the P^* approach that we're familiar with,
9 in terms of the ABC control rules we use in traditional stock
10 assessments.

11
12 The first thing we're looking at here is the approach that we
13 took to coming up with different ways of subsetting the numbers
14 from the Great Red Snapper Count, and we did that under a basic
15 premise that all the red snapper in the Gulf, which is
16 presumably what our absolute abundance represents, are not
17 equally vulnerable to the fisheries, and, if only a subset of
18 those are vulnerable to fishing, setting catch levels on the
19 total abundance estimate would likely lead to localized
20 depletion on the fishing grounds, and, based on some of the
21 things that I've heard discussed already, there is evidence that
22 some of that localized depletion is already taking place in
23 areas around the Panhandle or nearshore in Alabama, where people
24 are having to go further offshore to find fish, and so I don't
25 think it's an unreasonable assumption.

26
27 Rather than test every possible variation, because we did not
28 have time to do that, and it was just kind of a futile effort,
29 we set about putting together a few subsets of numbers to
30 demonstrate this process, and then, like I said, we'll be ready
31 to respond to requests for different subsets from the SSC.

32
33 Those initial subsets were looking at only the fish over
34 structure, and so this is all fish over artificial reef, natural
35 reef, and pipeline, and then all those fish in the structure,
36 with additional fish added from the uncharacterized bottom, and,
37 here, we used 15 percent, and this number was selected basically
38 as an arbitrary value.

39
40 At the time, there wasn't anything to support it. Since then,
41 and ongoing now, which is the basis of the material that John
42 Walter was hoping to present, is our efforts to add some
43 additional science to the selection of that percent of
44 uncharacterized bottom, but, for this demonstration, we used 15
45 percent. Then we also did all of the numbers produced by the
46 Great Red Snapper Count.

47
48 Then, just for comparison, the SEDAR 52 values are also

1 presented in this table, on the far-right, with the breakdown by
2 the east and west, and then the percent change, here at the
3 bottom, is the difference between the total for a given subset
4 and the SEDAR 52 total value, and, again, as I believe Kai
5 pointed out earlier, these are very close, but this might just
6 be a coincidence.

7
8 I wouldn't take how close this is, the 2.3 percent difference
9 between SEDAR 52 and the all-structure, as proof that the SEDAR
10 52 estimate is perfectly capturing the same number of fish that
11 the Great Red Snapper Count covered over structure. This is
12 just to give you an idea of the magnitude of the differences
13 between the estimates.

14
15 Then, further, as we started putting this presentation together,
16 we wanted to have an understanding of what those subsets
17 represented, in terms of whether they were plausible proportions
18 for vulnerable biomass in the Gulf, and, when we looked at the
19 different subsets and what percent of the total they
20 represented, the all-structure subset represented about 38
21 percent of the total, and the all-structure-plus subset, which,
22 again, includes that 15 percent uncharacterized bottom, was
23 about 47 percent of the total.

24
25 The next couple of slides are sort of a teaser of John's
26 presentation, because, when I put this together, we did not have
27 his material, and we weren't sure he was going to get it, and I
28 guess, at this point, we're still not sure that he's going to
29 present it, but, if he does, you'll see more of what you're
30 looking at right now, and these are very preliminary analyses.

31
32 They're coming out from research projects being conducted by
33 Chris Gardner and John Walter and Mandy Karnauskas and myself,
34 and Larry Perruso and others, I believe, where we're attempting
35 to explore, initially, commercial exploitation in the Gulf, and
36 we did that using the VMS data, which is the vessel monitoring
37 system data that tracks where these vessels are operating, and
38 the TIP landing data, which we can map to those vessels and
39 those trips to assign landings to grids in the Gulf of Mexico,
40 and that's basically what you're seeing in the plot down on the
41 left.

42
43 These are ten-by-ten-kilometer grids, where the commercial
44 landings have been mapped to those grids and the intensity, with
45 red being the most intense and then fading down to blue being
46 the least intense.

47
48 Then, using that mapping of those landings, we can estimate a

1 harvest rate for the commercial fleet by dividing those landings
2 by the biomass per grid, and that's based off of the Karnauskas
3 et al. 2017 biomass distribution maps. In doing so, we come up
4 with this plot here, this histogram in the top-right, which is
5 showing fraction of the biomass targeted and the level of
6 fishing pressure, and the level of fishing pressure here is just
7 rough quantiles breaking it up.

8
9 When we look at that, what we can see is that, for the
10 commercial fishery, roughly 20 to 25 percent of the biomass is
11 not targeted at all in a given year. Further, 40 to 45 percent
12 experiences only very light fishing pressure, and then the
13 remainder is what's really being targeted by those fleets.

14
15 The question then becomes that's useful, but it tells us nothing
16 about the recreational fleet, and that's really what we've been
17 struggling with for the last couple of days, and hopefully we'll
18 have a present to you more completely at the conclusion of my
19 presentation, but, for this, when we put this slide together, we
20 just had to make a couple of assumptions about the recreational
21 fleet, because there was no VMS equivalent for them, and that is
22 that a significant amount of the biomass is estimated to be
23 greater than forty nautical miles offshore, and we can see that
24 in the graph to the left.

25
26 Those black lines around the coast represent twenty and forty-
27 nautical-mile delineations, and then the biomass here -- Rather
28 than the catch in the previous slide, this is biomass, and it's
29 shown with the color gradient, and so those areas, and I believe
30 this was pointed out earlier, along the West Florida Shelf,
31 where the distribution map suggests there's a large amount of
32 biomass off by the shelf break, which is a long way for
33 recreational anglers to go.

34
35 We assumed that the proportional vulnerable to the recreational
36 fleet was less than or equal to the commercial fleet, and so
37 between 40 to 70 percent of the stock would experience little to
38 no fishing pressure in a given year.

39
40 Then, if 40 to 70 percent is assumed to experience little to no
41 pressure, the remaining 30 to 60 percent of the stock is
42 probably actively exploited by the fishery in any given year,
43 and so, as I said at the start of this, the all-structure
44 subset, which was about 38 percent of the stock, therefore could
45 represent a reasonable proxy for the lower end of the vulnerable
46 biomass, and the all-structure-plus, around 47 percent, could
47 represent a reasonable proxy for the average vulnerable biomass.
48 Then, obviously, runs utilizing any proportion of the

1 uncharacterized fish can be completed upon request, and we are
2 ready to do so, if needed.

3
4 Once we had the subsets broken down, we were left with numbers
5 of age-two-plus fish. To use the method we proposed, we needed
6 to have a vector of numbers-at-age. To do that, we used
7 composition data from SEDAR 52 to construct age frequency
8 distributions for age-two-plus fish and used those age frequency
9 distributions to divide the numbers of age-two-plus fish down by
10 region, and, when I say, region, we were working on the rough
11 east/west breakdown in SEDAR 52, and so, here, we took Great Red
12 Snapper Count numbers from Florida, Mississippi, and Alabama and
13 assigned them to the east and then Texas and Louisiana and
14 assigned them to the west.

15
16 2016 was selected because it's the last year in the assessment
17 which is fully informed by data. Other years, obviously, would
18 have the assumptions of the projections and the constant
19 recruitment, therein contributing to the age composition, and so
20 we opted to go with 2016, because it was the last fully-informed
21 data year.

22
23 Once we take those AFDs and multiply it by subset to the Great
24 Red Snapper Count numbers, we get vectors of Great Red Snapper
25 Count numbers-at-age, and those are just shown here in a
26 somewhat truncated form. The important thing to take away from
27 this slide is that the way we set up our projections was to use
28 age-two as the recruitment and have those be fixed throughout
29 the projection, and so the selection of the age frequency
30 distribution also informed the recruitment for our projections.
31 These values here for age-two, for the different subsets, would
32 be fixed in the spreadsheet projections that we did going
33 forward.

34
35 This is just a follow-up on that. Again, here, this is showing,
36 specifically, the numbers used for recruitment by region, for
37 the three different subsets we talked about, and then SEDAR 52,
38 presented for reference. The recruitment is quite different in
39 these, and that's a result of where the biomass is being placed
40 by the two different approaches, the Great Red Snapper Count and
41 SEDAR 52.

42
43 SEDAR 52 also skews west, likely due to the shrimp bycatch
44 that's experienced there on the young-of-the-year fish, and so
45 it needs to generate more fish over there to accommodate them
46 being removed by the shrimp trawls, and that's basically it for
47 recruitment.

1 The next thing was getting at those different fishing mortality
2 rates. To do that -- In our spreadsheet projections, we're,
3 obviously, projecting to SPR-based reference points. If you
4 project to an SPR-based reference point, we need an estimate of
5 SSB0, and we went about getting that in a couple of ways. The
6 one that I am talking about here is we took the SSB in 2019, and
7 that SSB in 2019 is based on Great Red Snapper Count numbers,
8 and we did that using the fecundity and maturity vectors from
9 the SEDAR 52 and the numbers-at-age from the Great Red Snapper
10 Count and summed those up across all ages, to get an SSB in
11 2019, and then we took the estimate of SPR in 2019 from SEDAR
12 52, and we did a little simple math, and we used that to get an
13 estimate of SSB0.

14
15 In internal review, it was brought up by Dr. Porch that another
16 way of doing this would be to conduct the projections at a F
17 equals zero, at F zero, and so those were undertaken as well,
18 and the two produced very similar results, and, so rather than
19 redo all of our analyses and tables, we went with what has been
20 presented here, but we did try that multiple ways, and we got
21 similar results that came us some confidence in the approach.

22
23 With the fishing mortality rates, obviously, the Fs would
24 normally be derived from a fully-updated assessment model, and
25 we could not update SEDAR 52, for the purpose of this analysis,
26 for a number of reasons.

27
28 SEDAR 52, regardless of the Great Red Snapper Count, is out-of-
29 date at this point, and I have listed a few of those reasons
30 here, but there are others, and those are the fact that it still
31 uses the Coastal Household Telephone Survey recreational
32 landings, rather than the Fishery Effort Survey, which is a big
33 change, and it also uses the Hoenig M, and it's been discussed
34 that updating to the Then M might be a preferable way to go, and
35 then discard mortality rates, which is an issue that is
36 discussed every time we have an assessment, are still reflective
37 of older data and don't take into account some more recent
38 studies that look at depredation, among other things, that may
39 result in higher discard mortality than previously assumed.

40
41 To update that assessment, and make it meaningful and robust, it
42 would have required adjusting all of these things, as well as
43 incorporating the Great Red Snapper Count, into the assessment
44 model, and we would have done all of that without the
45 transparency and review that is typically associated with the
46 SEDAR process, and so, that being the case, it seems
47 inappropriate to even really attempt it at this stage, because
48 we would be putting an air of scientific rigor on a product that

1 had not been subjected to the appropriate levels of review.

2
3 That being the case, we went ahead with the spreadsheet
4 projections, because the differences, as I said earlier, between
5 the Great Red Snapper Count overall abundance, as well as the
6 distribution between the east and the west, necessitated that
7 something be done to re-estimate the fishing mortality rates,
8 and doing these projections also allowed us to explore different
9 reference points, which is another area that we can talk about
10 further, and we will.

11
12 These projections were completed using the Great Red Snapper
13 Count numbers-at-age. Then, from SEDAR 52, we took all of the
14 life history information, the selectivity, and the retention
15 relationships from the fleets, and we used the relative Fs for
16 the directed fleets and the absolute Fs for the discard and
17 bycatch fleets. Here, when I say Fs, I'm talking about the
18 instantaneous apical Fs.

19
20 We used the absolute values for the discard and bycatch fleets,
21 because of the same general approach we take in projections for
22 full assessments, where we are fixing those values throughout
23 the course of the projections, and, as I said earlier, since we
24 had this projection framework, then we could explore other
25 possible reference points, and we did projections at F SPR 26
26 percent, because that's the current reference point on the
27 books, and then we also looked at F SPR 40 percent, to provide
28 some contrast and a discussion starting point for the SSC.

29
30 40 percent was selected based on basically information from the
31 Harford et al. study, as well as the things that Dr. Porch
32 mentioned earlier in regard to how the abundance from the Great
33 Red Snapper Count changes our perception of productivity in the
34 stock.

35
36 We don't have to linger on this slide very long, because it's
37 just a lot of numbers, but it's put in here I guess for
38 reference, and, like I said, we used the SEDAR 52 fleet-specific
39 relative Fs as starting points for the directed fleets, and then
40 we adjusted those up or down to achieve the SPR targets in
41 equilibrium, through our projections.

42
43 The other thing to mention here, because I don't think I
44 mentioned it anywhere else, is, in the lead-up for this
45 presentation, one of the things that we were trying to
46 understand is how influential the relative nature of these Fs
47 from SEDAR 52 was in the results in our projections, and so we
48 did a number of sensitivity runs, where we maintained the

1 overall magnitude of the Fs, but we redistributed them, such
2 that we had runs where the allocation from commercial and
3 recreational was 50/50, as well as more towards the
4 recreational, and so a 75 percent allocation to the rec and 25
5 to commercial.

6
7 We also did runs where we balanced the east and west components
8 of each component fleet, and so, for example, handline east and
9 handline west would be given the same F that summed up to
10 whatever their original F was, to look for how differences east
11 and west might impact their results, and we found the results
12 from the projections to be fairly robust to different
13 sensitivities around those Fs, and we can talk about more
14 details there, if needed, but I just wanted to mention that that
15 was something we explored.

16
17 With the relative relationship between those Fs fixed, we used
18 the projections to adjust the overall magnitude of them, and we
19 obtained, through those estimates, an F at-age vector for each
20 fleet, and then catch was calculated just using Baranov's catch
21 equation, with the estimates of F-at-age, M-at-age, Great Red
22 Snapper Count numbers-at-age, and mean landed weight-by-age.

23
24 These are the results from those runs up here on the screen now,
25 and all of the scenarios tested produced increased catch advice
26 relative to current management. The percent change in the
27 advice, obviously, varies, depending on the reference point and
28 the subset of the overall data selected, and these catches are
29 landings and dead discards, but they do not include B2s, the
30 fish released alive and then presumed to -- Some fraction of
31 that is discard mortality.

32
33 Obviously, from looking at this, we can see that there's a wide
34 array of possible results that come out of these projections.
35 When we take the grand total, which is all 110 million fish, as
36 being vulnerable to the fishery, it suggests that OFLs could be
37 as high as fifty-four to fifty-five million pounds, if we look
38 at the F SPR 26 percent results from that, and that is part of
39 why I opened the presentation with those slides looking at the
40 history of the stock and how it has been depleted in the past
41 over the local fishing zones and the fishing areas.

42
43 That's a big number, as I'm sure everybody is aware, relative to
44 where we are now, and I have the current ABC at the bottom of
45 this and the percent increase of the five-year average relative
46 to that ABC. That represents a big step up, and, with the
47 uncertainty around the Great Red Snapper Count, as well as the
48 limitations of the projections that we're capable of doing

1 today, the Science Center cannot really say, at this point,
2 whether we even know that to be biologically sustainable or not.

3
4 We believe it's likely not economically sustainable, or
5 sustainable for those fleets operating over the fishing grounds,
6 and it would more than likely result in localized depletion in
7 those areas, but we also, due to the limitations, can't say
8 whether or not that's even biologically sustainable right now,
9 but it is what it is, and that's not for me to decide. It's for
10 me to present you the options and the flexibility to see
11 different runs, if you desire to see them, and to help you reach
12 a decision, if one can be reached.

13
14 Since these numbers represent basically examples, and they could
15 also be selected as alternatives, if you choose so, but they're
16 mainly as examples, and I won't linger on them too much longer.
17 Just a couple more slides to review, some of the key assumptions
18 and then some of the discussion points before turning it over to
19 the committee.

20
21 The key assumptions were the rates assumed in SEDAR 52, and this
22 is natural mortality, fecundity, and maturity, selectivity,
23 retention, and weight-at-age, are appropriate, irrespective of
24 the total abundance. That using the relative allocation of F
25 across fleets, rather than the apical Fs estimated in SEDAR 52
26 was appropriate. Estimated depletion levels in 2019 was
27 appropriate for setting that SSB0.

28
29 The SEDAR 52 estimates of age composition by region represent
30 true age composition, and that recruitment and SSB0 estimates
31 are derived solely from the abundance subsets, and what I mean
32 there is that we did not try any situations where we had only
33 the all-structure, for example, being vulnerable to the fishery,
34 but we have all 110 million fish contributing to recruitment,
35 and so we did not assume any scenarios where there was
36 connectivity or contributions from the cryptic biomass that
37 we've been talking to. Everything was either available to be
38 vulnerable and providing recruits or it was not.

39
40 I believe this is my last slide, but these are some discussion
41 points that internally at the Science Center, and I'm sure that
42 most of you have come to these conclusions yourself as well, but
43 that we felt were important places for the SSC to focus some
44 energy.

45
46 The first, which we've done for the last two-and-a-half, almost
47 three, days now, was to come to the results of whether the Great
48 Red Snapper Count was appropriate, because everything we've

1 talked about, and everything we'll do going forward, is
2 contingent upon those results being accepted.

3
4 The process, like I said, used to create this catch advice is
5 flexible. The percent of exploitable population can be changed,
6 and other reference points can be used, and so those are places
7 to discuss.

8
9 Then OFL, we feel, has to be based on F SPR 26 percent, because
10 that's the reference point that's on the books. However, ABC
11 could be calculated using a different reference point, a
12 different subset of the Great Red Snapper Count numbers, or a P*
13 approach. If a P*-type approach would be taken, we would need
14 to specify the P* as well as the variance. If those two were
15 decided, the Science Center could produce the results in a
16 relatively short amount of time.

17
18 With that, I will leave you to your work. Thank you for your
19 attention, and myself, as well as numerous members of the staff,
20 are available to field questions that may come up, and so thank
21 you very much.

22
23 **CHAIRMAN POWERS:** Thank you, Matt. We'll open it up for
24 comments and questions, and I am going to take the prerogative
25 to initiate that. One of the things that we have to make clear
26 to ourselves, and others, is, in my mind, accepting the Great
27 Red Snapper Count abundance estimate is basically telling us
28 that the stock assessment that we have -- That it's hard to
29 interpret things in terms of the stock assessment we have.

30
31 We really can't tell, at this point, if we implemented those
32 counts, whether the stock is overfished or underfished, and, in
33 particular, the reference point that's on the books as a proxy
34 for FMSY, which is a proxy for the overfishing limit, is F 26
35 percent SPR, and my guess is that, at the end of the day, you
36 will end up with something different, but, at this point, we
37 really don't know what the OFL is.

38
39 Probably, more importantly, when you establish -- When you are
40 trying to estimate that, that really depends on the selectivity,
41 which depends on the selectivity that's being assigned for the
42 large abundance of the uncharacterized bottom, and so there's
43 lots of uncertainty there, and I guess my initial reaction is
44 the advice is essentially somewhere between fifteen million and
45 fifty million.

46
47 If one just took the current ABC of fifteen million, the red
48 snapper catch from the count is three-times what you had before.

1 If you multiply fifteen by three, you would say that the catch
2 level ought to be somewhere between fifteen and forty-five, and
3 so, in a sense, we're -- A much simpler approach is giving you
4 the same answer, and I would argue that it's probably equally
5 reliable.

6
7 The guidance of this, and I think it's important to begin to
8 understand the whole issue of management of the unclassified
9 bottom versus management of the traditional fishing areas, and I
10 think that's really important, but, in terms of where we pick
11 amongst that continuum, there hasn't been, in my mind, a lot of
12 structure to how we might proceed with this, and that's the
13 difficulty we have.

14
15 I would also turn things around and say, if I were on the
16 council, in a better world, I suppose, my reaction to this would
17 be, all right, we need to allow some increase in catch in the
18 traditional areas, and probably allow some experimental
19 increases in catch in the non-traditional areas, and kind of
20 proceed in a precautionary sort of approach like that, and how
21 that could be actually implemented, I kind of doubt if it could
22 be done within a single year, but, to me, that's the way that
23 one should react to this sort of information.

24
25 One other thing is that, as we go through this process, I will
26 not be supporting any recommendation of catches beyond 2021,
27 because it seems to me that we are being asked to develop some
28 ad hoc sorts of procedures, based on preliminary information,
29 and the actual process of doing that will end up being fairly
30 simple, one way or another, and so, for us to pretend like we
31 know what's going to happen in 2022, when likely we're going to
32 have more information, then it seems to me that we shouldn't be
33 delving into 2022, and so that's going to be my position
34 throughout, and so that's my starting point for discussions, and
35 Bob Gill wishes to be recognized, and I will give the floor to
36 him. Bob.

37
38 **MR. GILL:** Thank you, Mr. Chairman. I will address your last
39 comment before I get to what I really wanted to talk about, and
40 that is, if we choose an ABC for 2021, that one is going to
41 remain there until it gets changed in the future, and so,
42 effectively, it's constant catch advice out into the future,
43 however long that is, until we change it.

44
45 **CHAIRMAN POWERS:** Well, what I'm implying is, if in fact the
46 Great Red Snapper Count is evolving, we will have more
47 information a year from now. If the council wants to keep it at
48 that level, feel free, but my advice is that we should be only

1 making recommendations for one year, and one year only, and not
2 carrying it over.

3
4 **MR. GILL:** Thank you, Mr. Chairman. My comment is directed to
5 Matt, and thank you, Matt, for your crystal-clear presentation,
6 as always. I wanted to get a little more lucidity on the quick
7 turnaround. If we provided, for example, an abundance from the
8 GRSC study different than the ones that you used, what kind of
9 timeframe are you really talking? Today has roughly three hours
10 left, and we have tomorrow, and, at some point, we say, okay,
11 here's where we're at. We're talking a matter of hours, in
12 terms of needing to know an answer and get to a solution, and so
13 could you put a little harder timeframe than merely a quick
14 turnaround? Thank you.

15
16 **DR. SMITH:** Sure. I will respond to that, if I can. The
17 spreadsheet itself is set up to adjust certain inputs very
18 quickly and very easily, and so, depending on what is requested
19 by the SSC, I could probably turn around results for different
20 scenarios in five to ten minutes a scenario, and, again, it
21 depends on exactly what you're asking for. If you're looking
22 for different sensitivities on age composition used for the age
23 frequency distributions or different sensitivities on the
24 relative Fs, those might take a little longer.

25
26 Making adjustments to the numbers of red snapper at the start,
27 and so like different percentages of the uncharacterized bottom,
28 that's very straightforward and quick. Different reference
29 points is also very straightforward and quick, and so, depending
30 on the complexity of the requests, they could be turned around
31 very quickly, and I mean very quickly. Other ones might take a
32 little longer, but nothing that involved.

33
34 **MR. GILL:** Thank you, Matt. That's very helpful.

35
36 **CHAIRMAN POWERS:** Doug Gregory.

37
38 **MR. GREGORY:** Thank you. Matt, that was very good. My question
39 is -- Hopefully it make sense. With the all-structure-plus,
40 and, obviously, grand total, those increased catches, is the
41 premise that the fishery will expand into areas they're not
42 currently fishing or that the exchange rate between the cryptic
43 areas and the fished areas will increase, or none of that?
44 Thank you.

45
46 **DR. SMITH:** As of right now, there are no explicit assumptions
47 about the fleets expanding, or anything of that nature, and
48 certainly that comes into whether or not those catch levels are

1 going to be sustainable in the long run.

2
3 As they get higher and higher, you would presume the fleet would
4 have to expand into different areas, in order to sustain
5 reasonably high CPUEs, and there is some evidence to suggest
6 that, potentially in places like the West Florida Shelf, which I
7 think we've talked about kind of getting repopulated, that there
8 are grounds and areas there that are not exploited at levels
9 that other areas are, and they certainly could sustain
10 additional removals from the commercial fleet, specifically, or
11 the recreational also, but it's just they're further offshore.

12
13 In the analyses that you're looking at, there is no explicit
14 assumptions about fleet movement, but it's certainly part of the
15 conversation, and coming up with whether or not those may or may
16 not be sustainable for the next year, or two years, until we get
17 the research track assessment done.

18
19 **MR. GREGORY:** My other question is, given this extra biomass,
20 does that inform any of the historical trends in recruitment
21 that we otherwise might have been perplexed about? I know we've
22 had a high steepness, which is not that unusual, but it seems
23 like we should have, I guess, a more steady recruitment than we
24 otherwise would have thought.

25
26 **DR. SMITH:** The recruitment issue is a complicated one, for a
27 number of reasons. I agree with you that, if there was a large
28 cryptic biomass offshore that was not targeted, you would
29 presume that they were supplying larvae to areas and recruits to
30 areas inshore that would then turn into harvestable fish.

31
32 One of the issues at play with recruitment is some of the work
33 that was done by Mandy Karnauskas, and she has provided it to us
34 in support of the research track, that looks at where recruits
35 go, based on some oceanographic modeling, and it suggests that,
36 by and large, and I think I put this graphic in the report, but,
37 by and large, that most of the recruitment is local, such that
38 fish that spawn off of Texas -- That most of those recruits end
39 up in Texas, and the same for Louisiana, Alabama, Mississippi,
40 and Florida.

41
42 We run into the potential problem of relying on sort of cryptic
43 biomass sources of recruits, in that those animals might not be
44 in a spot where their larvae are going to necessarily reach the
45 areas where the fisheries are operating, and it's a complicated
46 question to deal with.

47
48 I am getting notice that John is ready to present his

1 information, if the Chair thinks it would be useful. His
2 information, again, pertains to the 15 percent and coming up
3 with a more scientifically-defensible value to use there,
4 instead of 15 percent, that he is ready and willing to present
5 that, if you think it's useful, and I will stop there.

6
7 **CHAIRMAN POWERS:** Thank you, but I want to go through the first
8 round of comments and questions. Kai Lorenzen.

9
10 **DR. LORENZEN:** Thanks, Matt. I am having real -- I mean,
11 although this a fairly straightforward analysis, in terms of its
12 mathematical complexity, I am having real problems wrapping my
13 head around the sustainability implications of what's going on
14 here, and I want to take a little bit of a step back, actually,
15 if you can bear with me for a couple of minutes, because I
16 wanted to provide a bit of perspective on the sources of
17 information that we have in front of us.

18
19 Clearly we have this outstanding new piece of a very large study
20 on the absolute abundance of red snapper, and I want to point
21 out, also, that in fact the stock assessment is an undertaking
22 of similar magnitude, and think of all the port samplers and all
23 the fisheries-independent monitoring that goes in there and all
24 the size and comp data, and all of that gets sort of cleaned and
25 analyzed and fed into the stock assessment.

26
27 That's done not just one year, but it's been done for now forty
28 years or so, and so this actually represents a tremendous body
29 of knowledge, and the stock assessment, in a sense, has a
30 different function from what the Great Red Snapper Count
31 provides, and let me give you an analogy.

32
33 Say I get a rental car, and I drive this car, and I find out how
34 it behaves, and I realize that it doesn't accelerate all that
35 fast, and I realize how it brakes, and I find out how fast I can
36 go into a curve before I have problems keeping it on the road
37 and all of those things. Then I stop, and I have a look under
38 the hood, and I see the engine, and I say, wow, this is actually
39 a pretty big engine.

40
41 Now, it's still quite sluggish in accelerating, and so I think,
42 well, probably this is a big car, with a big engine, but it's
43 quite heavy, and that's why it's not accelerating so fast, and
44 so I am gaining information here about, in this case, the size
45 of the engine, and that leads me to understand better what's
46 going on with this vehicle, but then, when I drive it, it's
47 still the same vehicle, and so it's not that it will behave
48 completely differently just because I have found out the size of

1 the engine.

2
3 I might think, okay, well, it can probably take some more sporty
4 driving here and there, and so there might be things that I can
5 explore and improve beyond what I've done before, but it's not
6 going to suddenly be a completely different car.

7
8 In the context of the analyses that we're looking at, I think of
9 the stock assessment, and that's my driving experience, and
10 that's what we've learned about this fishery in like forty
11 years, and we've really overexploited this fishery, and we have
12 driven it into the ground, and we've seen it recover, and so
13 we've -- That's our driving experience.

14
15 In a sense, the Great Red Snapper Count is that look under the
16 hood, and so now we have to reconcile that information that we
17 got from looking under the hood with the experience that we have
18 about how this fishery behaves, and, of course, one probably
19 does that by combining -- Basically bringing the Great Red
20 Snapper Count information into the stock assessment, and I think
21 that will be done in the research track assessment, but, right
22 now, we have to basically juggle these two pieces of information
23 together here, and so that's what we are really trying to do.

24
25 One thing that I think is important for us to bear in mind is
26 that, given that the fishery will not behave fundamentally
27 differently from the way it has behaved in the past, and so, as
28 we bring in this information from the Great Red Snapper Count,
29 we will have to rescale various other parts of our understanding
30 of the fishery, and I think Dr. Porch said that nicely.

31
32 Now, instead of thinking it's a small, highly-productive stock,
33 we start thinking of it as a bigger, less-productive stock that
34 probably will support somewhat more harvest, but nothing like
35 what might be implied by the difference in abundance, because,
36 as we take that into account, we have to basically adapt other
37 parts of our understanding of this fishery.

38
39 I'm sure we'll come back to this, but, in the meantime -- One
40 way I think about this is, if we take the information from this
41 analysis, and we want to get a reading on how risky is it to do
42 something that is considered in this analysis, one way I would
43 look at it is to go back to the assessment and say what would
44 that model population do if we did something like that?

45
46 For example, in this presentation here, we have one option of
47 basically counting the fish on all the habitats that were
48 covered by the Great Red Snapper Count, and that gives us a

1 large increase, and it's like 200 percent or so, in the catches,
2 and then I would say, well, let's think about, in the
3 assessment, what would happen if we allowed people to
4 essentially harvest at twice the rate that the fishery is being
5 harvested now, because that's kind of actually what would
6 happen, and you can see that that would probably take us back to
7 the days when the population took a nosedive, and so that's
8 probably too much, whereas there are smaller changes that the
9 population could conceivably sustain.

10
11 I will leave it there, and I'm sorry for the long diatribe, but
12 I do think that it's important to get a bit of a perspective on
13 what we're looking at here. Thank you.

14
15 **CHAIRMAN POWERS:** Thank you. Ken Roberts.

16
17 **DR. ROBERTS:** Thank you, Mr. Chairman. The question I have has
18 to do with the all-structure-plus. The 15 percent assumption
19 relates to catch actually on the UCB areas, as opposed to maybe
20 the UCB areas playing a role in replenishment of overfished
21 areas, or site-specific overfished areas, that are receiving too
22 much effort?

23
24 **DR. SMITH:** In this application, given the very simple nature of
25 what we were doing, there was no explicit spatial distribution,
26 and so you could really think about it either way. You could
27 either think about those fish as being there to replenish
28 depleted areas over structure or as -- The way we've kind of
29 been talking about it, it's fish that are occurring over some of
30 those obstructions and things that were found on the bottom
31 during the Great Red Snapper Count in the uncharacterized bottom
32 that likely hold fish, that are likely known to fishermen,
33 fishing communities, but are not known to us.

34
35 We had seen some evidence of that in the VMS data that I briefly
36 talked about, when I looked at the commercial fishery, where we
37 had evidence of vessels that were fishing over something, based
38 on the fact that there was a cluster of VMS ping points around
39 areas that had no known structured mapped to them, and so the
40 assumption we're working on is that presumably those vessels
41 were operating over something that holds fish, and they weren't
42 just spending all day bouncing around over mud, and we just
43 didn't know that it was there.

44
45 I think the imaging from the Great Red Snapper Count supports
46 those type of things, that there are probably numerous amounts
47 of structure over the uncharacterized bottom that hold fish and
48 that are actively fished, but that we just haven't mapped yet,

1 and so we can think about that 15 percent either way, as animals
2 replenishing known structure or as animals existing over
3 structure that's just not mapped, and therefore not included, in
4 the artificial and natural reef categories.

5
6 **DR. ROBERTS:** Thank you very much. I appreciate the answer.

7
8 **CHAIRMAN POWERS:** Harry Blanchet.

9
10 **MR. BLANCHET:** Thank you. Matt, a couple of quick questions.
11 You said that some analyses would be easier than others. One of
12 the things that I would expect to see, if we are increasing
13 harvest rates at some significant fraction, is we may see a
14 difference either in the yield per recruit or age distribution
15 of that harvested fish, and we may see a difference in terms of
16 either like what Sean was talking about, and he said that, in
17 some of those nearshore structures off of Alabama, he used to
18 see a lot more red snapper than he was currently seeing in the
19 Great Red Snapper Count.

20
21 Is there any sort of way that you can project things like
22 saying, okay, if we increase say 20 percent harvest, this is
23 what you might see in an eastern Gulf average size or age
24 structure or if you would expect to see a measurable change in
25 the catch per effort?

26
27 It just seems like, if there is a recommendation for increased
28 harvest rates, we need to give a context and some -- If
29 possible, some ideas of if there is other things going on.
30 Certainly, from a commercial perspective, it's a price per
31 pound, but, on a recreational perspective, I don't know if
32 people are going to be as enthusiastic to purchase a brand-new
33 boat to go catch a four-pound snapper as they are currently to
34 go catch a ten-pound snapper. Obviously, there is a lot of
35 context that the council is going to have to consider.

36
37 **DR. SMITH:** Thanks for the question, Harry. The short answer is
38 yes, and that's very similar to, I think, what Kai was getting
39 at with his comment as well, and we did do a couple of those,
40 where I took some of the output from the Great Red Snapper Count
41 projections and fed it back into the SEDAR 52 projections, with
42 those values as fixed landings for --

43
44 I believe I did ten years, as a fixed catch for ten years, and
45 we could certainly, from those, pull some of the things that
46 we're talking about out, like the age composition, and probably
47 CPUE as well, but the crux of that is that all of those results
48 depend on the structure of SEDAR 52, which has the very

1 different distribution of numbers and abundance from east to
2 west, and, when we do those projections, and I, unfortunately,
3 don't have them tabulated, because we decided to not run them
4 for all scenarios, but, when we did those and looked at them --
5 Anyone who is familiar with SEDAR 52 will know how the outcome
6 of this turns out.

7
8 That is that the eastern portion of the stock just got decimated
9 under those levels of fishing pressure, which makes sense,
10 because the model estimated the ABC that we have on the books
11 right now based on everything that it was being fed, in terms of
12 the information and data, and then to come in after the fact and
13 almost double the landings is going to have a negative effect on
14 those stocks, and the west was more capable of dealing with it,
15 although it did see reductions, but the east fell apart under
16 that level of catch in the SEDAR 52 assessment.

17
18 Again, because they're not necessarily apples-to-apples anymore,
19 and they're different perspectives of not only available
20 abundance, but where that abundance is occurring, I don't know
21 how useful they would be, but, if it's something you would like
22 to see, it's possible that, before -- Probably not today, but I
23 could probably have some stuff summarized for you by tomorrow,
24 looking at a few of those scenarios.

25
26 **CHAIRMAN POWERS:** Thank you. Luiz.

27
28 **DR. BARBIERI:** Thank you, Mr. Chairman. Matt, thank you so
29 much. That was a great presentation, as always. It was right
30 on the mark, and so I greatly appreciate it. Mr. Chairman, I
31 mean, I don't have a question for Matt, really.

32
33 I mean, I would just sort of bring up some discussion points,
34 some of my thoughts, and perhaps spark some discussion from
35 committee members about some issues that I think we need to
36 think about as we look at this analysis.

37
38 I was wondering about our knowledge about the biology, ecology,
39 and life history of red snapper and how that comes into play
40 here. This sort of ties into, I guess, what Dave Eggleston, and
41 I don't know if Dave is still on the webinar, but he brought
42 this up earlier, in terms of the need to include the life cycle
43 of red snapper and have some discussions along those lines, and
44 I think about this because, as we interpret the significance of
45 this biomass over space, in each one of the regions, how this
46 biomass, pieces of this biomass, would be interacting with the
47 fishery and what would be the subsequent impacts of that, or the
48 results of that.

1
2 I am thinking about a couple of things, and so, one, when we
3 talk about SPR levels, in terms of spawning stock biomass, we
4 have to imagine where are red snapper spawning, and, I mean,
5 which part of the population, and not just demographically, in
6 terms of ages, but are all the fish that are sexually mature in
7 all of those areas capable of spawning in those areas, or do
8 they move between different areas, due to that spawning
9 behavior, or occupying spawning areas? This is one issue, and I
10 think that this touches into the SPR level that we consider as
11 part of our discussion.

12
13 Another thing is my understanding of red snapper biology is that
14 even the fish out in this unconsolidated habitat and that are
15 not now accessible to the fishery -- My understanding of red
16 snapper life history is that they would still occupy the same
17 nursery areas that we know and have been characterizing, and
18 this is not a new species in the Gulf of Mexico that we haven't
19 studied for a long time.

20
21 I would have to defer to people like John Mareska, who have been
22 involved in SEAMAP for a long time, and Will Patterson, that has
23 been studying red snapper biology for a long time, but, also,
24 Mandy Karnauskas has done information on dispersal models and
25 where these reproductive products are coming from and where
26 they're being put into nursery areas.

27
28 I'm thinking about the depth ranges, the bottom types, the
29 distance from shore, where all this massive biomass will be
30 putting recruits into, and I haven't kept up, really, with the
31 results of SEAMAP, for example, and this is why I'm bringing up
32 some of these other names here of folks that perhaps can help
33 with this discussion, but are we seeing, over the last five
34 years or so, major increases in recruitment, like inputs of
35 recruits that are coming from other places into these nursery
36 habitats, or perhaps the nursery grounds for red snapper have
37 actually expanded and gone beyond the current scope of the
38 SEAMAP surveys and we cannot measure what that increase in
39 recruitment has been.

40
41 I think critical to this would be understanding the little --
42 The larvae and then the little fish and where they recruit and
43 what types of habitats they require to survive for us to
44 understand the significance of this, in terms of sustainability,
45 from a spawning stock biomass perspective. I will leave it
46 there, Mr. Chairman, hoping that others will jump in and add to
47 this discussion as we continue this.

1 **CHAIRMAN POWERS:** Thank you. Dr. Porch.

2
3 **DR. PORCH:** Thank you. I think Dr. Barbieri and Dr. Lorenzen
4 made some very key points. Like Dr. Lorenzen said, I'm a little
5 concerned that history could repeat itself, and I think the way
6 I would express it is Mandy's work, and even some of the otolith
7 chemistry work before that, suggests that there's probably --
8 The whole Gulf stock of red snapper is a collection of
9 metapopulations with a fair amount of self-replenishment in each
10 of them.

11
12 If so, that would explain the history of the fishery, where
13 there was a pattern of serial local depletion, and you recall
14 the fishery started really in the 1870s, in Pensacola, and, by
15 the 1880s, they had already fished out the snapper grounds
16 adjacent to Pensacola and Mobile, and the fishery had to start
17 going farther and farther, and, eventually, they fished out the
18 snapper grounds off the Middle Grounds and south, and they
19 eventually fished out the Dry Tortugas, which really still
20 hasn't recovered anywhere near its former glory, and so there
21 was this very clear pattern.

22
23 If you read the old accounts, even the fishermen who were old-
24 timers in the 1950s said that all the snapper grounds off of
25 Florida were impoverished, and so something happened there, and
26 it would make sense, if you have a lot of local metapopulations
27 with some self-recruitment, that they could kind of fish them
28 out one-by-one by directed effort.

29
30 That means that, in order to repeat that sad history, or avoid
31 repeating it, we need to extract a level of catch supposed by
32 this interim analysis across the whole range of the stock and
33 not just focus on the parts of the population that are in areas
34 where the fishery currently operates.

35
36 That, obviously, is a little bit challenging, because, in some
37 areas, the density is low, and it's just the fact that there's a
38 huge area, and so it's not necessarily profitable for the
39 fishery, except where they can find those little pieces of
40 bottom that are counted as uncharacterized, but maybe somebody
41 has GPS numbers on or something.

42
43 The bottom line is that I think we have to be very careful here.
44 As Kai said, it's probably a less-productive population than we
45 thought, on a per capita basis, and that may be linked to the
46 idea that there's a bunch of smaller metapopulations, and it's
47 definitely not just a big mixing bowl out there, either with
48 regard to the way that adult red snapper move or with the way

1 the larvae are distributed.

2
3 In order to extract that bigger amount, even the forty-five
4 million pounds, if that's even possible, you would really have
5 to spread the effort across all of the different
6 metapopulations, or you're going to get severe local depletion.

7
8 **CHAIRMAN POWERS:** Thank you, and I think my initial reaction --
9 What I was trying to convey is that the analysis here is not
10 really a stock assessment, and it's basically a projection based
11 on a set of assumptions. We are going to have to make our
12 decision based more on commonsense and biology.

13
14 We can fit it into -- We can interpret what we pick, in terms of
15 one set of the suite of assumptions that are in these
16 projections, but, in reality, what we're doing is evaluating
17 things in terms of the biology and what is known, and I think
18 that's the message that I am trying to convey, that the analysis
19 itself, in my mind -- My attitude for these kinds of analyses
20 sometimes is it's better to make one bit assumption rather than
21 a bunch of little ones.

22
23 This particular one makes it a bunch of little ones, but, in
24 effect, it really doesn't make any difference, in terms of the
25 outcome, and the other thing is we, as the SSC, have a control
26 rule and P* and all those things, and, in my mind, that is
27 completely out the window, because none of the information we
28 have really fits within that paradigm, and, so, again, I am
29 arguing for commonsense and biology more than this. Let me give
30 the floor to Will Patterson.

31
32 **DR. PATTERSON:** Joe, the instructions earlier were unclear to me
33 about whether the folks who contributed to the study could
34 actually participate in this part, and so I don't want to go too
35 far down the road of --

36
37 **CHAIRMAN POWERS:** Let me interject right now. You're okay. In
38 my mind, you're okay. Ryan may have a different opinion. Ryan.

39
40 **MR. RINDONE:** Thank you, Mr. Chair. If it's the SSC's decision
41 that they're going to consider providing some manner of catch
42 advice based on the GRSC interim analysis, then that decision is
43 made at that point, and so I think that any conflict of interest
44 that was outlined beforehand would be beyond us at that point,
45 and it wouldn't matter.

46
47 **CHAIRMAN POWERS:** So, Will, please go ahead with anything that
48 you wish to contribute.

1
2 **DR. PATTERSON:** Okay. Well, I agree with the comments that Clay
3 Porch just made about the population structure of red snapper
4 and what we know. There's a new analysis, or a series of
5 analyses, in a paper that we're hoping to submit very shortly
6 that Dave Portnoy is leading at Texas A&M Corpus Christi, and
7 that work is based on genetics, larval transport modeling, and
8 then dispersion modeling of adults.

9
10 It is, I think, the most comprehensive analysis yet done with
11 single nucleotide polymorphisms that demonstrates the degree of
12 metapopulation structure that exists, and even these molecular
13 markers aren't able to track things that efficiently on
14 ecological timescales, but it does demonstrate that there is
15 this localized structure that's becoming revealed more and more
16 through that.

17
18 Then, if you look at the conventional tagging data, the otolith
19 chemistry data that Clay cited, and the larval transport work
20 that's been done by Johnson and Karnauskas, it all adds up and
21 starts to make sense with this idea that there's more structure
22 in the stock than the hypothesis of panmixia, or equal mixing,
23 across our regions that some of the early genetic analyses
24 weren't able to reject that idea of panmixia.

25
26 Also, I think it starts to make sense, and we've been thinking a
27 lot about this, at least among the folks who participated in the
28 red snapper study, about reconciling what we discovered, or what
29 our estimates were from that work, spatial distributions of
30 animals, estimates of density and population size, with what we
31 thought we knew beforehand about red snapper.

32
33 When you start to fold the layers in together, a lot of this
34 stuff is at least consistent, if not corroborating, with each
35 other, and so, if the estimates are in the ballpark, the new
36 estimates are in the ballpark, of reality, then you have this
37 interesting dynamic where you have the older age comp in the
38 west that still is apparent, the younger age comp in the east,
39 the population moving into areas that had been overfished on the
40 Florida Shelf for a long time, and a lot of anecdotal
41 information to suggest there are more and more red snapper in
42 those regions, but it still boils down to this conundrum about
43 what the connectivity is between animals that live in areas
44 where the populations are less dense, and therefore much less
45 exploited, versus what's happening on the structure and habitat
46 that is targeted.

47
48 In a lot of regions, that's artificial reefs, especially in the

1 recreational fishery, although, in Florida, there are lots of
2 natural bottom areas that are targeting red snapper, and so this
3 balance is really important, and, obviously, it's a large part
4 of the discussion here, as to what the implications of this
5 larger biomass are for the resistance of the population to
6 increased pressure and then the resiliency that we've been
7 witnessing in recent years.

8
9 There's lots of things about the red snapper assessment and
10 population ecology that don't make sense, or haven't made sense
11 for a long time, how you could have this large, long-lived fish
12 not collapse under the estimates of SPR below 2 percent, going
13 back to Goodyear's early analyses, and how is that possible,
14 given the life history of red snapper, and so this unexploited
15 biomass that's likely to exist out in broader areas of the shelf
16 that are lightly exploited, or unexploited, now those things
17 start to get pieced together.

18
19 In the end, as far as management decisions and catch level
20 recommendations, we still need to think clearly about most of
21 the fishery is still in that shallow zone, the near-shore zone,
22 and on artificial structures that could easily be mined, if
23 fishing pressure were allowed to ramp up very quickly and to a
24 large extent.

25
26 **CHAIRMAN POWERS:** Thank you. Doug Gregory.

27
28 **MR. GREGORY:** I have a question for somebody from NMFS about the
29 SEAMAP surveys. We've got the bottom longline index coming up,
30 and, before red snapper was really managed in the Gulf, there
31 was a vertical longline, drifting longline, fishery developing
32 that was catching these big snapper over this uncharacterized or
33 unconsolidated bottom, and Amendment 1 shut that fishery down,
34 either by outlawing that gear altogether or by an extension of
35 the longline-prohibited area from Florida to the west, but it
36 shut that fishery down.

37
38 I was really optimistic when the bottom longline survey was
39 developed, that that survey would finally catch these larger
40 fish, and we would again have them in our age composition,
41 because -- Restore them to the stock assessment.

42
43 I talked to Dr. Goodyear at the time, and I said, well, what
44 happens with the stock assessment if these fish are no longer
45 being harvested, and is the mortality assumed to go up, or is it
46 a selectivity issue, and I think he said it would be handled
47 through selectivity.

1 I'm curious if the bottom longline fishery -- What that is
2 capturing, and is that fishing some of these unconsolidated
3 areas? Also, the groundfish survey that somebody had mentioned,
4 and I had forgotten about that, and that should be catching more
5 red snapper also, since the BRDs have been put in place and the
6 shrimp fishing effort has gone down. Do we have any information
7 on those sorts of things? If we do, that might be instructive.

8
9 **CHAIRMAN POWERS:** Does somebody from NMFS want to comment?

10
11 **MR. GREGORY:** I mean, clearly, we need to be sampling that area.
12 Are we sampling it now, and to what extent?

13
14 **CHAIRMAN POWERS:** Clay, or you may want to delegate this to
15 Katie.

16
17 **DR. PORCH:** I can start and let Katie fill in, but our longline
18 survey does work in what generally would be classified as
19 uncharacterized bottom. In fact, they will set close to
20 structure, but not right on structure, typically, and so it does
21 get a pretty broad area, and, of course, in the western Gulf,
22 we've been seeing increases since the 2000s, or since the 1990s.

23
24 We did in the eastern Gulf as well, although it started to level
25 off just shortly after the assessment, but it does tend to get
26 bigger fish than what we see in the fishery, and so it is
27 getting, I think, what you expect, Doug, and it is included in
28 the stock assessment.

29
30 The groundfish survey, however, typically gets basically age-
31 zero and one-year-olds, and it doesn't get many of the bigger
32 ones, and there are so few of them that it does catch that you
33 can't really make an index for the older animals, that I'm aware
34 of, and so the big question there is whether those recruits that
35 we get on the shrimping grounds are indicative of recruitment in
36 general.

37
38 There's always been that question of whether -- There's a lot of
39 fish that settle there, but are they the ones that survive and
40 end up replenishing the adult population, or is it some other
41 smaller fraction that settle closer to structure that ends up
42 being the juvenile fish that replenish the adults, but we never
43 really have seen a big change in the numbers of young fish being
44 picked up in the groundfish survey, and certainly not anywhere
45 near the change in abundance that we've picked up on our
46 longline survey.

47
48 **CHAIRMAN POWERS:** Thank you. Katie, did you want to follow-up?

1
2 **DR. KATIE SIEGFRIED:** Just a few things that I can add to that.
3 I mean, as you can see, our Director is incredibly familiar with
4 the red snapper fishery and data sources, but the two things
5 that I can add are, the vertical line that Doug mentioned, we
6 are talking with SEAMAP a little bit more about the vertical
7 line fishery and the vertical line survey.

8
9 One of the reasons it's been excluded in the past is because of
10 the gear saturation, just that the red snapper are so hook-
11 happy, and so that's just one thing to add. Then, if you all
12 want to see pictures of the sampling from the bottom longline
13 survey, we can provide those as well, and I think that they're
14 in the Adam Pollack document that was uploaded to the website,
15 and LaTreease may show one of those plots in her presentation, or
16 could show it, if requested.

17
18 **CHAIRMAN POWERS:** Thank you. Benny Gallaway.

19
20 **DR. GALLAWAY:** I was curious about the SEAMAP bottom trawl
21 fishing in the eastern Gulf, and what is the age-zero and age-
22 one abundance, and what does survival look like through those
23 early ages in the eastern Gulf?

24
25 **CHAIRMAN POWERS:** I presume you're asking somebody from NMFS.

26
27 **DR. PORCH:** Like I said, I don't have the numbers right in front
28 of me, but, generally, Benny, I think we're not seeing any clear
29 long-term trends in the eastern Gulf as well, although, in our
30 Panama City video survey, which some fraction of it is inshore,
31 we definitely saw an increase early on. I think that survey,
32 like the longline survey, has shown a decrease immediately after
33 the last stock assessment, and then, since then, it has leveled
34 off, but, if somebody actually has the numbers in front of them,
35 they can correct me if I'm wrong.

36
37 **CHAIRMAN POWERS:** Okay. John Mareska.

38
39 **MR. MARESKA:** Thank you, Mr. Chairman. I just wanted to comment
40 on, I guess, the juveniles in the trawls in the north-central
41 Gulf, and I can speak to that, and so we typically see more of
42 the age-zeroes and ones in the nearshore habitats that are
43 associated with some kind of small debris that litters the
44 bottom, shell ridges and small rock piles like that.

45
46 In the deeper waters, when we've done the trawl, we may,
47 opportunistically, collect several small red snapper in a trawl,
48 but that's because they were utilizing opportunistic debris,

1 maybe a tire or a car bumper or a hollowed-out log, a sponge,
2 some kind of small structure like that that those age-zeroes and
3 ones find attractive.

4
5 **CHAIRMAN POWERS:** Thank you. Any other questions at this point
6 in time? Obviously, we'll probably be revisiting this. Because
7 this elusive Gardner document relates to this subject, I
8 believe, is that document available, or does somebody want to
9 talk about it, or should we defer that?

10
11 **MR. RINDONE:** We have a presentation to that effect.

12
13 **CHAIRMAN POWERS:** So it is available now?

14
15 **MR. RINDONE:** Well, we have a presentation. We don't have the
16 draft document available at this moment.

17
18 **CHAIRMAN POWERS:** Is somebody going to give the presentation, is
19 really what I'm asking.

20
21 **MR. RINDONE:** Yes. Dr. John Walter with the Southeast Fisheries
22 Science Center will give it.

23
24 **CHAIRMAN POWERS:** All right, because it relates to this subject,
25 correct?

26
27 **MR. RINDONE:** Yes. John, are you around?

28
29 **DR. WALTER:** I am around.

30
31 **CHAIRMAN POWERS:** Okay. Please proceed then, John. Thank you.

32
33 **DR. WALTER:** Thanks, and good afternoon, everyone. I'm going to
34 be presenting some work that is excerpted from some of the work
35 that we've been doing to try to characterize the spatial extent
36 of fishing, and this work is largely done by Chris Gardner, but
37 it's also some work from a number of our team, and there is a
38 manuscript, but it's really -- The bulk of the manuscript isn't
39 particularly pertinent to our task at-hand, and we felt that, by
40 giving a full draft manuscript, it was probably going to add
41 more unnecessary things to consider for this group than exactly
42 the pertinent stuff, and so what we've tried to do is distill it
43 down to exactly what this group might need to consider when
44 they're considering the advice framework that Matt presented
45 just prior to this.

46
47 In particular, this gets to trying to determine the spatial
48 extent of commercial and recreational red snapper catch in the

1 uncharacterized bottom and to try to determine what the current
2 status quo fishable uncharacterized bottom might be, and so to
3 try to find out whether that 15 percent number is in fact
4 something that's about what the fishery is doing now, or would
5 that require substantial spatial expansion of the fishery.

6
7 We have three objectives. One is to map the distribution of
8 biomass, and then to map the distribution of catch and effort by
9 recreational and commercial, and then determine the extent of
10 the fished biomass, because, if you divide the catch by the
11 biomass, you can get an exploitation rate and determine whether
12 an area is exploited or not exploited. Then partition that
13 biomass up by the habitat type at the particular location, and
14 we can identify whether it's UCB or other habitat.

15
16 We have taken the relative biomass maps from Karnauskas et al.
17 raised to the Great Red Snapper Count numbers, and so basically
18 took the map of the biomass distribution and applied an average
19 weight and raised it up, and then we get a spatial mapping.
20 This spatial mapping is exactly the relative map that is in
21 Karnauskas et al., but it just now has biomass per block, so
22 that then we can do the division based on the catches.

23
24 Then, in this slide, what we've done is a large part of the work
25 that went into the manuscript that I alluded to was in being
26 able to assign VMS effort in the commercial handline fishery to
27 a particular spatial location and a particular habitat type.

28
29 By taking the VMS data and separating it between whether they
30 are steaming or fishing, we can then add up the fishing effort
31 that is occurring in a particular spatial location, and these
32 are on 10,000-kilometer-by-10,000-kilometer grid cells, and the
33 shaded low to high fishing effort is a relative fishing effort,
34 and you can see the areas that do receive the greatest handline
35 fishing pressure.

36
37 This is not specifically attributed to any particular species,
38 and so the reef fisheries are multispecies, and a lot of this
39 would be on other species, and then the two lines are the twenty
40 and forty-nautical-mile contours, and then you see the map of
41 artificial reefs, natural reefs, and pipelines and platforms.
42 These were largely the same information that went into the Great
43 Red Snapper Count mapping of the habitat types, and I think it
44 is almost exactly the same information that went into there.
45 This allows us to then partition fishing effort by spatial
46 location.

47
48 Then, by matching a trip to what's reported in the Trip

1 Interview Program landings, we can then assign the landings to
2 those particular spatial locations that they occurred, and then
3 we can estimate the total landings by 10,000 kilometers squared
4 to identify where the landings in the fishery come from, and I
5 believe these are an average landings over a multiple-year time
6 period, but you can see, in general, these are the spatial
7 locations that have received the greatest amount of commercial
8 catch.

9
10 Here is an expanded view of the VMS effort mapped into space,
11 and you can see the spatial locations that have received a fair
12 amount of fishing effort. Then, by placing landings in space on
13 each of the grid cells, we can determine where the catches have
14 come from.

15
16 By doing division of the catch over the biomass, we can get a
17 relative exploitation rate, and, here, the shading shows the
18 relative rate of exploitation, and that's the percent of the
19 biomass removed by fishing, and you can see a lot of the areas
20 are very low, 0.01 to zero exploitation rate, which suggests
21 that the fish and the biomass that is there is receiving very,
22 very little fishing pressure. A number of areas are quite high,
23 where they are dark-shaded, which suggests that the fishing
24 pressure is fairly high in those areas.

25
26 The bulk of what we're trying to do here is to identify how much
27 of the uncharacterized bottom is receiving a certain amount of
28 fishing pressure or very little at all.

29
30
31 Here is a map of the relative exploitation rates over the entire
32 U.S. Gulf of Mexico, showing the highlighted fishing areas, and
33 most of the exploitation rates that are in blue or gray
34 represent about less than 500 pounds removed from a five-by-
35 five-nautical-mile cell, and so those are areas which we're
36 saying are basically unfished by the commercial fishery.

37
38 What we'll do in the next slide is say that, if they're unfished
39 under the current status quo fishing, then they would not be
40 part of the universe of how the fishery is currently operating,
41 and, for it to access the biomass in those areas, the fishery
42 would have to extend its spatial footprint of fishing.

43
44 Now, I will comment on the exploitation rates here. Take these
45 with a slight grain of salt. We're not saying, necessarily,
46 that they're removing, say, for instance, 50 percent of the
47 population in a given grid cell, and that could be the
48 inference, but, really, what we're trying to identify is the

1 areas that are almost unfished, and that's where there is a
2 large component of the population that's not receiving very much
3 fishing pressure, and this is something that Matt had brought up
4 in his presentation.

5
6 Here is where it gets messy. Unfortunately, this is kind of a
7 nasty spreadsheet, but I will try to work people through it.
8 Here, we've taken the map in the previous slide and integrated
9 the total biomass by exploitation rate, and so this is
10 essentially a two-dimensional histogram of the biomass summed up
11 the exploitation rate, and so each one of the grid cells has an
12 estimated exploitation rate, and they're ranging from zero to
13 one. Again, take the ones with a grain of salt.

14
15 Then, also, by distance from pass, and the reason that we're
16 doing this by distance from pass is because, when I go into it
17 for the recreational side, we think that the recreational
18 fishing pressure is likely to decrease with increasing distance
19 from pass, and it's just harder and more costly, and there are
20 fewer opportunities to be able to fish, as you get further from
21 port, particularly for the recreational fishery that may be less
22 likely to do multiple-day trips. The commercial fishery,
23 however, may be able to do multiple-day trips, and they may have
24 a larger ability to fish further from port.

25
26 Here, we're taking these distributions from the actual VMS data,
27 and so this about as good information as we can have over where
28 they're fishing, and what you -- Working down, at least -- If
29 you go to the bottom row, we see the percent of unclassified
30 bottom, or uncharacterized bottom, as the total, ranging from 3
31 percent, and increasing with increasing distance from the pass.

32
33 Then the third row is the total uncharacterized bottom as a
34 function of the total biomass, and then the total available is
35 on the third row up. Moving over to the last two, or the last
36 three, columns, the percent of unclassified bottom by
37 exploitation rate, but I have shaded in green our assumption
38 that anything less than 0.01 percent exploitation rate is almost
39 entirely untouched. Again, that's about 500 pounds out of a
40 five-by-five-nautical-mile area.

41
42 By summing up these green areas that have an exploitation rate
43 of above 0.01 or higher, then we can sum up the values from 8
44 percent and 10 percent and get a total of 26 percent of the
45 total biomass that is currently subject to any measurable, or
46 appreciable, degree of exploitation, and, right now, that's
47 about our best estimate for what the commercial fishery might be
48 able to actually fish upon in its current spatial footprint of

1 fishing.

2
3 For the recreational, we don't have as good fine-scale
4 information for where they fish. However, we do have a number
5 of surveys that estimate where fishing effort occurs in space,
6 and, in particular, the iSnapper app, which is on the upper-
7 left, which is primarily located in Texas, and that tells us
8 that the fishing -- On the right, there's a line, and the blue
9 line is the iSnapper proportion of the catch by distance from
10 pass, with the highest proportion of the catch about thirty
11 nautical miles from the nearest pass, and decreasing
12 proportionally with increasing distance.

13
14 In Alabama, the fishing is closer, and the Alabama Snapper Check
15 tells us that about 90 percent of the fishing is occurring in
16 depths less than 120 feet. The picture in the middle is
17 distribution of vessel counts by an aerial survey, also showing
18 a more closer-to-shore distribution of fishing effort.

19
20 We're working on incorporating data from Florida, but we, right
21 now, haven't gotten that quantitatively incorporated, and so we
22 derived an overall guess, which is this orange line here of
23 about 20 percent between zero and five nautical miles, 25
24 percent between five and ten, and then a decreasing fraction of
25 red snapper catches with increasing distance offshore.

26
27 Now, we could alter that assumption, and, in particular, we
28 could inform that with data from the states, and, ideally, it
29 would be great to get data from every one of the states, and do
30 that probably on a state-specific basis, and, in Florida,
31 perhaps the Panhandle would need to be separated from the
32 Peninsula, because the fishing is likely different, but, for the
33 purposes of the remainder of this talk and our estimates, we
34 have used this orange line here, which is our overall guess.

35
36 Here is the map of the recreational exploitation rate, as we
37 have put it together right now, and I will caveat that there are
38 a number of assumptions here that we have had to make, and they
39 could impact the results to a greater or lesser extent, and, in
40 fact, we're open to altering those assumptions or, ideally,
41 informing any assumption with data.

42
43 The first assumption that we made is that we estimated starting
44 values and increased the uncharacterized biomass availability
45 with distance from pass, and the starting values is a strong
46 assumption that we made at the outset about the percent of catch
47 that comes from different habitat types.

1 In Florida, we made the assumption that 50 percent of it comes
2 from natural, 25 percent from artificial structures, and 25
3 percent from uncharacterized. In all of the other Gulf states,
4 we assumed that 10 percent comes from natural, 80 percent from
5 artificial structures, and 10 percent from uncharacterized
6 bottom. We could inform this with data, if we have it, and I
7 know a number of the state surveys do now explicitly ask what
8 fraction of a trip, or of a catch, comes from natural or
9 artificial, and so, ideally, we would like to inform that with
10 empirical data, but, for now, this is our basic assumption.

11
12 Then we made another assumption that the percentage of the
13 available uncharacterized bottom increases with distance from
14 pass, and the rationale behind this is that it would seem
15 unlikely to us that the structure that is in the uncharacterized
16 bottom that fishermen are going to be accessing is something
17 that they know about that is not part of our universe, but it's
18 unlikely that there's a lot of that kind of structure in shallow
19 waters, because people tend to fish there more often, and they
20 probably would have found it, and it's much more likely that it
21 is out there in deeper water, where people may just not have
22 fished as often, because it's just further to run and more
23 difficult to find.

24
25 We have a vector of increasing fraction of uncharacterized
26 bottom with distance, and then the next assumption is, as I
27 mentioned, the percentage of effort by distance from pass, and
28 then we allocated the recreational landings by state to each of
29 those blocks and subtracted out the catch that occurs from
30 natural reefs and artificial structures, based on the assumption
31 in Bullet Point 2 above, and so then we obtain the exploitation
32 rate on uncharacterized bottom.

33
34 We get our horrendous spreadsheet here on the percentage of the
35 unclassified biomass that would be accessible to the fishery,
36 with, again, the green is the exploitation rates above 1
37 percent, and we assume that those are the ones that are actually
38 fished, and everything else is almost entirely unfished, and
39 this gives us 17 percent of the total uncharacterized bottom
40 available for the recreational fishery.

41
42 Again, if we change some of the assumptions about the distance
43 offshore fished, it might change these numbers somewhat.
44 However, there is not as much biomass out further offshore, and
45 so, even if there is -- Or inshore, and so it might not change
46 the result, and it might balance out, but, again, if we could
47 inform these with empirical data, then it would strengthen the
48 case here.

1
2 In summary, our best guess over all uncharacterized biomass that
3 is vulnerable to the status quo fishing distribution, we can
4 derive from the relative allocation of commercial and
5 recreational of 49/51 and get a weighted average of 21.41
6 percent of the UCB that might be vulnerable to fishing under the
7 current status quo distribution of fishing.

8
9 This is probably more of an upper end on the status quo, because
10 we were pretty liberal about including biomass, even if it has a
11 quite low exploitation rate.

12
13 The key assumptions we made here is one that the Karnauskas
14 mapping of relative biomass matches fairly similarly to the
15 Great Red Snapper Count, and we believe that, in general, that
16 it does, and then that the exploitation rate of less than 0.01
17 is basically unfished at the present time, and then the number
18 of assumptions that we made regarding recreational effort and
19 the availability of uncharacterized biomass for the recreational
20 fishery, and so, with that, I am happy to take questions.
21 Thanks.

22
23 **CHAIRMAN POWERS:** Thank you very much, John, first off. Before
24 we take questions, Ryan, did you have a procedural comment?

25
26 **MR. RINDONE:** Not a procedural comment, but it's a comment on
27 this last slide. The allocations attributed to the commercial
28 and recreational sectors are backwards. It's 51 percent to the
29 commercial sector and 49 percent to the recreational sector.

30
31 **CHAIRMAN POWERS:** Thank you. So it flips that. Okay. Are
32 there questions about this? Essentially, the way I am
33 interpreting it, this is suggesting that we may want another
34 alternative other than the plus-15 percent, and maybe we want a
35 plus-20 percent or -- With the right stratifications, something
36 equivalent to 21.41 percent, and that's, essentially, I think,
37 what we might be leading to, but I would open it for comments
38 and questions. Luiz.

39
40 **DR. BARBIERI:** Thank you, Mr. Chairman. John, thank you for the
41 presentation, and this is really helpful. Just a point of
42 clarification, and maybe you covered this in the beginning, and
43 it was just such an avalanche of information that it's hard to
44 keep up with everything, but, when you talk about catch, are you
45 really talking about everything, landings plus discards, or is
46 this analysis just based on harvest landed?

47
48 **DR. WALTER:** This is on just harvest landed, and so it doesn't

1 include the discards.

2
3 **DR. BARBIERI:** Okay. So the distribution of fish in some areas
4 may be causing further removals than what we can properly
5 account for here, just for us to keep this in mind, if that is
6 the correct thinking?

7
8 **DR. WALTER:** Yes, and so, when I said the exploitation rates,
9 take them with a grain of salt. Since there is high discards in
10 these fisheries, then the exploitation -- The actual
11 exploitation rate would be higher in particular locations where
12 there is high fishing, and the goal here was to try to put
13 fishing in space, but not put the total fishing mortality in
14 space, and, if there's a disjointness from where, for example,
15 the closed season fishery, which is modeled explicitly
16 differently in the assessment, operates in the open season, then
17 there could be a different pattern there, in terms of where the
18 fishing mortality, or where the discard mortality, occurs,
19 versus the directed and landed fish mortality.

20
21 **DR. BARBIERI:** Right. Got it. Thank you, John.

22
23 **CHAIRMAN POWERS:** Thank you. Kai Lorenzen.

24
25 **DR. LORENZEN:** Thank you, John. I just have a quick question.
26 In that space, where are the bottom longline index catches
27 taken, and so does that cover areas that are under very low
28 fishing pressure, if you know or someone else does. Thanks.

29
30 **DR. WALTER:** Kai, was your question about the bottom longline
31 commercial fishery or the --

32
33 **DR. LORENZEN:** No, and it was specifically about the survey, and
34 so what sort of area does that correspond to, or does it
35 correspond to an area that generally has a low fishing pressure
36 in your map or not.

37
38 **DR. WALTER:** The bottom longline survey has inference over the
39 entire waters out to -- I think it's 150 meters, except that it
40 is not on known artificial structure or platforms, and they have
41 to avoid that, and so we could pull a map up of where it's
42 actually operating, or where it catches red snapper, and that
43 might be informative, and maybe we can get that side-by-side
44 map, and I know that I have, in fact, produced that, and perhaps
45 we can dig that up, because I think the picture is far more
46 useful than words.

47
48 **DR. LORENZEN:** I think that would be great, because we'll soon

1 enough be talking about what the bottom longline index means in
2 relation to all of this, and that would be really helpful, to
3 have that information. Thank you.

4
5 **CHAIRMAN POWERS:** Thank you. John Mareska.

6
7 **MR. MARESKA:** Just a quick note on the bottom longline. I
8 believe that's a randomized survey, and so I think it's going to
9 cover fishing grounds as well as UCB, and so, John, my question
10 -- Thank you for the presentation. Looking at your summary here
11 of the total of UCB vulnerable, you looked at those
12 independently, right, and have you overlaid those maps, to see
13 if there is overlap between the commercial and the recreational,
14 and, if there is that overlap, would that subsequently make that
15 vulnerable area smaller?

16
17 **DR. WALTER:** In terms of overlay, I would look at them side-by-
18 side, and so if you're asking if the commercial and recreational
19 overlap in where they're fishing --

20
21 **MR. MARESKA:** Yes, and so what might be non-exploited by the
22 recreational may be utilized by the commercial, and so then that
23 area would be -- You would count that for one, but not for the
24 other, but, if there's areas where they're both utilizing an
25 area -- Let me think about this some more.

26
27 **DR. WALTER:** That raises an intriguing question there, and
28 perhaps the easiest way to do it is to look at a side-by-side
29 comparison of the two, and they are disjointed in where they're
30 actually catching fish, particularly in areas where the
31 commercial fishery is either excluded or where it's deeper than
32 the recreational fishery. I would have to think about that,
33 whether it reduces the overall UCB.

34
35 **MR. MARESKA:** Okay. Thanks.

36
37 **CHAIRMAN POWERS:** Thank you. Carrie, did you want to interject
38 something? Do you need to get jumped ahead of Dave?

39
40 **EXECUTIVE DIRECTOR SIMMONS:** No.

41
42 **CHAIRMAN POWERS:** Okay. David.

43
44 **DR. CHAGARIS:** Thank you. I don't have a question, but just a
45 comment, in light of this information and analysis. Just to
46 remind the committee about the random forest model that Rob
47 Ahrens did for the Great Red Snapper Count, and I asked him --
48 This isn't in any of the documentation that was provided

1 earlier, but I asked him what percentage of the uncharacterized
2 bottom was classified as high probability, and that percentage
3 was 13 percent, just to maybe put this value in context of some
4 other information that we did have.

5
6 **CHAIRMAN POWERS:** Thank you. Carrie.

7
8 **EXECUTIVE DIRECTOR SIMMONS:** Thank you, Mr. Chair. Thank you,
9 John, and your team, for getting this together for us. I guess
10 I have a question, and it's kind of along the line of the
11 discards that I think have already been brought up, but would it
12 be possible, particularly in the eastern Gulf, to look at the
13 commercial bottom longline VMS data, because what we're hearing,
14 at the council level, is that those folks are discarding a lot
15 of red snapper, and so they may not be showing up in the
16 landings, but they may in fact be interacting with red snapper,
17 and so is there a way to look at like a percentage on a trip of
18 discards from that gear type and look at exploitation or
19 interaction in that way, because that may be actually sampling
20 more of the uncharacterized bottom in those deeper depths, and
21 that's just a thought. Also, how many years of information is
22 this? Thank you.

23
24 **DR. WALTER:** For the commercial, it's about four years of
25 information that goes into this. For the recreational, it's the
26 2019 catch data, and whether we could look at the commercial
27 bottom longline to identify if in fact -- I don't know about the
28 exploitation rate there, and that commercial bottom longline has
29 a very low retained catch, relative to the handline, but it
30 probably would be useful to determine whether the spatial
31 distribution of the population is in fact out in the UCB, and I
32 think we should have pictures from our survey longline available
33 quite soon that we're putting together that I think will inform
34 that spatial distribution for us right now, but we haven't, to
35 my knowledge, looked at the commercial longline discards
36 spatially to inform that.

37
38 **EXECUTIVE DIRECTOR SIMMONS:** Okay. Thank you. I was just
39 thinking that the fish may not be landed if they don't have
40 allocation, and so, if there's a way to look at that, that would
41 be interesting.

42
43 **CHAIRMAN POWERS:** All right. Thank you. Let me interject here,
44 and kind of let's talk a little bit about how we want to proceed
45 for the rest of the day. Part of my concern right now is that,
46 if there is something that you wish John Walter and Matt to do,
47 in terms of different alternatives in the spreadsheet, we
48 probably should decide on that now, because we're running out of

1 time.

2
3 I also would like to, if at all possible, finish with the
4 presentation of the bottom longline interim analysis section as
5 well, but, first off, I think we do need to kind of hone-in on
6 is there anything we want from the NMFS team by the first thing
7 tomorrow morning, and, if so, what is it? Let me try to see
8 what we might do there. Dave Chagaris.

9
10 **DR. CHAGARIS:** I will throw something out there, and this is,
11 obviously, up for debate, but it does reflect sort of my
12 concerns with the Great Red Snapper Count number and the
13 variance. One suggested alternative that I have would be to
14 reduce the input population abundance number from the 110
15 million to roughly eighty-five million.

16
17 How I arrived at that is, if I double the standard error,
18 assuming that we have drastically underestimated the variance in
19 the estimate, if we double that number and then take the lower
20 bound and subtract the estimate by twenty-four million, we get
21 to -- The number is 85,259,101 age-two-plus red snapper. Then
22 use the -- I am okay with the 15 percent plus for the
23 uncharacterized bottom, but we could also try the 13 percent,
24 which was out of the random forest model from Rob Ahrens.

25
26 **CHAIRMAN POWERS:** Matt, remind me. Putting in a different
27 catch, that's basically instantaneous, and you just put the
28 vector into the spreadsheet and there you go, and am I
29 interpreting that right?

30
31 **DR. SMITH:** Yes, you are. The only thing I would have as a
32 follow-up is the east and west breakdown on that eighty-five-
33 million-plus, and should I just take the difference equally out
34 of both regions, or did you want to look at the specific CVs by
35 region and adjust based on those?

36
37 **DR. CHAGARIS:** I would say the former, keep everything else as-
38 is, and just keep the entire analysis as-is and just change the
39 number. I mean, obviously, we could get into the weeds of
40 partitioning it out by region, but I haven't thought through
41 that part of it yet.

42
43 **DR. SMITH:** Okay, and so just take roughly twelve million from
44 each region. The way I have this projection spreadsheet set up,
45 it is east and west specific, and so I will have to make
46 adjustments to both, but I will take roughly twelve million out
47 of each side.

1 **DR. CHAGARIS:** Well, what I was suggesting is actually double
2 that, but take it out of each side, yes.
3
4 **DR. SMITH:** Yes.
5
6 **CHAIRMAN POWERS:** Okay. Harry. While we're waiting for Harry,
7 does anybody else want to chime in?
8
9 **DR. WALTER:** We can show the map of the longline fishery while
10 we're waiting.
11
12 **CHAIRMAN POWERS:** Okay. Go ahead. While we're waiting, Carrie,
13 let me give you the floor.
14
15 **EXECUTIVE DIRECTOR SIMMONS:** Thank you, Mr. Chair. I had a
16 question for Matt, I believe. In Table 5, are those values the
17 ABC, because you have the current ABC underneath, and is that
18 whole column ABC projections?
19
20 **DR. SMITH:** It gets down to what the interpretation of ABC would
21 be from the Great Red Snapper Count results, and it's very
22 difficult to make a direct comparison between SEDAR 52 and what
23 we're getting out of this analysis, and so I wasn't specifying
24 any particular option there as an OFL or an ABC specifically, as
25 we would do with a traditional assessment, and only that the 26
26 percent reference point would have to form the basis of the OFL,
27 in my opinion, given what's on the books, but any other
28 possibility there could be assigned as an ABC.
29
30 As I think Joe stated earlier, or maybe not, and I agree, if we
31 move to this catch advice, then the rebuilding plan kind of goes
32 out the door, because that was the foundation of the ABC runs in
33 SEDAR 52, but I don't know how you interpret the rebuilding plan
34 if we move to the Great Red Snapper Count-based advice outside
35 of a full assessment.
36
37 That being the case, it becomes the prerogative of the SSC to
38 select an option as ABC, and I think they could choose from
39 those, or any other option that they might come up with, if that
40 helps, and so I didn't specify any specific thing there as
41 specifically an ABC option only, and they're all on the table.
42
43 **EXECUTIVE DIRECTOR SIMMONS:** Okay. Thank you.
44
45 **CHAIRMAN POWERS:** Thank you. Harry.
46
47 **MR. BLANCHET:** This is to Dave Chagaris' point regarding the 13
48 percent of high-probability bottom off the random forest model.

1 In the eastern part of the Gulf of Mexico, that random forest
2 model was informed by a lot of the VMS data, as well as a lot of
3 other pieces and parts in the western part of the Gulf of
4 Mexico, and there was not as much information going into that
5 random forest model development, and I had some questions about
6 how some of that data was input, or whether it was used at all,
7 and the one that -- My concern was there was a small set of data
8 from state-run SEAMAP programs that showed up at 0.04
9 probability of running into a red snapper.

10
11 My analysis of the Louisiana data showed it to be about 0.37, or
12 an order of magnitude higher. I asked what difference that
13 would make in the results of the random forest model, and I
14 think it would make some difference, but, until we get a better
15 understanding of how that model was implemented for the western
16 Gulf, I don't know that we can say it's 13 percent high
17 probability for the western Gulf.

18
19 **CHAIRMAN POWERS:** Do you want to run another scenario with a
20 different probability for the western Gulf?

21
22 **MR. BLANCHET:** I don't know what I would base that off of. It's
23 just my concern is that this as yet unproven exercise is being
24 used to then come up with something that might be turned into
25 catch advice, and I am kind of concerned about that.

26
27 **CHAIRMAN POWERS:** Yes, but, in a sense, you might look at it as
28 all we're doing is creating a grid that one can interpolate
29 between.

30
31 **MR. BLANCHET:** In that sense, I get that. I'm just concerned
32 that it sounds more scientific than it is.

33
34 **CHAIRMAN POWERS:** Yes. That is an issue. Ryan.

35
36 **MR. RINDONE:** Thank you, Dr. Powers. Just to be clear, and this
37 is from the Science Center, the top map here is from SEDAR 52,
38 from Working Paper Number 16, which can be taken from the SEDAR
39 website, and the bottom map there is from Matt Smith's
40 presentation on the Great Red Snapper Count-informed catch
41 analysis, just so people know where these came from.

42
43 **CHAIRMAN POWERS:** I am losing track. Who asked for it?

44
45 **DR. LORENZEN:** That was me. I wanted to know how the coverage
46 of the bottom longline index essentially relates to the fishing
47 intensity, and I am wondering whether we can put that somewhere
48 or you can email it to me, please. Thanks.

1
2 **CHAIRMAN POWERS:** Yes, I'm sure we can. Bob Shipp.

3
4 **DR. BOB SHIPP:** Thank you.

5
6 **CHAIRMAN POWERS:** I am not hearing anything, Bob.

7
8 **MR. RINDONE:** Dr. Powers, we can come back, if he comes back on.

9
10 **CHAIRMAN POWERS:** Yes. Is there anything more, in terms of
11 these graphs or these maps that people wanted to say or talk
12 about or interpret or request additions to? If not, then me go
13 back to other requests that we might have of the update to the
14 spreadsheets that we might outline what we need.

15
16 I suppose, for most of these things, because they are fairly
17 instantaneous, if we have a few more in the morning, if somebody
18 wants to think about it, I think they can respond to that, but
19 the difficulty is probably less in terms of updating the
20 spreadsheet, but rather putting it in a form that is easily seen
21 by us on the screen. Anyway, we'll keep that open.

22
23 With that, we've got about an hour-and-a-half left, and I would
24 like to take at least a five-minute break right now, and then
25 hopefully we can get through the bottom longline traditional
26 interim analysis before the end of the day. Let me take ten
27 minutes. I think I need ten minutes, and so we'll come back at
28 3:50 EDT. Thank you.

29
30 (Whereupon, a brief recess was taken.)

31
32 **CHAIRMAN POWERS:** Welcome back. I think we're at the stage now
33 to look at the traditional interim analysis, and, in this case -
34 - "Traditional", to me is a little bit of a misnomer too,
35 because I don't think we've applied it all that much, two or
36 three times.

37
38 In any case, this is the approach that would have been taken if
39 we had no Great Red Snapper Count, and this would be the
40 procedure that we had agreed to some time ago, and so let me
41 turn it over to the Center, and I believe Dr. Siegfried is
42 making that presentation, but I'm not sure about that.

43
44 **DR. SIEGFRIED:** It's LaTreeese Denson.

45
46 **CHAIRMAN POWERS:** Okay. Excuse me then. If you will proceed
47 then, LaTreeese.

1 **REVIEW OF RED SNAPPER INTERIM ANALYSIS (NMFS BOTTOM LONGLINE)**

2
3 **MS. LATREESE DENSON:** Hello, everyone. As Katie said, I'm
4 LaTreeese Denson, and I'm a new stock assessment scientist with
5 the Gulf Branch. I'm currently the co-lead for the research
6 track for red snapper.

7
8 As Mr. Chair said, yes, this is, I guess, traditional, in the
9 sense that it does not include the Great Red Snapper Count. It
10 is similar to the methods that have been conducted in the past
11 for gray triggerfish and red grouper.

12
13 Just to go through what's going to happen in this talk, I'm just
14 going to talk about some of the background, which Matt has
15 covered already in great detail, and then I'm going to go
16 through the different parts of the interim assessment, the
17 different decision points that there will be, and some of the
18 results from those decision points, and recommendations.

19
20 As you know, this interim assessment is based on an index, and
21 it's based on the bottom longline index, and the intention was
22 for it to occur on a regular interval in between different
23 assessments, faster than we would do a regular stock assessment,
24 where we have to do a collection of a bunch of different data
25 sources. This is based off of one data source that we believe
26 is -- The index that we believe is proportional to the
27 population size.

28
29 Using this index allows for us to update catch limits pretty
30 fast, if there has been changes in the stock size, changes due
31 to maybe recruitment changes, and possibly mortality changes,
32 and so this is providing advice basically without the Great Red
33 Snapper Count. We're basing it off of the last accepted stock
34 assessment, and so that was SEDAR 52, with a terminal year of
35 2016, and so that catch advice that was made previously was
36 based on 2016, and, as Matt said before, the OFL was 15.1
37 million pounds whole weight, and the ABC was set at 15.1, given
38 constant catch projections.

39
40 The data source we're actually going to use, and everybody knows
41 this already, is the bottom longline survey, and so here I have
42 a picture, and this is from the document that I believe is
43 online now, and here I have a picture of the coverage for that
44 survey, and the bottom picture is actually the catch per unit
45 effort in numbers per hundred hook hours from 2001 to 2020 for
46 the entire Gulf of Mexico, just to give you an idea of what the
47 coverage is. I believe this is updated also from what was shown
48 in the comparison graphs for the commercial index.

1
2 As some of you also know, the year 2020 was difficult for
3 sampling, and so, fortunately, the Dauphin Island Sea Lab's
4 bottom longline survey was actually able to go out and collect
5 samples in the eastern Gulf of Mexico. That information is used
6 as part of the NMFS bottom longline survey, and so, here, what
7 I'm showing you is the 2019 sampling in the eastern Gulf of
8 Mexico compared to what was able to be collected in 2020.

9
10 You will see that is reduced to south of 28 degrees North, and,
11 for the interim assessment, we needed an index of abundance that
12 was actually Gulf-wide and not split up into east and west, as
13 it has been for the SEDAR 52 and stock assessments previously.

14
15 To ensure that this was actually -- That this data was
16 sufficient to be used in a Gulf-wide index, some comparisons
17 were made, and so what you're looking at in this bottom graph is
18 the scaled indices, and so the reduced area. We took that
19 reduced area and used that area, the abundance from that area,
20 back in time to 2001, and the index was created using that area
21 for the eastern Gulf of Mexico, and that's what you will see in
22 this graph, with the orange being the 2020 update reduced.

23
24 Then you also see the 2020 update, which uses all the
25 information from the eastern Gulf of Mexico, as well as that
26 reduced area, all the information from 2001 to 2019 as well as
27 the reduced area in 2020, and that's that teal line. Then you
28 will see the eastern Gulf of Mexico index from SEDAR 52, which
29 stops in 2016.

30
31 Over time, the trends are pretty similar. What I do want to
32 point out to you all is that, in that last years, where we do
33 have this updated data from after SEDAR 52, the trends are
34 similar when we use that reduced area compared to when -- When
35 we used the reduced area compared to when we used the full area.
36 This let us know that this actually could be representative of
37 the eastern Gulf of Mexico and could be used in the full index
38 of abundance for the Gulf-wide.

39
40 Given that information, of course, we needed a Gulf-wide index
41 for this analysis, to provide Gulf-wide advice, and so the
42 choices are if you use that terminal year of 2019 without that
43 reduced sampling area or if you use the index with a terminal
44 year of 2020 and using that reduced area in 2020.

45
46 Looking at both of these indices over time, they are pretty
47 similar in trend, and so 2016 seems to be the year of highest
48 abundance, according to this index, and then they both agree

1 that there is some decline over time. Now, 2020 does have a
2 decrease, and this is likely due to the fact that those samples
3 are taken in the western Gulf of Mexico, but this is represented
4 in the confidence intervals around that index.

5
6 Using those two options of 2019 or 2020, these are used then in
7 the index-based interim assessment, which is based on Huynh et
8 al, 2020, and you guys have probably seen this before, where the
9 original model has -- To account for uncertainty in the observed
10 values in the recent years, there is an average used for those
11 recent years, and the catch advice is adjusted based on the
12 ratio of those observed values to the reference.

13
14 For us, we added a little -- A buffer for a little bit more
15 uncertainty, and we can increase that average window that we can
16 average from three years to five years, to incorporate more
17 uncertainty, and now that average is actually over the observed
18 values in the recent time period, as well as around that
19 reference period, and sorry I didn't say that before, but that
20 reference period, for us, is 2016, and so that's the reference
21 catch.

22
23 Putting those two together, you have two basic decision points,
24 and so you have selecting in the index terminal year of 2019 or
25 2020 and then using the moving window of three years or five
26 years, and, again, the five years allow for a greater buffer
27 against uncertainty, and so, here, I'm going to show you some of
28 those results.

29
30 If you adjust the current ABC of 15.1, using the index of the
31 terminal year of 2019 -- Here, I'm showing you the trend over
32 time, and that red dot is actually supposed to be over 2016.
33 The recent average is that red bar, and what I am showing you is
34 three years, and so 2017, 2018, and 2019, and around the
35 reference year, the reference catch, and that will be 2015,
36 2016, and 2017, and it's very simple.

37
38 The ratio that we would adjust our catch advice by, for the
39 three-year moving average, would be -- What you see here is
40 0.82, and so, if we then include more uncertainty by using the
41 five-year average, and so then we start to include those higher
42 values in the index of abundance, our index that we would adjust
43 our catch advice would be 1.02, and so, basically, you would be
44 adjusting your catch advice by 18 percent, by decreasing the
45 catch advice by 18 percent, if you use the three-year average,
46 and increasing it by 2 percent if you were using the five year.
47 This is just because of the trend in the index. We are just
48 adjusting the catch based on the trend in the index.

1
2 Now, if you use 2020, 2020, again, we had that lower value in
3 the index in the year 2020, and so, of course, that's going to
4 bring down your ratio, and so, looking here, again, it's the
5 same reference year, and the catch in 2016 was 15.1, or the
6 catch advice, and now our ratios of the observed to the
7 reference years for the three years would be 0.64, and then, for
8 the five-year, it would be 0.92, and so, as you can see, with
9 the five-year again, the decrease would be less, because we're
10 taking in more uncertainty, given the changes over time.

11
12 To summarize all of that, here on the left, in this table, you
13 have the index terminal year versus the harvest control rule,
14 whether you're using that three-year or five-year average, and
15 how those ratios change. Anything above one, obviously, you're
16 increasing the catch. Below, you're decreasing the catch, given
17 the index of abundance advice.

18
19 Here, I have it for 2021 advice, and that's just summarizing
20 those slides, and so the lowest you will see -- The decline you
21 will see, is if you were to use that 2020 three-year average,
22 but, here, you have this 2020 five-year average, where you're
23 also using some of the most recent data that we have, and then
24 you're also allowing for the uncertainty that is possibly in
25 that data.

26
27 A recommended new ABC, based on this kind of interim assessment
28 of not including the Great Red Snapper Count and based off of
29 somewhat newer data, would be 13.94 million pounds whole weight,
30 and, if you separate that based on the commercial and
31 recreational sectors, commercial would be 7.11. Separating out
32 the recreational into federal for-hire and private, you can see
33 here 2.89 and 3.94.

34
35 Just to refresh everybody, the current OFL is 15.5, and the
36 current ABC is 15.1, and so all of these decrease, except for
37 one of the scenarios, decrease the catch, but that's based on
38 the index of abundance that we assumed the change is
39 proportional to the stock size. With that, I will take any
40 questions, and I hope my New York speed did not lose anybody.

41
42 **CHAIRMAN POWERS:** Thank you. All right. The whole idea of the
43 interim assessments are basically to do a pseudo-assessment,
44 where you're essentially adjusting the catches based on the ups
45 and downs of a representative index, and with enough buffers in
46 there so that it doesn't react too, too quickly to those ups and
47 downs. Kai.

1 **DR. LORENZEN:** Thank you, LaTreese. Three things. One is that
2 I think we shouldn't pay too much attention to 2020, for exactly
3 the reasons that you outlined, and so I would be discounting
4 that a little bit. As Joe pointed out, the idea of this
5 analysis was to essentially update the assessment in the light
6 of changes in abundance, and, historically, one of the ways the
7 stock assessment model for red snapper was a little bit off was
8 that the stock seemed to be rebuilding faster, somewhat faster,
9 than the model predicted, and so, if that was still the case, we
10 would have gotten an increase in catch limits out this analysis.

11
12 I think it's interesting and noteworthy that that no longer
13 seems to be the case, and so it seems that, in fact, that
14 rebuilding is stalling a little, and the third point is that, as
15 we've just seen, this is a survey that is based on essentially
16 natural reef and unconsolidated bottom, in the parlance of the
17 Great Red Snapper Count, and, in fact, here, we are using the
18 trends in that part of the red snapper population as really
19 probably the best index of abundance for red snapper.

20
21 You can see that the abundance there was extremely low at the
22 time of the -- Well, the very low Gulf-wide abundance, and it
23 increased, and, at the moment, it seems to be stalling, and what
24 that tells me is that this is in no way disconnected from what
25 is going on on the more structured habitats, where a lot of the
26 fishing is concentrated.

27
28 I think it should make us think quite hard about the idea of the
29 big cryptic biomass. We know that there is biomass there, and
30 it probably saves us, in cases where we have really fished
31 abundance on structures down to near nothing, but it's in no way
32 largely removed from the impact of fishing. Thanks.

33
34 **CHAIRMAN POWERS:** Thank you. Luiz Barbieri.

35
36 **DR. BARBIERI:** Thank you. Thank you, LaTreese, for the
37 presentation, and welcome to the Southeast Fisheries Science
38 Center. I am not familiar with you, and we haven't met yet, and
39 so you must be new to the team, or relatively new, and so I just
40 wanted to say welcome to the Center, and it's always good to
41 have new analysts joining our team in the region.

42
43 I have a few questions. Number one, can you give me a little
44 more information on the size selectivity, just a range, more or
45 less, of the bottom longline here? I am trying to see what size
46 or age groups this gear is actually indexing, if you have that
47 information handy.

1 **MS. DENSON:** Thank you for that welcome. Yes, I am fairly new.
2 This is based off of -- Someone can correct me, but this is
3 based off of what I know from SEDAR 52. At least 50 percent are
4 selected at age nine to twenty in the east, and seven to twenty
5 in the west. Does that answer your question, or if someone else
6 can jump in and add more context to Luiz's question.

7
8 **DR. BARBIERI:** I think that's good enough. I mean, that gives
9 me an idea, LaTreese, of the size.

10
11 **CHAIRMAN POWERS:** Katie wants to mention something.

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

14
15 **DR. SIEGFRIED:** If Luiz is happy, then I'm happy, and we just
16 have plots and all kinds of fun pictures to show you, Luiz, if
17 you want to see that in more detail, and Adam Pollack provided
18 that for this meeting.

19
20 **DR. BARBIERI:** Well, if you don't mind, Katie, that would be
21 super helpful.

22
23 **DR. SIEGFRIED:** Sure. I will forward it to Ryan, so that he can
24 put it up on the screen.

25
26 **DR. BARBIERI:** That would be great. Thank you, Katie. Mr.
27 Chairman, just a couple more questions for LaTreese. LaTreese,
28 if you could give me a little bit of additional background on
29 the choice of the bottom longline as the fishery-independent
30 index for this interim analysis, and I know that the Center has
31 been looking at the different stocks, the different species, and
32 has been looking at different indices of abundance. This choice
33 was made based on the fact that this index, you believe, best
34 represents what is indexing Gulf-wide abundance of red snapper,
35 correct?

36
37 **MS. DENSON:** Yes, and so the bottom longline is indexing the
38 adult population of red snapper in the Gulf of Mexico, and it
39 was also one of the surveys, maybe one of the only surveys, to
40 actually have the updated data for 2020, but I know that we
41 might not be using that one, and so that was one of the reasons,
42 and this indexes the adult population, and it was thought to be
43 the best index at the time. I think some higher-ups might have
44 some more, as to why we selected that.

45
46 **DR. BARBIERI:** Okay. Thank you. This next question might have
47 to do with information that Katie might be showing us in a
48 little bit, but I was curious about, on average, the number of

1 sets that this survey completes every year.

2
3 **MS. DENSON:** That is a good question. Is Adam online? He might
4 have more information on that one.

5
6 **DR. BARBIERI:** Okay. While we wait for that, LaTreeese, and this
7 is my last question, but your Slide Number 6, that has the two
8 indices side-by-side, with the terminal year of 2019 versus
9 2020, my interpretation of the year 2019 terminal year is that
10 that graph shows data Gulf-wide and not just for the eastern
11 Gulf, and is that correct?

12
13 **MS. DENSON:** Yes, these are Gulf-wide.

14
15 **DR. BARBIERI:** Okay. Thank you, LaTreeese. I am done, Mr.
16 Chairman.

17
18 **CHAIRMAN POWERS:** Thank you. I think you wanted to see some
19 other figures, and I think they're coming up now.

20
21 **MR. RINDONE:** Katie or Adam, do one of you want to talk to this?

22
23 **MR. ADAM POLLACK:** Sure. In this figure, on the left-hand side
24 is the length frequency histogram. A is the western Gulf, and B
25 is the eastern Gulf, from the NMFS bottom longline survey.
26 Then, on the right-hand side, this is the age distribution for
27 the same, and so A and B are western Gulf, and C is eastern
28 Gulf.

29
30 To answer the other question, in the Gulf of Mexico, in a
31 typical year, we had anywhere from about 150 to 200 stations,
32 Gulf-wide, on the survey.

33
34 **DR. BARBIERI:** Thank you so much, Adam. I really appreciate you
35 bringing up this additional information. Thank you.

36
37 **MR. POLLACK:** You're welcome.

38
39 **CHAIRMAN POWERS:** Thank you. Jim Tolan.

40
41 **DR. TOLAN:** Thank you, Mr. Chair. I will echo the welcome to
42 LaTreeese, and I feel for you, if this is the first species that
43 you've been assigned to. You've been basically thrown into the
44 woodchipper, but the question that I was going to ask has been
45 addressed by both Kai and Luiz, in terms of the inclusion of the
46 2020 information, in terms of west and east, and so I will yield
47 the floor, but welcome to the group.

1 **CHAIRMAN POWERS:** Thank you. Doug Gregory.

2
3 **MR. GREGORY:** Thanks. Adam, I hate to impose on you, but could
4 you quickly tell us -- I mean, with 250 samples, and you're
5 using other gear as well, video gear and trawl gear, and what
6 different gears do you use simultaneously at a station, and then
7 with the bottom longline, have you looked to see if the
8 distribution of the sampling sites might have changed
9 significantly in any year that would influence the trend, let's
10 say, or a peak in this? Thank you.

11
12 **MR. POLLACK:** For our surveys, we don't fish any gear
13 simultaneously. All of our surveys are pretty much single gear,
14 and we have our SEAMAP trawls, and they are conducted in the
15 summer and the fall, and we pull a forty-foot shrimp trawl, and
16 that is now Gulf-wide.

17
18 In the late summer, between August and September, that's when
19 the bottom longline survey runs, and it's Gulf-wide, and then
20 there is the reef fish survey that is also Gulf-wide, and
21 they're setting cameras on -- Previously, it was on natural
22 reefs, and they have expanded that sampling to include
23 artificial reefs now, and that is typically done in the spring
24 and early summer, and that's done in conjunction with FWRI and
25 the Panama City NMFS lab, also. Then we also have an
26 ichthyoplankton survey that takes place in September, in August
27 and September, that is looking for the larvae. Was there a
28 second part to that question, Doug, that I missed?

29
30 **MR. GREGORY:** I think it's inconsequential, but I was wondering
31 if you noticed any gaps over the years with the randomness of it
32 all, but, more importantly, I think, to me, is do you try to
33 avoid natural rough bottom with the bottom longline, like you do
34 with the trawls, for obvious reasons, and you don't want to
35 damage the gear, and so you might lead more toward flatter
36 bottom, or the uncharacterized bottom?

37
38 **MR. POLLACK:** With the sampling, if you pull up the SEDAR 52
39 paper, that will have the sample distributions by year, just so
40 you can see, and, I mean, we do a pretty good job of keeping it
41 random. For the natural bottom, we typically avoid the large
42 banks, and we try not to set over that bottom, but, otherwise,
43 it's pretty much over whatever it out there, and we do stay a
44 mile away from any platforms, and that's just a limitation of
45 the survey vessel. Other than that, we typically don't set in
46 fairways, for obvious reasons.

47
48 **MR. GREGORY:** Right.

1
2 **MR. POLLACK:** For like the natural bottoms off of Florida, we
3 don't avoid them, and just the larger banks that would damage
4 the gear, like the Middle Grounds and such.

5
6 **MR. GREGORY:** Right. Okay. I appreciate it. Take care.

7
8 **CHAIRMAN POWERS:** Thank you. Dr. Siegfried, Katie.

9
10 **DR. SIEGFRIED:** Thanks, Chair. If Doug would like to see the
11 pictures to go along with Adam's explanation, I forwarded the
12 reduced area document, and I didn't see it on the website, but
13 that goes year-by-year through sampling design that Adam was
14 discussing, and I think it starts with 2001 in the paper and
15 goes through the end, but let's take a look.

16
17 **MR. GREGORY:** I wouldn't expect it to vary very much, but, with
18 hurricanes and everything, something could happen in certain
19 years, and I'm sure you all have looked at all that.

20
21 **DR. SIEGFRIED:** We're happy to show you, Doug. I mean, a
22 picture is worth a thousand words, right, and so I think it
23 starts in the appendix, Appendix Figure 1. That is the stations
24 sampled altogether, and there we go. It starts in the upper-
25 left is 2001, and then read row-wise to the sampling, if Adam
26 wants to comment any more about it, but this is what's in that
27 paper. Thank you.

28
29 **MR. POLLACK:** Doug, as you pointed out, we do have some issues
30 occasionally, with hurricanes or vessel breakdowns, and that
31 will be the gaps that you see in some of the years, and so I
32 should also point out that the survey does sample out to 366
33 meters. From my analysis, I drop all the data greater than 183
34 meters, because we've never had a catch of red snapper out past
35 that point.

36
37 **CHAIRMAN POWERS:** Thank you. Dr. Cass-Calay. We haven't heard
38 from you in these last few days.

39
40 **DR. CALAY:** My team is very competent, and so I rarely feel the
41 need to speak. I wanted to understand better where the SSC is
42 headed with this line of questioning. If the concern is whether
43 there is any reason to doubt the decline between 2016 and 2019,
44 that could be a very important conversation, but, if really,
45 what you're interested in is understanding whether the Science
46 Center prefers this analysis over the one informed by the Great
47 Red Snapper Count, I wanted to remind the group that the SEDAR
48 52 stock assessment is still done in CHTS units.

1
2 The advice that we would be adjusting is essentially assuming
3 those lower removals than what we currently understand, and so
4 the interim analysis that LaTreese presented very well I'm
5 reminding the group is based on CHTS recreational estimates and
6 is not informed by the Great Red Snapper Count. Thank you.

7
8 **CHAIRMAN POWERS:** Thank you. I think most of the questions are
9 really about interpreting the index, in terms of an overall
10 perception of what's going on for the stock and not necessarily
11 how it might get applied to that, but your point about the FES
12 versus CHTS I think is important, because I guess we would be
13 reminded that, if we were to use the traditional interim
14 analysis sort of approach, that would have to get re-scaled at
15 some point, in terms of FES, correct?

16
17 Like I said, I think most of the discussion really is not
18 necessarily a discussion of picking one method versus another,
19 but rather interpreting the perceptions of what is happening
20 with the stock over the last years, and I think Kai Lorenzen
21 sort of characterized this as a recovery, perhaps, that is
22 stalled, according to the index anyway.

23
24 **MR. GREGORY:** Mr. Chair, my interest is in understanding the
25 survey better, because, over the years, I've had high hopes of
26 this survey actually capturing those larger fish in the
27 uncharacterized bottom that I used to see in the landings from
28 the vertical buoy gear that was outlawed in 1992, and so I just
29 want to learn more about the survey, because it seems like
30 that's the area it's sampling, more than discrete pipelines or
31 artificial reefs, and it's a longline over a distance that is
32 covering a variety of bottom. Thank you.

33
34 **CHAIRMAN POWERS:** Thank you. Thank you for making that
35 clarification. Kai Lorenzen.

36
37 **DR. LORENZEN:** I just had a question of clarification to Shannon
38 about the units, and I am assuming here that -- This is the
39 other presentation, actually, the Great Red Snapper Count-
40 informed analysis, and I'm assuming that that results table that
41 compares the current ABC and the sort of proposed revised ABCs,
42 that both of those are in CHTS units, and so they're in the same
43 units, correct?

44
45 **DR. CALAY:** Are you speaking of the Great Red Snapper-informed
46 analysis?

47
48 **DR. LORENZEN:** Yes. I'm just making sure they're in the same

1 units, and so this is the one, and so the current ABC and the
2 revised ABCs are in the same units, and so we're talking about
3 an actual -- In the first column, the 40 percent increase in
4 removals.

5
6 **DR. CALAY:** This has been an open question. These are in
7 numbers of fish, multiplied by the average weight, and so these
8 are pounds of fish. They are informed by the relative Fs from
9 the SEDAR 52 assessment, which was conducted in CHTS units. I
10 will leave it at that.

11
12 **CHAIRMAN POWERS:** My interpretation is it's -- Well, I guess
13 you're telling me the same thing, that it's kind of vague.
14 What's being used is an F 20 percent SPR, which implies a
15 certain -- Adjusting the F level and selectivities, and, in some
16 sense, all you're doing is multiplying an F level times
17 abundance, and so the catch you get is the catch you get, and so
18 presumably that would be in whatever units, the FES units, but
19 it also gets affected a little bit by how you chose the
20 selectivities and things like that, and so I'm not entirely
21 clear either, I guess, about that.

22
23 **DR. WALTER:** Chair, if I could comment, and I don't see my hand
24 here, and so pardon me for my rudeness, and you can either call
25 me in order or --

26
27 **CHAIRMAN POWERS:** Go ahead.

28
29 **DR. WALTER:** Really, we want to separate the units that this is
30 measured in, and a lot of the discussions about calibrations and
31 things like this from the discussion here, particularly related
32 to what the SSC needs to think about, this is in units of fish.
33 When we have looked at selectivity within some sensitivities,
34 it's really not -- The overall ABC is really not very sensitive
35 to say changing allocations across commercial and recreational,
36 because the selectivities are quite similar.

37
38 For the most part, and we can show some of those analyses if we
39 need to, it's a non-issue to really worry about that too much at
40 this point, and, in terms of the units, it's fish, how it gets
41 monitored, and how that -- That is a management and monitoring
42 issue, and I think that's something that we can work on as it
43 come up down the line.

44
45 **CHAIRMAN POWERS:** Yes, but that row that says current ABC,
46 that's in some units, and what are those?

47
48 **DR. WALTER:** That's in CHTS.

1
2 **CHAIRMAN POWERS:** Okay. That's my understanding, too.

3
4 **DR. LORENZEN:** If I can follow-up on that, I think this is
5 important, and we cannot just ignore this, because -- I mean, my
6 question was, is the difference that we're seeing here between
7 the current ABC and the calculated catches under the different
8 scenarios, is that the actual difference in removals that we're
9 looking at, and, therefore, also, is the percent increase the
10 actual percent increase that we're looking at, in terms of
11 removals, and, if they're not in the same unit, and they're not
12 comparable, it's very difficult to make sense of this analysis.

13
14 **CHAIRMAN POWERS:** John, did you want to respond to that?

15
16 **DR. WALTER:** Yes, and perhaps putting the current -- In terms of
17 making sense of the analysis, Kai, I think you're meaning making
18 sense of that percent increase and the current ABC, and so
19 particularly those two lines. Had we redone, and when we do
20 redo, the assessment in FES, and it looks like FES numbers are
21 higher than CHTS, presumably, it's going to give a higher ABC,
22 simply on the basis of that, which might then make this
23 difference less, and, in that case, it is probably not a
24 particularly useful analysis here, that comparison.

25
26 **DR. LORENZEN:** Yes, and I understand that, John, and I think my
27 concern is, the way I look at this, is that I want to understand
28 how much more of the removal are we looking at, if we go with
29 one of those options here, and so I'm really not concerned about
30 the units, but I do want to know whether, essentially, we're
31 proposing 40 percent more actual removal or that -- It seems we
32 kind of don't know.

33
34 **DR. WALTER:** That's right. We would have to convert the current
35 ABC somehow into the FES, and it's really difficult to do that
36 without running it through the actual assessment process.

37
38 **CHAIRMAN POWERS:** Ryan, did you have a comment relative to this?

39
40 **MR. RINDONE:** I didn't, but I do now. The first thing that I
41 was going to say was that, if anyone wants to learn any more
42 about how the NMFS bottom longline survey is conducted, Mr.
43 Pollack has submitted numerous working papers over the years to
44 SEDAR, in development of that index for the SEDAR data
45 workshops, the most recent one being SEDAR 52, and that is
46 Working Paper Number 16, and so you can download that from the
47 SEDAR website and peruse how that survey is conducted.

1 Insofar as it relates to this table, it probably would be
2 helpful to note that the current ABC is in CHTS units, and, like
3 Dr. Calay pointed out, a lot of the information that was used as
4 a surrogate for information that was presently unknown, as far
5 as like exploitation rates, recruitment, selectivity,
6 catchability, et cetera, was all taken from the SEDAR 52 stock
7 assessment, which is in CHTS units, but using the point estimate
8 of absolute abundance from the Great Red Snapper Count, which
9 Dr. Chagaris had talked about making some modifications to a
10 little bit earlier, based on a different understanding of the
11 variance.

12
13 Insofar as all of that relates to what these numbers actually
14 mean, we have a separate method entirely that has been used for
15 determining the absolute abundance that is separate from what
16 was done in the SEDAR 52 assessment, but, because we have to get
17 the data to get us to this point from somewhere, the most
18 logical place to get it from was the SEDAR 52 assessment, which
19 used CHTS units.

20
21 The transition to FES, either through monitoring or otherwise,
22 won't come until the next stock assessment, and there is no way
23 to create those numbers until we are able to incorporate things
24 like the Great Red Snapper Count and then all the years between
25 2016 and now from the other indices that were considered for
26 SEDAR 52 through the SEDAR 74 process.

27
28 To get to that point is not something that's going to be
29 possible today or tomorrow or this year, and so what you guys
30 have in front of you is, generally speaking, with some
31 modifications by Matt, based on your preferences, is what's
32 available.

33
34 **CHAIRMAN POWERS:** Yes, and sort of reiterating, I believe, what
35 John is saying. Remember that, basically, when you take the
36 Great Red Snapper Count, that's giving you numbers-at-age, and
37 you pick selectivities and sort of balance them out between the
38 different kinds of fisheries, and that's based on the
39 assessment, but the scale -- There is some effects of scale
40 there, but, essentially, all you're doing is what's the apical F
41 that produces the F 26 percent SPR, and, so in a sense, what's
42 in those columns is the recommended catch, in the best units,
43 whatever the units are.

44
45 What's different is the row about current ABC and the row about
46 percentage increase and things like that, and the numbers -- If
47 you accept the numbers-at-age from the SPR from the Great Red
48 Snapper Count, and you accept the selectivities, it's pretty

1 straightforward to basically find an F level that gets you to 26
2 percent SPR, and that F level gets translated into a catch that
3 gets translated into a catch environment. Ryan.

4
5 **MR. RINDONE:** Just to kind of punctuate it, Dr. Powers, I guess
6 the best way to look at this is that these yields that you guys
7 see are in CHTS-equivalent units, given the data that were used
8 to calculate them.

9
10 **CHAIRMAN POWERS:** Harry.

11
12 **MR. BLANCHET:** The question I have is the last line on that
13 slide says catches, or landings, plus dead discards, and I
14 thought the ABCs were landings only.

15
16 **MR. RINDONE:** Harry, when these catches are projected, it's
17 landings and observed dead discards, and those B1s make up a
18 very small portion of the total catches, and so they are usually
19 included, but they're an extremely small percentage.

20
21 The unobserved dead discards, or the B2s, especially for the
22 recreational fleets, and, in the case of red snapper, also
23 sometimes the closed season fleets that are used in the model
24 for the commercial vertical line and longline fleets, basically
25 for when those vessels don't have allocation to be able to
26 retain red snapper, those discards, or those B2s, can make up a
27 substantial portion, but those are not included in monitoring of
28 the ACLs, and so it's the landings and the observed dead
29 discards, the As and the B1s, for the recreational fleet and
30 then the observed commercial landings.

31
32 **MR. BLANCHET:** So that does include the closed season
33 recreational dead discards?

34
35 **MR. RINDONE:** No, and those would be B2s, but the effects of
36 discard mortality are accounted for elsewhere within the model,
37 and so commercial and recreational, and I forget which table it
38 is in the stock assessment, but there's a pretty detailed
39 breakdown by fleet and by open and closed season, pre and post
40 implementation of circle hook requirements, for what discard
41 mortality rates are for red snapper. We probably have more data
42 for this species on that than we do for any other that we
43 manage.

44
45 **MR. BLANCHET:** Okay. I just wasn't sure that those were really
46 equivalent. If you all say that they are, I'll go along with
47 it.

1 **CHAIRMAN POWERS:** All right. Thank you very much to our
2 presenters and all participants. We're sort of reaching a
3 point, I think, for today where we're sort of winding down. My
4 preference would be to adjourn for the evening.

5
6 Tomorrow, we have to make some decisions, and so I would
7 encourage people to formulate, in their own minds, how they
8 think we ought to proceed, and perhaps some people actually
9 formulate, in writing, how we might make a recommendation to the
10 council, or recommendations to the council, in regard to what
11 the catches are for 2021 and, if so desired, for other years.

12
13 Essentially, the options are myriad, and what we've talked about
14 is a range of values that would fit into this Great Red Snapper
15 Count-informed analysis, a range of values there, and we also
16 have -- If that were rejected completely, we have the interim
17 analysis, and then I suppose we could do nothing as well, and
18 that is an option, but certainly with big ramifications.

19
20 If those are the kinds of framework which we could do, and, more
21 than anything, I think, when we make decisions, we would like to
22 have a reasonable justification for those decisions, a
23 reasonable scientific justification for those decisions.

24
25 The kinds of things that I believe we should -- If not in
26 motions themselves, then certainly in the discussion, is the
27 things that have been talked about previously about the
28 traditional fisheries have been overfished, traditional areas
29 have been overfished, and how increases in quotas -- How fishers
30 might respond to that and how effort might be distributed in the
31 unclassified area versus the natural bottom and artificial reef
32 areas, all those sorts of things.

33
34 There's a wide range of ways in which we might respond, and,
35 hopefully, tomorrow, we can kind of hone-in on the most
36 appropriate set of advice that we can give the council. Are
37 there any other comments relative to this before we adjourn?
38 John Mareska and Ken Roberts, but first John.

39
40 **MR. MARESKA:** Thank you, Mr. Chairman. I actually wanted to
41 follow-up on the comment that Dr. Patterson made before the
42 break about clarifying what Kai's intent was in the motion that
43 passed, as to what was east and what was west, and I assume that
44 he meant the current break that's used in the current stock
45 assessment as being east and west?

46
47 **CHAIRMAN POWERS:** Kai.
48

1 **DR. LORENZEN:** Yes, and I have to say that this was informed,
2 really, by one of the consultants' reports, and I think it was
3 Dr. Cadrin, who more or less made that distinction, but, yes, I
4 would say it was that eastern and western sub-stock distinction
5 that is in the assessment, but, at the same time, I wouldn't --
6 This is not a gold standard, and I was trying to come up with
7 something that was broadly reflective of the input we had from
8 the consultants and the discussions, and this is not meant to be
9 a precise assessment, if you see what I mean. Thanks.

10
11 **CHAIRMAN POWERS:** Thank you. John, are you okay?
12

13 **MR. MARESKA:** Yes.
14

15 **CHAIRMAN POWERS:** Okay. Ken Roberts.
16

17 **DR. ROBERTS:** Thank you, Mr. Chairman. I know you deserve a
18 break, more than all of us, and you want to get out of here, but
19 I know, yesterday, you called and allowed for some input from
20 the public that was listening in, and I don't know if you
21 intended to do that or not today, and so this is just a
22 reminder, in case you were. Thank you.
23

24 **CHAIRMAN POWERS:** It's up to the powers that be, and not this
25 powers, but, basically, it's on the agenda for tomorrow, but I
26 will leave it to Mr. Frazer, if you wish to have input at this
27 point in time.
28

29 **MR. RINDONE:** It's on the agenda for tomorrow, and so, at this
30 point, we'll expect to receive comment from the public about
31 these deliberations tomorrow.
32

33 **CHAIRMAN POWERS:** Okay. Thank you. All right. I expect 9:00
34 a.m. with enthusiasm and solutions. All agreed? All right.
35 Thank you very much, and particularly thank you for the input
36 this afternoon from the Southeast Center. I think that's very
37 helpful. Thank you. See you at 9:00 a.m. tomorrow.
38

39 (Whereupon, the meeting recessed on April 1, 2021.)
40

41 - - -
42

43 April 2, 2021
44

45 FRIDAY MORNING SESSION
46

47 - - -
48

1 The Meeting of the Gulf of Mexico Fishery Management Council
2 Standing and Special Reef Fish and Socioeconomic Scientific and
3 Statistical Committees reconvened via webinar on Friday morning,
4 April 2, 2021, and was called to order by Chairman Joe Powers.

5
6 **CHAIRMAN POWERS:** Good morning, everybody. I guess, pursuant to
7 the discussion that we had at the very end yesterday, I've been
8 informed that we should have a public comment period to open
9 this meeting at this time. My question is, does this mean that
10 we will not have a public comment period at the end of the
11 meeting, Ryan or Dr. Frazer?

12
13 **MR. RINDONE:** Dr. Powers, that's correct.

14
15 **CHAIRMAN POWERS:** Okay. Thank you. With that, then me just
16 turn it over to Ryan, and he can kind of guide the public
17 comment through this. Thank you.

18
19 **MR. RINDONE:** Thank you, Dr. Powers, and good morning, everyone.
20 Part of the reason why we're moving this up is just the
21 uncertainty about how long these deliberations might last, and
22 just to give folks an opportunity, at this point, to get some of
23 those comments that they might have, so we can get those
24 recorded on the webinar. As you would like to speak, go ahead
25 and raise your hand, and we'll put you up in the queue that Jess
26 is putting up on the screen now, and everyone that wants to
27 speak will be given a few minutes to do so, and so we'll start
28 with Ms. Ralston.

29
30 **PUBLIC COMMENT**

31
32 **MS. RALSTON:** Thanks, Ryan. My name is Kellie Ralston, and I'm
33 representing the American Sportfishing Association. I really
34 appreciate the additional opportunity for public comment this
35 morning, prior to your final deliberations today. I know it's
36 been a difficult week, and you still have some difficult
37 decisions to make, and difficult discussions have been ongoing,
38 and so know that many of us have listened along with you through
39 it all this week, and so I certainly understand the challenges
40 that you have faced.

41
42 Here's what I have heard so far, that the Great Red Snapper
43 Count is a foundational study, and it's a credit to the
44 investigators. It's a groundbreaking study, and there's been
45 lots of other praise for the study overall.

46
47 On the science side of things, I've heard that we know that
48 there are more fish out there, red snapper, than we previously

1 thought, that the Great Red Snapper Count really represents an
2 overall underestimate of abundance, potentially, but also
3 potentially underestimated the amount of variance as well, due
4 to challenges that arose with such a large-scale study.

5
6 I also heard that the best scientific information available bar
7 says it's doesn't have to be perfect and that you can temper
8 your concerns with caution in your final advice to the council.
9 I also heard that there are uncharacterized bottom options, or
10 options to deal with those challenges in the uncharacterized
11 bottom in the Great Red Snapper Count interim analysis, and so,
12 kind of to summary that, ASA would urge you to use the Southeast
13 Fisheries Science Center's Great Red Snapper Count interim
14 analysis for your decisions today and then provide a wide sweep
15 of options, with any caveats that you feel are necessary, for
16 the council's consideration. I thank you for your time.

17
18 **MR. RINDONE:** All right, Kellie. Thank you so much. Next, we
19 have Jeff Angers.

20
21 **MR. ANGERS:** Good morning, Ryan. My name is Jeff Angers, and
22 I'm the President of the Center for Sportfishing Policy. Thank
23 you, again, for allowing another opportunity for public comment
24 this week.

25
26 As I did on Wednesday, I would like to second what my colleague,
27 Kellie Ralston, said, and said so beautifully. This is an
28 unprecedented look at this fishery, and it explains so much of
29 what stakeholders have seen on the water, day in and day out,
30 for years. The recreational fishing community, particularly
31 across the Gulf, has tremendous confidence in the Harte Research
32 Institute and all of the leaders of the Great Red Snapper Count,
33 and we were pleased to hear the lively discussion about all of
34 the minutia through this week.

35
36 I will repeat what I said on Wednesday, that we encourage you to
37 don't let the perfect be the enemy of the good. There are
38 always questions with new science, and we, of course, want you
39 to honestly evaluate those. What we hope that this committee
40 will find is that this massive project undertaken by some of the
41 brightest minds in marine science represents a tremendous step
42 forward in our understanding of this stock and truly represents
43 the best science we have on the range and population of red
44 snapper in the Gulf. Thank you very much.

45
46 **MR. RINDONE:** Thank you, Mr. Angers. Captain Zales.

47
48 **MR. BOB ZALES, II:** This is Bob Zales, and I'm representing the

1 National Association of Charter Boat Operators, and also the
2 Southern Offshore Fishermen's Association. The information that
3 I've heard over the past couple of days while I've been fishing
4 has been very good, and we're real happy with how everything is
5 being looked at.

6
7 I want to make one point, and there was some discussion
8 yesterday about the harvest from the commercial bottom longline,
9 and there was very little harvest of red snapper on that
10 longline, and I want to be sure that everybody at that table
11 understands that the reason for that is that those commercial
12 longline fishermen don't have any allocation, and, to try to get
13 allocation, they have what's called a quota bank, and you can
14 get allocation from that quota bank, but, in order to do that,
15 you have to join the organization that sponsors that quota bank,
16 and a lot of these people don't have the same philosophy, and so
17 they don't do it.

18
19 At the same time, the lease rates are very high, and there's not
20 very much difference between what they have to pay for a lease
21 and what they get per pound for the fish, and so, in many cases,
22 it's not worth the effort to try to do that, and so you're
23 discarding a whole lot of red snapper in those bottom longlines,
24 and, when you're talking about that bottom out there, that
25 uncharacterized bottom, according to what I am hearing from
26 these longline fishermen, there is a tremendous amount of
27 snapper out there that they're discarding, and so we need to be
28 able to figure out a way to handle those discards, because it's
29 not good for the fishery, and it's clearly not good for the
30 economics of the fishermen, and so we need to do that.

31
32 On the charter side, we're anxious to see where all this is
33 going to end up. The interim analysis, or assessment, that I
34 saw yesterday provided a little bit of an increase in the quota,
35 it looked like to me, and so we're anxious to see how the Great
36 Red Snapper Count is going to affect this, and so keep up with
37 the good work, and we appreciate all the discussion, and there's
38 been some good, lively discussion on there, and I see that
39 there's been some questions about some of the data that's going
40 to get straightened out, and so thank you all, and we appreciate
41 what you're doing.

42
43 **MR. RINDONE:** Thank you, Captain Zales. Is there anyone else
44 out there that would like to make a comment? If so, just hit
45 the raise-your-hand icon on your control panel, on the right-
46 hand side of your screen. Ms. Rosenberg.

47
48 **MS. ASHFORD ROSENBERG:** Good morning, SSC, and thank you, once

1 again, for another opportunity to provide comment. I'm Ashford
2 Rosenberg, and I'm the Policy Analyst with the Gulf of Mexico
3 Reef Fish Shareholders Alliance. Again, along with everyone
4 else on this call, I want to commend the tremendous work that's
5 gone into this study to help better understand the science of
6 red snapper in the Gulf of Mexico.

7
8 Based on what we've heard in the last few days, there are some
9 outstanding questions, and, while those don't take away from the
10 immense work done here, I just want to urge a little bit of
11 caution. This fishery is rebuilding, and it has been rebuilding
12 for the last thirty years, and fishermen have made a lot of
13 choices and sacrifices to make sure that happens, for the good
14 of the resource, and so I just wanted to urge a little bit of
15 caution to make the decision that's best for the resource and
16 best for the fishery moving forward. Thank you so much.

17
18 **MR. RINDONE:** Thank you, Ashford. Is there anyone else out
19 there in webinar-land that would like to make public comment?
20 All right. Seeing none, Dr. Powers, it's all yours.

21
22 **CHAIRMAN POWERS:** Thank you very much, and thank you for those
23 comments. I think, at this point, there were some outstanding
24 requests for some simple calculations that were requested, and I
25 would like to know the status of those and if we might deal with
26 those first.

27
28 **MR. RINDONE:** Matt Smith, I think that one is you.

29
30 **DR. SMITH:** All those calculations that were requested yesterday
31 have been run, as well as a couple of additional ones that
32 provide some extra context, and they are being looked at this
33 morning by Katie, Shannon, and John, just to make sure I didn't
34 do anything horrendously wrong, which I don't think that I did,
35 and so they should be coming and available shortly, just as soon
36 as they get the review completed, and I'm not sure how long that
37 will take, but it's not all that much to look at, and so
38 hopefully pretty soon.

39
40 **CHAIRMAN POWERS:** All right. At this point, it's the will of
41 the committee how to proceed, because, essentially, we are at
42 the point of formulating some recommendations, via motion or
43 whatever, to the council.

44
45 **MR. RINDONE:** Dr. Powers, if it's the committee's pleasure, you
46 guys could recess for thirty minutes, to wait for that review to
47 be completed and have the information distributed, to see if
48 that's enough time.

1
2 **CHAIRMAN POWERS:** If it is enough time, that would be a very
3 good idea.

4
5 **MR. RINDONE:** That way, folks aren't jumping off the webinar and
6 then having to log back on. You can just kind of leave it
7 running in the background, and everyone can leave themselves
8 muted.

9
10 **CHAIRMAN POWERS:** Matt, is that likely to be enough time?

11
12 **DR. SMITH:** I would think so. I am, obviously, not the one
13 reviewing the work. Shannon just said yes.

14
15 **CHAIRMAN POWERS:** Okay. Thank you. Then let's come back at
16 9:45 Eastern Daylight Time. Thank you.

17
18 (Whereupon, a brief recess was taken.)

19
20 **DISCUSSION: GRSC-INFORMED CATCH ANALYSIS AND RED SNAPPER INTERIM**
21 **ANALYSIS**

22
23 **CHAIRMAN POWERS:** All right. Welcome back, everybody. Via
24 email, Dr. Siegfried has informed us that the information is
25 available. I haven't checked on the website, but it's certainly
26 available to present to us, and so let me just -- Either Katie
27 or Matt, whomever, can we take a look at this, what we have?

28
29 **DR. SMITH:** Sure. We can take a look at it. What we did was
30 respond to the three different requests that we heard yesterday,
31 two from Dave Chagaris, and one was interested in looking at a
32 13 percent UCB, as opposed to the 15 percent, and then the other
33 one, which is on the next slide, had to do with a reduction from
34 the 110 million to the eighty-five million for the total
35 abundance.

36
37 Here, we also presented this 22 percent result, which was
38 derived from the information that John Walter presented
39 yesterday, that they arrived at around 22 percent of UCB from
40 the analysis done on the commercial and recreational landings
41 being mapped to the biomass distribution, and so these are two
42 additional alternatives to consider, with three-year and five-
43 year averages, and then just to supply some graphical
44 representations, and they've been plotted below.

45
46 Again, we didn't receive any specific advice or thoughts, that I
47 can remember, from the SSC yesterday, in terms of reference
48 points, and so we just carried forward with the 26 percent and

1 the 40 percent that we had presented yesterday. If that comes
2 up in discussion, of different possible reference points,
3 obviously, these could be rerun, pretty much on the fly today,
4 as needed.

5
6 Then the other request, like I said, was using the estimates of
7 variability around that 110 million number, and Dr. Chagaris
8 came up with roughly eighty-five million, and I did use the
9 exact number of 85,259,101 that he gave yesterday to discount
10 the two areas, east and west, and the results are what you see
11 here.

12
13 Unfortunately, when I copied and pasted this over, I cut the
14 years off, but it is 2021 on the top row, 2022, 2023, 2024, and
15 2025, and then three-year and five-year averages at the bottom.
16 Then the 110 million was what we looked at yesterday, and that's
17 just put up here for comparison, so you can see how these two
18 things compare. Again, at the F SPR 26 percent and 40 percent.

19
20 As I said, we sent these to Ryan, and I can fix this last table
21 up and resend it, but you can circulate it to the committee
22 members, if they want to have this material available to them to
23 review as you undertake your discussions today, and we are
24 prepared, at the Center, to field additional requests as they
25 may come up, and so I will leave it at that for now. If there's
26 any questions, I'm happy to answer them.

27
28 **CHAIRMAN POWERS:** Thank you. Are there any questions? Go
29 ahead, Dave.

30
31 **DR. CHAGARIS:** Matt, did you run the eighty-five million
32 scenario with all-structure and all-structure-plus, or was that
33 second table just with the grand total abundance?

34
35 **DR. SMITH:** That's just with grand total. When we start to talk
36 about the eighty-five million, I interpreted that as a discount
37 from the 110 grand total, where the all-structure and the all-
38 structure-plus are their own separate subsets. I'm not exactly
39 sure how one would go about creating an all-structure version
40 based on the eighty-five million, because the all-structure
41 itself is just a subset from the 110 million.

42
43 **DR. CHAGARIS:** I apologize that I wasn't clear, and I didn't
44 think that through far enough. I think maybe my intention was
45 to proportionally or decrease the overall abundance, I guess, in
46 all strata, and let me think about this a little bit more,
47 because I don't think that what I asked you to do is actually
48 capturing what I actually wanted to see, and so I apologize for

1 that.

2
3 **DR. SMITH:** No problem. If you sort it out, obviously, let us
4 know, and I can get the stuff pulled together for you.

5
6 **CHAIRMAN POWERS:** Thank you. Will Patterson, do you wish to
7 speak?

8
9 **DR. PATTERSON:** There's been a lot discussed the last few days,
10 and my apologies if this was talked about and I missed it, and I
11 know that Clay brought up the issue of the buffer and ideas
12 about precaution.

13
14 You know, we've had discussions before about where to set
15 threshold fishing mortality proxy values, and there's been
16 disagreement within the SSC, and there's been differences of
17 opinion within the council staff, and maybe council members
18 present, about whether it's in the purview of the SSC to set the
19 proxy value, such as F 26 percent versus F 40 percent.

20
21 Given the uncertainty in that, or maybe it can be clarified
22 here, it seems to me that a better approach would be to use one
23 of the other ideas that Clay put forward and try to develop a P*
24 type of approach with the F 26 percent, if folks didn't think
25 that level was precautionous enough, given the uncertainties
26 expressed in the review by both the SSC and the external
27 reviewers.

28
29 I'm not sure how you would capture the joint distribution,
30 because you have assessment results and then qualified with the
31 scaling factor from the Great Red Snapper Count, but, anyway, it
32 seems to me that we should talk about whether F 40 percent SPR
33 is going to be considered even as an option here, so we can
34 start to kind of minimize the realm of possibilities.

35
36 **CHAIRMAN POWERS:** Thank you. Luiz, and then I'm going to ask
37 for Bob Gill.

38
39 **DR. BARBIERI:** Thank you, Mr. Chairman. Will already touched on
40 one of my points, which was our choice here of a reference
41 point, SPR level for reference point, and it's just difficult,
42 without sounding completely arbitrary, to have this discussion
43 here, and it's like, if we use the F 26 percent, are we really
44 taking into account the biomass, or the potential biomass, that
45 could be estimated from the Great Red Snapper Count, but, if we
46 then use F 40 percent SPR, what are we basing that on, really,
47 without any analysis to really guide us in seeing the potential
48 outcomes of that choice?

1
2 To me, I am still sort of uncertain there on how to proceed, in
3 terms of those choices, number one, and, two, Matt, I think you
4 mentioned that the spreadsheet that generated these values, the
5 projections, do not actually give you the estimated biomass of
6 the stock at SPR, or SSB at SPR 40, so we can have an idea of
7 how any one of these choices would reflect on stock status. Is
8 that correct, Matt?

9
10 **DR. SMITH:** Potentially, but I'm not sure I fully understand
11 what you're asking. You're asking about current stock status?

12
13 **DR. BARBIERI:** Well, what I would like to see is which one of
14 these levels here could lead us to not be fishing at a
15 sustainable level.

16
17 **DR. SMITH:** In the projections, I am projecting out to a given
18 SPR, and so the catch advice that is coming from that
19 projection, based on a given reference point, is sustainable, as
20 far as the projections are concerned, at that reference point.
21 For 26 percent, for example, here, the 13 percent UCB F SPR 26
22 percent column, those are sustainable, and I am using air quotes
23 in my living room, harvest rates for that given reference point,
24 based on the projections that we conducted, and then the same
25 thing would be said for the F SPR 40 percent.

26
27 How they relate to maximum sustainable yield, it's impossible to
28 say, outside of the full stock assessment that we're hopefully
29 going to complete with the research track, because we don't
30 really know what the reference points for this stock are in the
31 new Great Red Snapper Count paradigm, but, as far as the
32 projections we're looking at here for a given reference point,
33 those catch levels are sustainable.

34
35 **DR. BARBIERI:** Right. Exactly. Thank you for that, Matt,
36 because that's exactly where I was trying to get to, is your air
37 quotes around the sustainable, because we don't actually have
38 the full stock dynamics really captured in these projections to
39 have the estimate of MSY, right?

40
41 **DR. SMITH:** Yes, that is correct.

42
43 **DR. BARBIERI:** So, at this point, Mr. Chairman, this is one of
44 my concerns. I am still thinking about it, as we discuss all of
45 this, but I find it difficult for me to make a decision on which
46 one of these to use, or even if using a different one would be
47 wise, given all the uncertainties that we are discussing. Thank
48 you, Matt.

1
2 **CHAIRMAN POWERS:** Thank you. Sean, I had mentioned that Bob
3 Gill wanted to get in, because he had told me that he actually
4 has a motion, and so let me go for Bob Gill before you.

5
6 **MR. GILL:** Thank you, Mr. Chairman. **I do have a motion, and**
7 **it's in the chat box, Jessica.** If I get a second, I would be
8 happy to explain my rationale for it.

9
10 **DR. ROBERTS:** I will second.

11
12 **DR. NANCE:** I will second this one.

13
14 **CHAIRMAN POWERS:** I think we've got several seconds. Bob, go
15 ahead.

16
17 **MR. GILL:** Thank you, Mr. Chairman, and thank you, Jim, for the
18 second. First of all, explaining what it is, this is the all-
19 structure Great Red Snapper Count interim analysis, the all-
20 structure F SPR 26 percent, utilizing -- You can call it what
21 you like, the three or five-year average, and, effectively, as I
22 mentioned yesterday, it would persist until changed anyway, and
23 so that's where it comes from.

24
25 Part of the basis of this is that the Great Red Snapper Count
26 indicates that there's some significant greater biomass than we
27 have previously known. The problem we have is we don't know
28 what that number is. It's highly uncertain, and we can't get
29 our hands around a good number with any reasonable degree of
30 certainty. I think there are ways to try and get at it. For
31 example, we could have attempted to agree upon lower bounds on
32 Table 1 of the report, but that's problematic in its own right,
33 not to mention subjective.

34
35 Utilizing this number gets us to a precautionary number, given
36 the questions that have arisen. For example, the productivity
37 of the stock is now in question, depending on the magnitude that
38 is really out there, and we have indications from the
39 traditional interim analysis that there may be some slowdown in
40 the recovery, and, of course, the real concerns of localized
41 depletion, should a substantial increase in ABC be defined.

42
43 Now, to that point, I disagree with the rationale. I believe
44 that defining where people should fish, in terms of that aspect,
45 is a management decision. That's for the council to decide.
46 Our role here, at least in theory, is to define how many fish
47 are available, but we can't put our arms around that very well,
48 and so I think the number we get to by this basis is reasonable,

1 and it's conservative, and it represents a good approach, and I
2 offer this for discussion. Thank you, Mr. Chairman.

3
4 **CHAIRMAN POWERS:** Thank you. I really like the structure of
5 this, because it's talking about ABC, rather than getting too
6 involved in F SPR and so on like that, in relation to OFL,
7 because we really haven't been given much information about how
8 to interpret that on this ad hoc analysis. We're tying it to
9 the Great Red Snapper Count, and there's an explanation of that.

10
11 I mean, we can -- I am really supportive of the structure, and
12 we can start debating about the actual numbers here as well,
13 but, like I said, I'm really supportive of the structure. The
14 chair of the council wishes to be recognized, and I'm wondering
15 if this is some procedural thing that he wishes to bring up, and
16 so let me skip ahead to him. Tom.

17
18 **DR. FRAZER:** Thanks, Joe. I actually will -- It's not a
19 procedural one, and it has more to do with this motion and
20 subsequent motions, and so I will wait my turn. I will go after
21 Kai.

22
23 **CHAIRMAN POWERS:** Okay. Thank you. Sean Powers.

24
25 **DR. POWERS:** I was going to talk about something else, but I
26 don't want to distract us from talking about this motion. My
27 only question is don't we need to set an OFL, because,
28 obviously, if this, or some magnitude of this, ABC was
29 recommended, we would violate the OFL that's on the books.

30
31 **CHAIRMAN POWERS:** The problem is we really haven't been given
32 any information in order to evaluate OFL. We have been given a
33 number that relates to the 26 percent SPR, the F 26 percent SPR,
34 but the logic that really relates all that to -- I mean, it's
35 not a regular stock assessment, and so it's hard to interpret
36 what you have there, but I presume that Ryan will tell us some
37 advice about this.

38
39 **MR. RINDONE:** Thank you, Dr. Powers. Yes, you guys will have to
40 define OFL, and, typically, OFL is defined at the 50 percent
41 probability that overfishing would occur if that OFL was caught,
42 and so I guess the question to Matt should be is there a way to
43 determine the probability of overfishing occurring at any of
44 these values in the analyses that have been performed?

45
46 **CHAIRMAN POWERS:** Before Matt gets in there, I think it's very,
47 very tenuous to start getting too involved in interpreting those
48 projections as being a projection of OFL. What is the OFL right

1 now?

2
3 **MR. RINDONE:** 15.5 million pounds whole weight, and the ABC is
4 15.1 million pounds whole weight, and so it's a difference of
5 about 2.59 percent, based on the P* approach.
6

7 **CHAIRMAN POWERS:** My reaction would be then to perhaps -- If we
8 want to check off the box about OFL, is to say that ABC and OFL
9 are the same thing, or are the same amount. That's one option.
10

11 **MR. RINDONE:** Under Magnuson, we are allowed to say that the ABC
12 is equal to the OFL, but we would have to provide justification
13 as to why setting the ABC equal to the OFL would not result in
14 overfishing occurring, and I think that, given the recent
15 landings histories with red snapper, that would be no small
16 task.
17

18 **CHAIRMAN POWERS:** All right. Sean, were you finished?
19

20 **DR. POWERS:** Great information, Ryan. Thank you. I don't see
21 why -- Obviously, we need to recommend an ABC, based on this
22 methodology, and we could easily recommend the OFL at F 26
23 percent, and I'm not saying that I support this level of the ABC
24 yet, but, I mean, we would have -- If we're using it as the
25 rationale for setting the ABC, I don't see why we don't use the
26 same rationale for setting the OFL, but that's it.
27

28 **CHAIRMAN POWERS:** All right. Kai Lorenzen.
29

30 **DR. LORENZEN:** I actually put my hand up before this motion came
31 up, and I will sort of save the longer thing that I wanted to
32 say for later, but I do want to point out that the interim
33 analysis, the traditional interim analysis, which is sort of the
34 most rigorous piece of analysis that we have in front of us
35 right now, suggests that, if anything, we should be decreasing
36 the catch levels moderately and that even this twenty-million
37 pounds actually sets us above 60 percent above the level that
38 the traditional interim analysis suggests.
39

40 Then we have to remember that, of course, we're talking about
41 the fishery as it is, and we're talking about the catches that
42 are obtained from the areas that are being fished, and if part
43 of the rationale for what we have in front of us here is the
44 assumption that somehow fishing pressure would distribute itself
45 differently, then that would have to be made explicit, and I'm
46 not quite sure how even to go there, but I will come back to
47 this later. Thanks.
48

1 **CHAIRMAN POWERS:** Thank you. I believe, and Bob Gill can
2 correct me if I'm wrong, but, when he's referring to interim
3 analysis here, I think he really means the GRSC preliminary
4 analysis, meaning the estimates that we reviewed and so on, and
5 not the interim analysis that the Center presented yesterday.
6 Is that correct, Bob?

7
8 **DR. LORENZEN:** Yes, I think that's what he does, but I was
9 referring to the traditional interim analysis, and we should
10 remember that that is something that is actually a rigorous,
11 tested analysis that we decided to request on a regular basis
12 for a number of stocks, and so we should not discount the
13 information that's in that analysis, and that's all I'm saying.

14
15 **CHAIRMAN POWERS:** Okay. Thank you. Tom Frazer.

16
17 **DR. FRAZER:** Thanks, Mr. Chair. I am sitting here thinking
18 about this from a council perspective, and what I'm hoping,
19 basically, is that the council will have some options to
20 consider moving forward, and I appreciate the motion that Mr.
21 Gill made with regard to trying to establish an ABC, but I do
22 think that it would be helpful to establish an OFL, or at least
23 recommend an OFL, and try then to determine what's the best
24 approach to derive the ABC.

25
26 I mean, you could make an argument, based on the data and the
27 analysis that incorporated the Great Red Snapper Count, that
28 using the F SPR 26 percent in the all-structure-plus, to get
29 that OFL, because that particular reference point was actually
30 based on an assessment that was conditioned on where the fishery
31 is actually operating.

32
33 I am just offering it up as something that would be useful to
34 the council, as perhaps a number of alternative OFLs, and then
35 subsequent ABCs, and those ABCs could be, as Ryan pointed out,
36 some proportion of that OFL, 75 percent, or you could use a P*
37 approach, and I'm not going to necessarily try to dictate your
38 business there, but I think it would be beneficial to have some
39 rationale for those OFLs and then an ABC and perhaps a suite of
40 alternatives to consider, and so thank you.

41
42 **CHAIRMAN POWERS:** Thank you. Doug Gregory.

43
44 **MR. GREGORY:** Thank you. Good morning. If you go back to
45 Matt's presentation on page 4, and, for many, many years, we
46 have used or OFL has been defined as fishing at F of 26 percent,
47 and so that's more an OFL than it is an ABC, given the
48 historical way we have defined these terms, and, relative to I

1 guess Luiz's concern, as far as the arbitrariness, I don't know
2 about how difficult that is, if we agree as a group that it's
3 the best measure of the uncertainty that we have observed in
4 this study.

5
6 In fact, this study gives us a better measure of uncertainty
7 than maybe we've had in stock assessments, as far as the range,
8 and, offhand, I don't know how to incorporate that uncertainty
9 into this, but, if we're uncomfortable with the F of SPR 40
10 percent, then ABC could be 75 percent of the F SPR, the 26
11 percent, like we have normally done.

12
13 The other thing with this motion is I heard yesterday that these
14 numbers from the tables are not in CHTS or FES units, and
15 they're in Great Red Snapper Count units, and so, if we were to
16 suggest to the council that they measure this ABC in CHTS units,
17 this 21.2 would be divided according to the current allocation
18 scheme, and then the recreational sector's allocation would be
19 upgraded to FES, because they're definitely going to be measured
20 in FES, and so it looks more straightforward if we assume these
21 count numbers are in FES units to begin with. Thank you very
22 much.

23
24 **CHAIRMAN POWERS:** Thank you. To that latter point, it's a
25 little more vague than that, because remember, the way these
26 projections are being done, they are taking the selectivity from
27 each one of the sectors, including the recreational, and the
28 relative fishing mortality rates between the sectors, and that
29 was based on CHTS in the last assessment.

30
31 Then that gets adjusted up and down and multiplied times the
32 Great Red Snapper Count, and so it's a little more vague than
33 that. I mean, one could make the argument that it isn't in CHTS
34 units, but, like I said, it's kind of loose, the argument. All
35 right.

36
37 Now, several people, both Kai and Sean, had mentioned that they
38 wanted to talk in more general terms, independent of this
39 motion, and we're being told that this motion itself does not
40 address the OFL, and we are being asked to provide an OFL level.
41 We're also being asked to provide a suite of options, and, that
42 one, I'm not sure exactly our mandate to do that.

43
44 I mean, obviously, much of the discussion that we've had about
45 how to proceed ahead has to do with how fishing effort is
46 distributed between traditional areas and unclassified bottom,
47 but I'm not sure, at this stage, how we can -- What sort of
48 suite of options we might have, I mean other than what we've

1 been asked to do, in terms of the OFL and ABC.

2
3 If Bob Gill doesn't mind, I would like to kind of -- I don't
4 know what the proper term is, but table this and then go back to
5 discussions, some background discussions, that both Sean and Kai
6 had, and then perhaps Dr. Frazer can help us along, in terms of
7 what he meant by the suite of options. Let me start with Tom
8 Frazer. Thank you.

9
10 **DR. FRAZER:** I mean, I just want to clarify that I think it
11 would be helpful -- For example, I realize that there are a
12 number of options already presented in the various reports that
13 have been provided by the Science Center, and I think, for
14 example, the one that I laid out had to do with setting an OFL
15 based on that 13 percent value for the -- I guess it was all-
16 structures-plus.

17
18 There were 15 percent values, for example, for that, and Matt
19 showed, this morning, 22 percent, but so those, for example,
20 could be OFLs, and then you could put a range of ABCs that are
21 based on a number of decision rules, but the important part of
22 that would be some narrative from the SSC that explains what the
23 assumptions are that go into that and what the potential
24 consequences might be. Essentially, what are the goods and the
25 bads and the unknowns? That would be very helpful to the
26 council, moving forward.

27
28 **CHAIRMAN POWERS:** Thank you. Is there any response or
29 suggestions to that from the SSC members? Doug Gregory.

30
31 **MR. GREGORY:** In the past, when we've offered alternatives to
32 the council, it was more like equivalent alternatives, like
33 constant catch versus an annual changing catch. If we say offer
34 three different alternatives, it's certainly going to be a range
35 of ABCs, from a low to a high, and then the council could choose
36 whatever they wanted, and, since we call them all ABCs, they're
37 all acceptable, I guess, from the Magnuson standpoint, but my
38 question would be, would be abrogating our duty if we did
39 something like that?

40
41 **CHAIRMAN POWERS:** That was sort of my question, too. In my
42 understanding, there is no such thing as a range of ABCs.
43 Essentially, if we were saying the uncertainty was such that ABC
44 should be this, then that lowest value would become the ABC.
45 Ryan, do you have any help there?

46
47 **MR. RINDONE:** Thanks, Dr. Powers. Just trying to think out loud
48 with everybody else about this, I think that, based on what Dr.

1 Frazer is saying and what Doug is saying and everybody else,
2 what I've got rattling around is, if you guys offered options
3 for OFL and ABC, that you provide some kind of justification
4 for, and I think part of the question is, insofar as it relates
5 to how and where the fishery operates, and the council is
6 uniquely positioned to be able to collect feedback on the areas
7 that fishermen are actually operating, and perhaps gain a little
8 bit more input on that front, to knowing exactly where people
9 are going.

10
11 The Gardner analysis did a good job of being able to
12 characterize where the commercial fleet is operating, and it
13 operated under the assumption that the recreational fleet was
14 able to access less than or equal to the same general areas,
15 but, of course, that's -- We don't know exactly where all the
16 recreational boats are able to go, or not go, because we don't
17 monitor them that closely in that way, and so all that
18 information is collected anecdotally.

19
20 Having options would allow some flexibility to try to better
21 define the actual universe of UCB that's being accessed in
22 total, using some of that more qualitative information. Again,
23 I think, as long as the SSC provides justification for why it's
24 providing an OFL and ABC combination as an option for the
25 council to consider, and, like I said, there's some
26 justification for each OFL and ABC combination, if more than one
27 is offered, then I think that falls within what's been done a
28 couple of times in the past anyway.

29
30 **CHAIRMAN POWERS:** I am not -- All right. John Froeschke.

31
32 **DR. FROESCHKE:** Good morning, everyone. Just thinking out loud
33 here, one way to accomplish this, perhaps, would be, if the SSC
34 is considering a suite of potential alternatives, or options,
35 each with their own set of caveats, you could provide an OFL
36 recommendation both based on the most optimistic scenario and
37 then provide conditional ABCs on the other one.

38
39 This would preserve the SSC's role in determining the
40 overfishing level that could not be exceeded by the council, and
41 then it would allow both the SSC to clarify their ABC
42 recommendations on various caveats and assumptions that might be
43 associated with each of those and provide the council with the
44 ability to deliberate and choose an ABC based on that.

45
46 **CHAIRMAN POWERS:** I was not aware that the council can choose an
47 ABC.

1 **DR. FROESCHKE:** Just as a follow-up, for example with red
2 grouper, in the Amendment 53, the SSC provided OFLs and ABCs
3 conditional on various assumptions of allocation that the
4 council was considering, because selectivity varies, and so the
5 OFLs and ABCs do change.

6
7 **CHAIRMAN POWERS:** This is a little more broad than that though.
8 I mean, the tables have been presented to us and the other
9 analysis, the Excel tables, and I mean, obviously, the council
10 can have that and review it. Each one of those entries has a
11 justification, or perhaps a better word is a set of assumptions
12 that go into them, but the difficulty I, and I think other SSC
13 members, are having is what our responsibility is in terms of
14 defining ABC.

15
16 I mean, essentially, there's a suite of numbers, and are we
17 saying here's a suite of numbers and go pick, and there are
18 certainly assumptions and justifications for each one of them,
19 but I am unsure how to go forward, but Sean will obviously help
20 me.

21
22 **DR. POWERS:** I don't know about that, but I think that this is a
23 conversation -- I understand Tom's point for some flexibility,
24 but, I mean, I don't see how we do that. I mean, we set an OFL
25 and an ABC, and, I mean, if we give them options for the ABC,
26 even if they're conditional, essentially, whatever low value is
27 the ABC -- I mean, I think my interpretation is our duty is to
28 set one OFL and one ABC, explaining the rationale for that, and,
29 if the council has questions, they can surely come back and ask
30 us to reexamine, but I don't see how, both in the law, as well
31 as in our practical operations, how we give a suite of ABCs, and
32 I think we give an OFL and an ABC and explain the rationale.

33
34 **CHAIRMAN POWERS:** Thank you. Andy Strelcheck.

35
36 **MR. ANDY STRELCHECK:** Thanks, Chairman. I don't know if I will
37 add to this or create more confusion, but my perspective, and
38 this has been shared by others, is the SSC should recommend an
39 OFL, and, ideally, have a buffer between the OFL and the ABC.
40 Historically, the council has then set the ACL equal to the ABC.

41
42 With regard to what Tom Frazer spoke to, in terms of a range, I
43 mean, certainly, whatever the upper end of that ABC range is is
44 what the council is bound by, but certainly it could be
45 informative to the council, as they deliberate about setting
46 ACLs, with regard to what you think the appropriate lower end of
47 that range is.

1 If the SSC chooses to select an OFL equal to the ABC, I think
2 that lower bound then becomes that much more important, because
3 the council should be looking at then buffering between that OFL
4 and ABC value and whatever they set the catch limit at, and so,
5 from a structural perspective, that's just the way I would view
6 your charge, in terms of providing guidance to the council.

7
8 **CHAIRMAN POWERS:** Thank you. Bob Gill.

9
10 **MR. GILL:** Thank you, Mr. Chairman. I'm in the camp that Doug
11 first brought up, and that is that we have the obligation to
12 provide one OFL and one ABC, or their equivalent, and that's how
13 we got to constant catch, but there is no validity to providing
14 multiple OFLs or multiple ABCs. In my mind, a limit is a limit,
15 and you can't have multiple limits, and so I would not support a
16 multiple approach.

17
18 I do support one OFL and one ABC, or their equivalent, and I do
19 not know how we determine that OFL, given the situation we've
20 got, but brighter minds than I can figure that out, and so thank
21 you very much, Mr. Chairman.

22
23 **CHAIRMAN POWERS:** Will Patterson.

24
25 **DR. PATTERSON:** I don't want to belabor this too much, and I
26 think what Andy said I agree with completely. The council can
27 set their ACL or ACT based on any type of precaution they want
28 to inject into the system, but our role is to estimate the OFL
29 and then set the ABC based on our perceptions and quantification
30 of uncertainty.

31
32 As far as the current motion, our proxy for MSY is 26 percent
33 SPR, a biomass of 26 percent SPR, and so the F 26 is actually
34 the OFL based upon how we operate traditionally and based on the
35 ideas of using proxies for MSY under Magnuson.

36
37 In the current motion, I think the F 26 percent is actually more
38 appropriately the OFL, and then we set ABC from there, and the
39 council then is at liberty to set the ACL equal to the ABC,
40 below the ABC, and, similarly, with ACTs -- I understand that
41 ACTs are typically only used in the recreational fishery here,
42 but the ACL certainly could be set below our estimate of ABC,
43 based on our perceptions of uncertainty.

44
45 **CHAIRMAN POWERS:** Thank you. All right. Again, in general, I
46 like the structure of the wording here, and so let me refer to
47 it. Some of what I'm hearing is, if we kept the exact numbers
48 in there, then that ABC should be OFL, and, if that were the

1 case, then how would we come to some agreement about what the
2 ABC is, and that's one thing.

3
4 Secondly, are those numbers the most justified at this point in
5 time, because, essentially, the same sort of analysis that was
6 presented this morning was you up the percentage a little bit
7 about the expansion, beyond the traditional areas, or not up,
8 and I guess one of them was up and one was down, but, anyway,
9 those are the kinds of things that I think we have to think
10 about, in terms of how we proceed. John Mareska.

11
12 **MR. MARESKA:** You have expressed that you like the format of
13 Bob's motion, and so I sent Jessica a new motion that would be
14 based on the OFL, and so we can look at that and discuss that,
15 and this would be based on the all-structure-plus, and I just
16 feel like, given all the information we've been told that this
17 is an underestimate, I feel like going with the all-structure is
18 probably a little bit too conservative, in my mind. This is a
19 substitute motion, because this is a motion for OFL and not ABC.

20
21 **CHAIRMAN POWERS:** Okay. Following parliamentary rules, which
22 we're kind of lax about, this would be a substitute motion, and
23 so there it is. Is there a second?

24
25 **DR. POWERS:** I second.

26
27 **CHAIRMAN POWERS:** Okay. All right. John, you pretty much
28 discussed already, but if you want to say anything further.

29
30 **MR. MARESKA:** No, not at this time.

31
32 **CHAIRMAN POWERS:** Okay. Kai.

33
34 **DR. LORENZEN:** Again, I put my hand up before this substitute
35 motion, but I just wanted to offer one general comment, in that
36 we're sort of dealing with two sources of uncertainty here, and
37 one is the uncertainty in the Great Red Snapper Count that we
38 have discussed at length, and I think we've made a reasonable
39 judgment on, and the other is the uncertainty of sort of what
40 does this estimate of abundance really tell us about sustainable
41 catch levels, and I think, right now, that's where we are much
42 more at-sea than actually with the estimate of abundance.

43
44 Then, just as a perspective, we have to bear in mind that it
45 seems that what we're doing at the moment is they're all sort of
46 reasonable calculations, in this way or that, but, actually,
47 we're, in my view, not able to really understand the
48 sustainability implication of these calculations, because,

1 basically, we haven't run them through a proper assessment, and
2 so they really are just more or less reasonable calculations.

3
4 If we want to run with something like that, I think, certainly,
5 we would need a very, very substantial buffer between the OFL
6 and the ABC, to capture that uncertainty in our interpretation
7 of what the Great Red Snapper Count numbers mean for the OFL and
8 ABC. Thanks.

9
10 **CHAIRMAN POWERS:** Thank you. Also, the way I look at it too is
11 that we are -- We're really being asked to provide some numbers
12 based on a limited sort of information, particularly about the
13 assessment portion of it, or the fishing mortality rate portion
14 of it, but, essentially, in my mind, you look at it and say, all
15 right, whatever ABC that we suggest, what are the chances that
16 something detrimental, or particularly really bad, would happen
17 within one year, and so what you want to guard against is
18 something really deleterious happening, with the expectation
19 that this can be revisited pretty regularly, because we are
20 operating off of a large uncertainty without a good set of
21 decision rules, and so we are -- We're looking at it in a very
22 pragmatic sense.

23
24 Guidance about what CPUEs are occurring during the next year,
25 things like that, might become important a year from now, in
26 terms of deciding what to do in 2022, and so those are the kinds
27 of issues, I think, that -- Sometimes I think we're getting tied
28 up into the actual model estimates, as if they are the
29 equivalent of a stock assessment, and I think we need to look at
30 it more pragmatically, in terms of basic biology and our general
31 expert knowledge about the likelihood of something deleterious
32 happening within the next year. Thank you. Doug Gregory.

33
34 **MR. GREGORY:** Thank you. Two thoughts. One is, if this is to
35 be an experiment for one year, we will need to also specify ABCs
36 for the next two or three years afterwards, to prevent this
37 particular number from staying on the record as an ongoing ABC,
38 but my original thought was the bottom longline survey actually
39 samples the uncharacterized bottom.

40
41 It has shown a decline in abundance, and so, if nothing more,
42 that should make us very precautionary, and I'm not talking about
43 the 2020, necessarily, even though that's about the same as
44 2019, but that gear actually samples unconsolidated bottom and
45 not artificial reefs and not oil platforms and not pipelines,
46 necessarily.

47
48 They might probably go over a pipeline every now and then, but

1 so that's our best index of what's going on in this population,
2 regardless of the reserve of older fish that we have or not. If
3 we don't use the interim analysis, the bottom longline interim
4 analysis, we should use it to help us set a precautionary
5 experimental ABC. Thank you.

6
7 **CHAIRMAN POWERS:** Thank you. Benny Gallaway.

8
9 **DR. GALLAWAY:** Doug just addressed my question, and I see that
10 Kai has come on the line, and I would like him to further
11 elaborate his thoughts on the interim analysis trends analysis,
12 the bottom longline survey.

13
14 **CHAIRMAN POWERS:** John Mareska was next. John.

15
16 **MR. MARESKA:** Doug pointed out that it looks like it's one year,
17 and, actually, that was intended to be a three-year average, and
18 it should be 2021 through 2023. Then, as far as the bottom
19 longline goes, we don't know what was caught, and I don't recall
20 if that was a lot of zero catches that we saw in 2020 or there
21 were additional species that were caught on the bottom longline,
22 and therefore the catch rate went down, and there's a lot of
23 uncertainty with that.

24
25 There's just a lot of uncertainty with this whole process, and
26 so I am very uncertain which way to go, but I did propose this
27 motion, just feeling like there's enough information that we can
28 move forward with it. If there's more fish out there, I think
29 that changes the fundamental age structure of that offshore
30 stock, and so there is, obviously, more older fish out there
31 than we thought, and it seems like, potentially, the bottom
32 longline doesn't do a good job of characterizing the actual
33 abundance of red snapper out there, and so just some thoughts.

34
35 **CHAIRMAN POWERS:** Thank you. To the point about the 2021
36 through 2023, I interpreted the motion to make an OFL for 2021
37 only, and that's the way originally I interpreted it, and I had
38 mentioned, earlier in the meeting, that I think that's
39 appropriate and that we should not be establishing ABCs for out
40 years, because the actual analysis to change this is going to be
41 relatively simple, and we could redo this in a year.

42
43 Secondly, we know that things will change during the year, and,
44 in fact, the Great Red Snapper Count, the actual estimates, will
45 change in another sixty days, and probably not very much, and
46 we'll have knowledge about the catch during that year, and so I
47 really do not support the SSC making decisions now about what
48 the ABC ought to be in 2022 and 2023.

1
2 **MR. MARESKA:** So, based on that, I guess I can remove that and
3 just make it one year. That way, it would allow the council
4 time to gather more information that I think Ryan was alluding
5 to, and so management could make adjustments for the next two
6 years, and so we can make that a single year, 2021.

7
8 **CHAIRMAN POWERS:** That was what was originally there.

9
10 **MR. MARESKA:** Yes, sir.

11
12 **CHAIRMAN POWERS:** Okay. Will Patterson.

13
14 **DR. PATTERSON:** I just wanted to comment on one thing that John
15 Mareska had said about the results of the Great Red Snapper
16 Count and the sort of implications that there must be a group of
17 larger, older fish in this unconsolidated, or unclassified,
18 habitats, based on those results.

19
20 I think perhaps the results from the Great Red Snapper Count
21 changed the perceptions, or estimates, about what the population
22 is in the east, more so than any other region, Florida in
23 particular, and, in that area, we have pretty good size
24 composition estimates that don't show a lot of large, older
25 fish, predicated on the assumption that bigger fish are equally
26 vulnerable to being scaled by ROV stereo cameras as smaller,
27 younger fish and there is no avoidance of bigger, older fish to
28 the gear, but we do have some information that suggests that
29 what John was perhaps inferring generally doesn't show up in the
30 data, at least for the east.

31
32 **CHAIRMAN POWERS:** Thank you. Kai.

33
34 **DR. LORENZEN:** Thanks. I am coming back to the bottom longline
35 and Doug's and Benny's points, and I very much agree that we
36 should not ignore the signal in the bottom longline, because
37 it's actually -- It's a very straightforward piece of
38 information, because it is a well established index of relative
39 abundance, and, right now, that index is stable, or declining
40 somewhat, and I am not talking about the last year, and I don't
41 think we should pay too much attention to 2020, for the reason
42 of the sampling issues, but it was going down a little before
43 then, and it is certainly is, at best, stable at the moment.

44
45 What that tells is that, right now, the levels of removals that
46 we have in this fishery are keeping the abundance at the same
47 level, or pushing it a little bit down, and, if we support
48 greater removals, we should expect that abundance to go down,

1 and that's just the way it is, and that's not making any
2 assumptions about all the complex details that we're discussing,
3 but it's just how fisheries abundance indices work. If you
4 remove more, they will start going down.

5
6 We really should not ignore that, and so, if we have something
7 that, for example, suggests a 60 percent increase in removals,
8 we should expect a downward trend in that index, and I think --
9 Now, Joe's point is right that we don't -- If we do that for a
10 long time, that would be very problematic. If we do it for a
11 year and reassess where we are, it may be a little bit less
12 problematic, but we should not ignore the information in that
13 index.

14
15 The other thing, and that's more for sort of a biology thought
16 and comment, and following on from both John Mareska and Will,
17 is that, when we looked at the size distributions, and I think
18 it was actually data that Steve Murawski presented, and I asked
19 about that at the time, how to interpret the size distributions,
20 which it seemed to show much larger fish, on average, in the
21 uncharacterized bottom.

22
23 It does make some sense, in terms of our general understanding
24 of the life history, that probably they recruit to structure,
25 and some may move off into the uncharacterized bottom later,
26 and, given the history of overexploitation in Florida, I think
27 that doesn't have to be a contradiction to Will's observation
28 that there actually aren't that many old fish in the
29 uncharacterized bottom in Florida and that they maybe just
30 haven't gotten there yet, because we have a very juvenescent
31 sort of population.

32
33 The other implication of that, and that's very clear from
34 looking at the trend in the bottom longline over time, is that
35 we should not consider that population in the uncharacterized
36 bottom to be unaffected by fishing, and it may be less affected
37 by fishing while it's already in the uncharacterized bottom, but
38 it surely is affected by fishing at some stage, and I presume
39 earlier on in their lives, when they probably are more
40 associated with structure, because we can see that, really, the
41 trends in the bottom longline index are very much indicative of
42 trends in the fishery overall, and so we should not consider
43 that to be a safety net that is not affected by what's happening
44 on the structure. It's some sort of safety net, but not to the
45 extent that it would be if it was really largely not affected by
46 fishing. Thanks.

47
48 **CHAIRMAN POWERS:** Thank you. Sean Powers.

1
2 **DR. POWERS:** A couple of points. I agree with setting it only
3 for one year, and if we want to make a statement that's clear
4 that we're not setting an OFL for 2022, that's fine with me.
5

6 The other thing about the bottom longline, I agree that we
7 should not believe the 2020 point, that it's based on a fairly
8 small sample. If you look at the index, it tends to suggest a
9 downward trend, but that's only because of the high catch in
10 2016, and so I would characterize that as stable, as Kai said,
11 and so I don't think basing our decision on any one index -- The
12 bottom longline is far from perfect, and it has increased sample
13 size and things like that somewhat over the year, but basing our
14 whole decision on one index bothers me, and I know that's not
15 this particular motion, but the bottom longline also gives
16 another signal in the age composition, and I am familiar with
17 the work that we contributed, which is the average age continues
18 to increase, and so that's a good sign.
19

20 As far as the uncharacterized bottom, that's my big debate, is
21 whether we use the OFL for the 13 or the 22 percent, and it was
22 uncharacterized bottom for us, the scientists, in the Great Red
23 Snapper Count, but clearly fishermen know areas in that that
24 they go to, and so it's not uncharacterized for them, and so
25 that's my only caution right now, is the level of whether we
26 choose that 13 percent or the 22 percent.
27

28 This gets to Tom's point, in that the council may be better
29 informed as to which one of those is more realistic, and,
30 obviously, if they think the 13 percent is more realistic than
31 the 22 percent, then they should decrease their ACL to take that
32 into consideration. Thank you.
33

34 **CHAIRMAN POWERS:** Thank you. Andy Strelcheck.
35

36 **MR. STRELCHECK:** Thanks, Joe. I just wanted to go back to the
37 discussion about years to specify in the motion and just let you
38 know, as a practical matter, if the council acts on the advice
39 of the SSC in the coming weeks, at the April council meeting, we
40 will be implementing this new ACL toward the middle to end of
41 the year, and my recommendation would be for the SSC at least to
42 specify this ABC/OFL combination for 2021 and 2022.
43

44 I certainly appreciate and understand that some of the
45 scientific advice and information may change to inform that
46 better, but, from a management standpoint, we're hard-pressed to
47 kind of react that quickly, and, ultimately, implement any sort
48 of changes in the catch limits in a timeframe that is no less

1 than four to six months, and so I would provide that advice to
2 the SSC for consideration. When we specify the regulations, we
3 do specify the ACL, and, if it's not specified out in time, that
4 would remain in effect until changed.

5
6 **CHAIRMAN POWERS:** I am not overly moved by that, because,
7 essentially, that's what you have asked the SSC this year, to
8 respond with very limited information, and to do exactly that.
9 If we can do it this year, then perhaps you could do it next
10 year as well. Doug Gregory.

11
12 **MR. GREGORY:** Oh my god. Another four-day meeting next April.

13
14 **CHAIRMAN POWERS:** Well, actually, no. My feeling is,
15 essentially, we're doing this part of it in one day. The
16 analysis associated with this is not all that onerous, and it's
17 basically spreadsheets, and I don't see it as a major effort of
18 the SSC, but I do -- I'm very leery of the fact that we are
19 making a lot of decisions based on information and decision
20 rules that are not really well documented.

21
22 We're trying to do that, and we're trying to be responsive, but,
23 at the same respect, we also are being asked to make those
24 decisions about ABC for those out years with, in my mind, the
25 expectation that things could change considerably in those
26 years, and I think it's unfair to the SSC to require that.

27
28 **MR. GREGORY:** Okay. Well, I wanted to share a couple of
29 observations. In the beginning of assessing red snapper, the
30 shrimp trawl bycatch was a major issue, and it was thought, and
31 I think incorporated in the assessment, that that was a big
32 contribution to the depressed state of red snapper in the Gulf
33 of Mexico.

34
35 A curious thing happened when we implemented management,
36 starting with a seven-fish bag limit and strict enforcement of
37 the size limit. The following year or two, the abundance of red
38 snapper increased, coincidence or not, but it gave some evidence
39 that direct management had an impact on the abundance of red
40 snapper over and above whatever effect shrimp trawls had.

41
42 We saw something similar in 2007, although none of these events
43 are without some coincidences. In 2007, strict quotas were put
44 on this fishery, but, then again, the shrimp industry had a
45 decline, and so it's confounded, but strict quotas have been put
46 on this fishery, and this fishery responded, and responded
47 dramatically.

1 Regardless of this reserve of old fish that have always been
2 there, they don't seem to be driving the abundance of the
3 population that we're harvesting, as much as overall fishing
4 pressure is, and so I just wanted to share that. Thank you very
5 much.

6
7 **CHAIRMAN POWERS:** Thank you. Clay Porch.

8
9 **DR. PORCH:** Thank you. I just wanted to contribute that we can
10 actually update this bottom longline index by January, and so,
11 if the SSC wants to set an annual catch, and the council was
12 willing to go along with it, in other words set it one year at a
13 time, like is being suggested, we can give you the information
14 to tell you how the stock trends have changed quite early, much
15 earlier than now, and so I don't know if that would affect
16 Andy's comment or not, but I do want to let you know that we can
17 update those indices fairly quickly. The video index takes
18 longer, but certainly the bottom longline, which seems to be
19 capturing the majority of the stock, we can have done by
20 January.

21
22 **CHAIRMAN POWERS:** Thank you. Jim Nance and then Kai Lorenzen.

23
24 **DR. NANCE:** Thank you, Dr. Powers. I'm of a mindset to be a
25 little more cautious, in the fact that I would recommend using
26 just structure and not having any percent in the UBC. The
27 reason I'm saying that is we have a -- What we're looking at
28 right now is a one-time value, and we don't have any
29 relationship of what's happened with this value in the past.

30
31 With the longline, we have a good trend, and we've got that over
32 several year, and we can see what's happening over years. While
33 we've seen a little decrease, it could be stable, as Sean said,
34 but at least it's stable, and we don't see it going up, and so I
35 would recommend we be cautious with our recommendations for OFL.
36 Thank you.

37
38 **CHAIRMAN POWERS:** Kai Lorenzen.

39
40 **DR. LORENZEN:** Just a question, following-up from Sean's comment
41 about the bottom longline index as the single index we are
42 considering here, and I was wondering whether there are other
43 indices of abundance that we could and should look at. I know,
44 the more indices you have, the more conflicted the information
45 may be, but it would be interesting, from my perspective, if we
46 have other indices, like the video index, pertinent more to red
47 snapper on structure, it would definitely be interesting to also
48 see those. Thanks.

1
2 **CHAIRMAN POWERS:** Okay. Benny, and then we're going to go to
3 Ryan, and then we'll have to think some more.
4

5 **DR. GALLAWAY:** I don't know if this is an inappropriate place to
6 interject this comment, but I was struck by Dr. Patterson's
7 comments, and, again, I think we need to focus on considering
8 managing the eastern and western Gulf of Mexico separate, at
9 least for the present, given the changes and the differences in
10 size and age composition.
11

12 **CHAIRMAN POWERS:** Thank you. To some extent, I think that's
13 sort of the background information that will go forward to the
14 council. As you say, not specifically in terms of these
15 motions, but what the Great Red Snapper Count has provided us is
16 a different way of thinking about some of the spatial
17 allocations and so on. Thank you. Ryan.
18

19 **MR. RINDONE:** Thank you, sir. I will Kai's point and then
20 Benny's. To Kai's point about using other indices, multiple
21 indices are, of course, used and considered as a function of a
22 full stock assessment, of which an interim analysis is not.
23 It's not a stock assessment, and it's an interim catch analysis
24 to provide updated catch advice for the short-term, in between
25 full stock assessments.
26

27 The reason why only one index is used is due to the simplicity
28 of the approach, and also to make it more timely. The Science
29 Center has gone through index selection exercises for all of the
30 species for which they have completed an interim analysis, and
31 the representative index of relative abundance that they have
32 used, or that they have found to be most representative, is the
33 one that is presented for that interim analysis. So, for red
34 grouper and red snapper, it's the NMFS bottom longline index,
35 just as examples, but, for other species, it may be the combined
36 video index, or it may be some CPUE index or something like
37 that, and it just depends on the species.
38

39 To Benny's point about managing the Gulf as -- Managing catch
40 separate for the eastern and the western Gulf, that's something
41 that the council has talked about in the past, and we'll
42 certainly capture that sentiment as part of the summary.
43

44 **CHAIRMAN POWERS:** Okay. Thank you. As we go forward here, I
45 think these comments are useful. In the background, we have
46 this substitute motion, and, eventually, we're going to have to
47 get to that. What I would like to do is get some of the
48 background information, the people that are on the list there,

1 and perhaps others as we go along, and then we'll take a break
2 before we really deal directly with the motion.

3
4 Now, the break -- We're getting to point that, if the discussion
5 goes on a little bit longer than that break, it will be
6 lunchbreak, but that's kind of the way I see this, but I do want
7 to take some time before we actually get to the motion, because
8 I think people have to kind of formulate in their minds not only
9 the particular motion, but are there different -- There are
10 likely to be discussions about using all-structure-plus, all-
11 structure-plus the 22 percent versus another percent versus just
12 the all-structure, things like that, the details of that. So
13 that's how I would like to proceed for the rest of this morning.
14 With that, Harry Blanchet is on the agenda. Not agenda, but --

15
16 **MS. MATOS:** Harry, you need to unmute yourself.

17
18 **CHAIRMAN POWERS:** He's had difficulty over the last couple of
19 days with that. He actually just sent me a note saying that I'm
20 unable to unmute myself, and so let me go ahead to Kai Lorenzen.
21 Then we'll go back to Harry afterward.

22
23 **DR. LORENZEN:** Just very quickly, and sort of following on from
24 Ryan, of course, I agree with his description of the process,
25 and that's what we've decided to implement for the interim
26 analyses. I was just interested in also seeing some of the
27 other indices, noting that what we're doing here is the most
28 freestyle discussion of management advice that I recall in the
29 history of ten years of being on the SSC, and so there are lots
30 of things on the table. I just think that it would be
31 interesting to see whether the trends in other indices of
32 abundance are similar to what we're seeing in the bottom
33 longline or not. Thanks.

34
35 **CHAIRMAN POWERS:** Thank you. Harry.

36
37 **MR. BLANCHET:** I had two points on the indices of abundance,
38 before we get away from that. The first is, to me, the longline
39 index really has two components. If you look at the age
40 structure of what you see in the longline, that is both fish
41 that are directly in the age sizes, age classes, that are being
42 prosecuted by the fisheries, and then there are some older fish
43 out there that are perhaps not as available to those fisheries,
44 and so I see that as a pretty good index of both what is in the
45 fishery and what's leaving the fishery.

46
47 The other aspect of that, to Doug's point, is, if you look back
48 at the early years of that index, around 2000, those values were

1 a lot lower than what they were in the last ten years, and
2 that's not purely due to distribution of the samples.

3
4 Even up in the northwest Gulf of Mexico, where they continually
5 have a relatively high frequency of occurrence, they just
6 weren't catching the numbers in 2000 and 2001 that they were
7 catching in the 2010s, and so I think that that longline does
8 tell us an awful lot about what's available to fishery.

9
10 The one index that has not been talked about, that I have a
11 certain fondness for, is the groundfish index, because, while
12 there is an awful lot of noise, and it doesn't always show up as
13 a really good index of recruitment, I think it is still the best
14 index of recruitment that we have, and so, in terms of providing
15 any sort of prospective idea of upcoming abundance, it doesn't
16 need to be, necessarily, part of the interim analysis, but I
17 think it's something that we can use in terms of providing
18 guidance to the council for upcoming year ABCs and so forth, and
19 that's all I had. Thank you.

20
21 **CHAIRMAN POWERS:** Thank you. Luiz Barbieri.

22
23 **DR. BARBIERI:** Thank you, Mr. Chairman. Right now, just very
24 briefly, I just want to go over some of my thoughts, because the
25 way that the original and the substitute motions -- I would be
26 inclined to vote against it, and so I just want to explain my
27 rationale, really quickly, which is based on three main issues.

28
29 One is I find it difficult to reconcile the idea of continuing
30 to use the F reference point, the SPR reference point, that we
31 had before, even though we integrate the new data from the Great
32 Red Snapper Count, and so either the stock is less productive
33 than we originally thought, or I don't understand how we can
34 maintain the same reference point.

35
36 I know that this is what is in the books, and we're trying to
37 find a way to make it work, but, to me, this is a concern,
38 because it involves this issue of sustainability, and this is
39 why I asked that question originally of Matt about where those
40 numbers were coming from and how they related to the actual MSY
41 proxy, number one.

42
43 Number two is I do feel that the trends that we are seeing in
44 that bottom longline are real. Everything that I hear, and I
45 think Harry just said the same thing about the situation off of
46 Louisiana, but everything that I hear from my staff and people
47 conducting research along the West Florida Shelf is that red
48 snapper catches are not the same as they were before 2017, or

1 thereabouts, and that people have to now go further offshore to
2 find fish of the same size or the same level of abundance.

3
4 I think that that fluctuation that we are seeing in the bottom
5 longline is actually picking up the signal of how the red
6 snapper population in the Gulf is reacting to the level of
7 fishing that is experienced right now, and that might be
8 combined with a level of recruitment that is not as high as
9 we've seen before, but, still, to me, I do believe that that
10 trend is correct.

11
12 Third, I'm also, and maybe Andy Strelcheck can help us with
13 this, but understanding -- Red snapper is still formally, I
14 believe, in a rebuilding plan, and so I would imagine that we
15 would have to be, according to that rebuilding plan, be either
16 fishing at F rebuild or a lesser fishing mortality rate, and, if
17 that's the case, what would be our target there? How does this
18 relate to the existing rebuilding plan that we're in the middle
19 of? Those are my three points, Mr. Chairman. Thank you.

20
21 **CHAIRMAN POWERS:** Thank you, Luiz. I am, essentially -- I have
22 repeated this a number of times, but, essentially, the Great Red
23 Snapper Count has provided a great deal of information, but what
24 it has done is it questions, essentially, a whole lot of what
25 came out of that assessment.

26
27 There is a lot of things, like OFL and FMSY proxies and so on
28 and so forth, that are on the books, but, from a scientific
29 standpoint, we are sort of up in the air about it, and so, in
30 terms of this substitute motion, or some rendition that we might
31 come to, what we are basically trying to do, I think, is to
32 supply some very short-term management advice, and, in my
33 opinion, trying to do it without getting too keyed into things
34 like the rebuilding plan and what an FMSY proxy is and so on,
35 because, without an assessment, we really don't know at this
36 point, and so what we are trying to do is to, again, sort of
37 come with a pragmatic response, and some of the terms that have
38 been used is kind of like an experiment for a year, to see how
39 things develop and to monitor that.

40
41 I would like one question of Luiz, and you had said,
42 essentially, that you didn't think, at this point in time, that
43 you would support this particular motion, and my question is,
44 and it's really a question to the entire SSC, but it's can we
45 support -- Is the issue the amount in here, in this particular
46 28.6 million pounds, or is that we can't make any sort of
47 recommendation about that, and so you don't have to answer this,
48 Luiz, but that's kind of something we have to come to grips

1 with, individually, as scientists. David Chagaris.

2
3 **DR. CHAGARIS:** Thank you. My concern with these motions is that
4 they don't really reflect the uncertainty that we have in the
5 Great Red Snapper Count estimate, and therefore the level of
6 precaution that we should take in making this decision might not
7 be reflected in these numbers.

8
9 The intent of my request yesterday was to use a reasonable lower
10 bound on the abundance estimate for the projections, but I
11 didn't provide enough information to Matt for him to do that
12 analysis as I intended, but, if the opportunity exists, and
13 there is interest in doing so, I can now make that request in a
14 way that I think would reflect our uncertainty in the estimate,
15 specific to each region and strata, and I just wanted to see if
16 the opportunity is still there, before we went into break.

17
18 **CHAIRMAN POWERS:** I would imagine that sort of thing can be done
19 fairly quickly, but, in the same respect -- I mean, there's no
20 reason not to do it, from my standpoint. Of course, I'm not the
21 one actually doing it, but we also -- As mentioned before, we're
22 talking about not only the uncertainty of the Great Red Snapper
23 Count, but also the uncertainty in -- The unknowns, essentially,
24 in the annual productivity rates, and that's really what it
25 comes down to.

26
27 There is a lot of -- In those projections, there is a lot of
28 assumptions about that that relate to the previous assessment,
29 which may or may hold true, given the Red Snapper Count, and so
30 it's going to generate some numbers, but I'm not sure it's all
31 that much more illuminating, but I will leave it to the group
32 that are providing the information, if we want to look at that.
33 Before we get to Will, Matt, is this a problem?

34
35 **DR. SMITH:** It should not be a problem.

36
37 **CHAIRMAN POWERS:** Okay. We're basically talking about something
38 in the next hour or two, or hour, correct?

39
40 **DR. SMITH:** That's correct. As long as I get the specifics, I
41 should be able to turn it around over the lunch break, or
42 sooner.

43
44 **CHAIRMAN POWERS:** Thank you very much. Will Patterson.

45
46 **DR. PATTERSON:** I just wanted to circle back to what Luiz and
47 some others were saying about the longline data. We published a
48 couple of papers last year about the shifts in the reef fish

1 community in the north-central and northeastern Gulf of Mexico,
2 and so this is basically Alabama through the Panhandle, and the
3 papers were about the decline, the shifts, in reef fish
4 communities after Deepwater Horizon, and, at the same time,
5 lionfish appeared in the system and had pretty explosive
6 population growth in that region.

7
8 Our data went through 2017, and the first paper was led by a PC
9 student at UF, Justin Lewis, and he documented this 65 or 70
10 percent decline on natural reefs, and we have similar estimates
11 on artificial reefs, that have occurred in that region, or that
12 occurred in that region over that time period, and so, if Luiz
13 is citing this decline from 2017 onward in the longline data, it
14 could be that that signal is just those age classes are
15 recruiting to that gear, and we know the selectivity of that is
16 quite different than the handline fishery or, in our case, the
17 fishery-independent ROV.

18
19 There have been increases in the camera data south of San Blas,
20 and we saw this is the most recent red snapper assessment, where
21 Ted Sweitzer and Sean Keenan, as well Chris Gardner and Kate
22 Overly and others at Panama City, pulled their data and showed
23 different patterns east and west of San Blas. Their patterns to
24 the west of San Blas corresponded very well with what we
25 reported in the north-central Gulf/northeastern Gulf, in the
26 Alabama over to the Panhandle.

27
28 The second paper is a paper led by Dave Chagaris, which was an
29 Ecopath with Ecosim model, and that initially was parameterized
30 and put together to examine the effect of lionfish on reef fish
31 production in the system. However, in doing that, we thought
32 about other stressors in the system, such as Deepwater Horizon
33 and fishing pressure, and so I won't go into very much detail
34 about that, but all three have big effects, and, if you turn one
35 effect off in the model, you can see recovery, but the age
36 composition, informed from various data sources, shows the same
37 pattern that we have witnessed in the ROV declines.

38
39 The second point is that you can have a rescaling overall in the
40 Gulf of Mexico, in the eastern Gulf of Mexico, of estimates of
41 biomass and productivity, while, at the same time, recognize a
42 leveling-off, or even a recent decline, in the population growth
43 in the east, and we saw -- After council action in the late
44 2000s, we saw a very rapid response in the west and the east in
45 the estimates from the stock assessment of stock recovery.

46
47 That trajectory level continued in the west, but the estimates
48 leveled-off in the east, and so I think there's this conundrum

1 about what to do here, because it's apparent, in some data
2 sources in the longline survey data, in particular here, of this
3 decline since 2017.

4
5 So we can have a rescaling of estimates of biomass and
6 productivity, and, at the same time, recognize that the more
7 recent, or most recent, trend could be downward, particularly in
8 the east.

9
10 This points to some really critical data needs as we go forward,
11 and we need to have estimates of connectivity between these
12 natural sites and artificial, as well as the UCB habitats, and
13 we need to have really good information about the size and age
14 comp of red snapper in these non-targeted, or undersampled,
15 habitats, and then, also, and I will try not to say too much
16 about management in this venue, but I really think that the
17 states, who now manage their red snapper seasons independently,
18 they need to do a really good job of estimating the catch per
19 unit effort trends and the size composition data in the next few
20 years, to closely monitor --

21
22 If there is going to be an ACL or ACT increase in the fisheries,
23 we need to have really strong information to be able to track
24 those, and that's not meant in pejorative, because I don't
25 really know all the details of how all the states are currently
26 tracking that.

27
28 The programs in place, especially the ones that have been
29 certified, are probably quite solid, but I just think that's
30 going to be a critical data need, to be able to track that as we
31 move forward.

32
33 **CHAIRMAN POWERS:** Thank you. What to do next. Again, before we
34 get to Kai, we're talking in generalities here, and information,
35 I think, is very, very useful, but we need to come to a
36 decision.

37
38 As I said before, I am inclined to let the discussion go on a
39 little bit longer and then break for lunch, with the hope that
40 the key issues that are outlined in these motions, and the exact
41 numbers may change, but that's essentially what we have to come
42 to grips with. Let me continue on with Kai Lorenzen.

43
44 **DR. LORENZEN:** I think now might be a -- Because Will sort of
45 brought up the issue of the rescaling of the assessment in the
46 light of results from the Great Red Snapper Count, and, on the
47 one hand, and on the other hand, the particular trends that
48 we're seeing right now, and I think that was a -- That's a very

1 important point, and those are two things that we have to bear
2 in mind.

3
4 I just wanted to elaborate a little bit on where I am on those
5 two things, and, as he pointed out, as we bring these snapper
6 count numbers into the assessment, what will happen is that
7 things will rescale, and we'll get to the point that, instead of
8 thinking we have a small, highly-productive stock, we have a
9 larger, less-productive stock.

10
11 Strictly speaking, I am not even quite sure where this will
12 land. My sort of overall judgment is that, quite likely, that
13 analysis will result in a moderate increase in sort of
14 sustainable catch levels, and I am thinking something maybe 20
15 or 30 percent or so, but that's really just a guess right now,
16 and it's not even necessarily guaranteed to be an increase. You
17 don't really know that until you have run those numbers, but
18 that would be my professional guess, at the moment.

19
20 Then, on the other hand, we have information that suggests we
21 are sort of, right now, at a level where the stock is no longer
22 increasing, and it might be declining a little bit, and there
23 might be various reasons for that, and it need not be just
24 fishing, and it could be recruitment, or it would be related, in
25 different regions, obviously, all sorts of different things, and
26 Will brought up a few of those.

27
28 Where this leaves me is that there are these two pieces of
29 information, and one is that, really, the interim analysis and
30 the information from the -- I'm talking about the traditional
31 interim analysis and the information from -- Also, as it seems,
32 some of the other indices and the observations that were
33 mentioned by several of the scientists of abundance on
34 structures being lower than they were in the recent past, and so
35 that tells us that we should be quite cautious, and, if
36 anything, decrease the catch advice.

37
38 Then, on the other hand, we have what is a likely, but very
39 uncertain, moderate increase that will result from rescaling the
40 assessment, which, together, makes me arrive roughly in the
41 middle and say that probably the current level of the ABC is not
42 a bad choice.

43
44 Remember that this is taking into account the information from
45 the Great Red Snapper Count, because, otherwise, I would
46 advocate for more caution than is implied in that, and so,
47 basically, where that leaves me is saying that -- I am not
48 saying that's absolutely the right level, and I think we can

1 probably be a little higher, but I think it's very, very
2 difficult for me to come up with a good, defensible what that
3 little bit higher would be, but I would say that I would be
4 opposed to anything on the basis of this information that would
5 represent a significant increase over -- A substantial increase
6 over the current ABC. Thanks.

7
8 **CHAIRMAN POWERS:** Thank you, I think. All right. We're kind of
9 reaching an impasse, and I don't want to vote on these things
10 now. I want to give some time to think, and, again, when we get
11 down to voting and that sort of thing, it's going to go in
12 stages, where presumably we would have to vote on this
13 substitute motion, or perhaps another substitute motion, about
14 the OFL, and then, based on that, make some recommendation about
15 the ABC.

16
17 I would -- Even though it's quite early for the Central Time
18 Zone people, I think we might break for lunch now. Ken Roberts,
19 because you're one of the Central Time Zone people, let me get
20 your input right here.

21
22 **DR. ROBERTS:** Thank you, Mr. Chairman. The break will be very
23 inconvenient for me, because I have an obligation, business-
24 wise, but, anyway, I want to ask, if the two motion makers, the
25 two that are on the screen now, the original motion and the
26 substitute motion, but let's talk about the substitute motion
27 first.

28
29 I don't know who made the motion, but I would ask you to have
30 the question raised as to whether the person who offered that
31 substitute motion is able to stay with it, based on the last
32 hour-and-a-half's worth of discussion, or should it be removed
33 now?

34
35 **CHAIRMAN POWERS:** It was John Mareska. I will let him respond
36 to that.

37
38 **MR. MARESKA:** Yes, I would stay with this substitute motion. I
39 think we've already heard from Matt that the stock structure is
40 sustainable, based on these estimates from the Great Red Snapper
41 Count, and there is concerns over the F 26 percent SPR, but this
42 stock is in a rebuilding plan, and it continues to rebuild ahead
43 of the timeline, and so, again, more evidence to stick with this
44 substitute motion.

45
46 I didn't recommend the grand total, because, obviously, that's
47 something that probably should be incorporated in the SEDAR
48 stock assessment process, and so we're being conservative, and

1 basically cutting the estimate of the Great Red Snapper Count in
2 half, but coming with the all-structure-plus.

3
4 Just going even further, because it's been stated numerous times
5 that it's an underestimate, and so now we've cut an
6 underestimate in half, and then we want to be more conservative
7 and just go to the all-structure, and so, to me, that's just too
8 conservative.

9
10 **DR. ROBERTS:** Okay. So, if I can interrupt, this motion, your
11 substitute, refers to OFL, whereby the original motion dealt
12 only with ABC. Why is it a substitute motion? What's
13 different?

14
15 **MR. MARESKA:** I thought it would be a separate motion --

16
17 **CHAIRMAN POWERS:** Excuse me. People are jumping in here, and
18 I'm kind of getting lost here. The question was, procedurally,
19 why is this a substitute motion, and I think Ryan may be able to
20 respond to that.

21
22 **MR. RINDONE:** Sure. The motion for defining the ABC was offered
23 first, and then you guys had continued discussion about, with
24 some staff input, about whether an OFL would need to be
25 considered and when that should be considered, and you guys
26 decided to tackle the OFL first, and so Mr. Mareska offered the
27 substitute motion to deal with the OFL first, and it's a
28 substitute, since it's all under the guise of offering catch
29 recommendations to the council, based on the analysis, and so
30 it's all within that vein, and so that's why it's a substitute
31 motion.

32
33 In the event that the substitute motion passes, then the
34 previous motion is null and void, and it's taken off the board.
35 If the substitute motion fails, then the previous motion is back
36 up for discussion.

37
38 **DR. ROBERTS:** Well, I was here for the whole thing, and I
39 realize that, but my point was to try to speed this along. If
40 the person who made the motion thinks, when all of this
41 discussion was had, thinks it's not going to pass, then maybe it
42 would be withdrawn now, and we would go back to the original
43 motion.

44
45 **MR. MARESKA:** I think, procedurally, I would be -- I don't think
46 we can vote on an ABC until we have decided on an OFL.

47
48 **DR. ROBERTS:** So it's not really a substitute motion then, and

1 that's my point. It's just a motion to be considered first, and
2 then you roll back to the former motion.

3
4 **MR. RINDONE:** That's the substitute motion.

5
6 **DR. ROBERTS:** If you pass the substitute motion, you have to
7 restate the original motion.

8
9 **MR. RINDONE:** No, you do not. If you pass the substitute
10 motion, the original motion goes away, and then another motion
11 would have to be made for defining the ABC. It could be the
12 exact same one that's up there now, if that's what you guys
13 wanted to do, and you could make whatever motion you want, but,
14 procedurally, that's how that would operate.

15
16 **CHAIRMAN POWERS:** We are not getting anywhere. I mean, we're
17 talking about procedure here. Now, we have three people on the
18 line that wish to talk. Again, we could call the question now,
19 and actually vote on this substitute motion, or what I -- The
20 reason that I was suggesting some breaks is to give people some
21 time to formulate their own either motions or whatever, and
22 strategies on how to deal with this.

23
24 If, procedurally, you want to vote on this now, that's certainly
25 a prerogative, but there are three people lined up to talk, or
26 two people now, and I will allow them to speak. First off is
27 Shannon Cass-Calay.

28
29 **DR. CALAY:** Thank you, Chair. My comment is no longer relevant
30 to the discussion you are having.

31
32 **CHAIRMAN POWERS:** Okay. Thank you. Will.

33
34 **DR. PATTERSON:** I pass as well. Thanks.

35
36 **CHAIRMAN POWERS:** Thank you. All right. I would like to --
37 Procedurally, we have a substitute motion. If we're going to
38 get moving, then, to follow the rules, we should vote on that,
39 and we've had a considerable amount of debate about the motion,
40 per se, and then other issues as well, and so, to force the
41 issue, we will -- Barring objection, we will vote on the motion.

42
43 Now, because of all this debate and the responses to it, I am
44 quite sure that this is not something that is going to be driven
45 by a consensus, and so we will go through individual-by-
46 individual and ask for their vote associated with this, if we
47 can do that, please.

1 MS. MATOS: Lee Anderson.
2
3 DR. ANDERSON: Abstain.
4
5 MS. MATOS: Dave Chagaris.
6
7 DR. CHAGARIS: No.
8
9 MS. MATOS: Doug Gregory.
10
11 MR. GREGORY: No.
12
13 MS. MATOS: Kai Lorenzen.
14
15 DR. LORENZEN: No.
16
17 MS. MATOS: Joe Powers.
18
19 CHAIRMAN POWERS: No.
20
21 MS. MATOS: Steven Scyphers.
22
23 DR. SCYPHERS: Abstain.
24
25 MS. MATOS: Jason Adriance. I don't think he's here. Jack
26 Isaacs. Jack, you need to enter your PIN. Luiz Barbieri.
27
28 DR. BARBIERI: No.
29
30 MS. MATOS: Benny Gallaway.
31
32 DR. GALLAWAY: No.
33
34 MS. MATOS: Walter Keithly.
35
36 DR. KEITHLY: No.
37
38 MS. MATOS: Camp Matens.
39
40 MR. MATENS: Yes.
41
42 MS. MATOS: Sean Powers.
43
44 DR. POWERS: Ryan, can you -- These are the votes that we can
45 start participating again, correct, for the PIs?
46
47 MR. RINDONE: Yes, that's correct. The co-PIs are open to vote.
48

1 DR. POWERS: Yes.
2
3 MS. MATOS: Jim Tolan.
4
5 DR. TOLAN: No.
6
7 MS. MATOS: Judd Curtis.
8
9 DR. CURTIS: I will abstain.
10
11 MS. MATOS: Kari Buck.
12
13 DR. MACLAUCHLIN-BUCK: Abstain.
14
15 MS. MATOS: Harry Blanchet.
16
17 MR. BLANCHET: Yes.
18
19 MS. MATOS: Bob Gill.
20
21 MR. GILL: No.
22
23 MS. MATOS: Robert Leaf.
24
25 DR. LEAF: No.
26
27 MS. MATOS: Jim Nance.
28
29 DR. NANCE: No.
30
31 MS. MATOS: Ken Roberts.
32
33 DR. ROBERTS: Yes.
34
35 MS. MATOS: Will Patterson.
36
37 DR. PATTERSON: No.
38
39 MS. MATOS: John Mareska.
40
41 MR. MARESKA: Yes.
42
43 MS. MATOS: Andrew Ropicki.
44
45 DR. ROPICKI: Abstain.
46
47 MS. MATOS: Jack Isaacs.
48

1 **DR. ISAACS:** No.

2
3 **MS. MATOS:** The motion fails thirteen to five.

4
5 **CHAIRMAN POWERS:** Okay. Again, procedurally, how do we deal
6 with the other motion?

7
8 **MR. RINDONE:** Now the other motion comes back up on the board as
9 being up for a vote or discussion. If you guys feel like you
10 need to discuss it more, you discuss it some more. If you want
11 to vote on it, you can vote on it, and, if you feel like it's
12 out of turn, given that you were just talking about the OFL,
13 then the motion maker, Mr. Gill, could withdraw it, in favor
14 going back to addressing the OFL, if you guys think that most
15 appropriate.

16
17 **CHAIRMAN POWERS:** That is probably most appropriate, given the
18 structure of how the decision should be made. Bob, do you have
19 a comment?

20
21 **MR. GILL:** I have no objection to withdrawing that motion at
22 this time. If we're breaking for lunch, I would encourage those
23 that oppose these motions to come up with a motion that they
24 think they can live with.

25
26 **CHAIRMAN POWERS:** Indeed. At this point, I take it we're
27 withdrawing this motion. Now, we need something. Basically,
28 over the break time, as those that are drafting motions, keep in
29 mind that, if we can start with the OFL, and we have just voted
30 down an OFL with 28.6 million pounds, and so presumably the will
31 of the group is something less than that.

32
33 Also, keep in mind that the bottom line, in terms of what the --
34 The bottom line, in terms of the TAC that is finally chosen, is
35 going to be driven by the ABC, and so one could argue for a
36 higher OFL and a lower ABC, and all sorts of combinations like
37 that, and just keep that in mind.

38
39 I don't want to get into too much more debate at this point,
40 because it's kind of pointless. We need something concrete to
41 look at. I will allow Kai to make a comment, but let's not --
42 Now is not a good time for debate, and we want product.

43
44 **DR. LORENZEN:** Thanks, Joe. I was sort of coming back to the
45 motion that Bob has just withdrawn, and I'm not sure why that
46 had to be the ABC, and I was wondering whether we could maybe
47 consider that same motion with the same figure as an OFL.

1 **CHAIRMAN POWERS:** That's certainly a possibility. If you want
2 to keep the discussion and not break now, then perhaps you could
3 make that motion.
4
5 **DR. LORENZEN:** I guess you can just put it back in and change
6 ABC to OFL.
7
8 **CHAIRMAN POWERS:** All right. Is there a second to this?
9
10 **DR. ROBERTS:** I will second it.
11
12 **CHAIRMAN POWERS:** Thank you. I don't know that we want any more
13 discussion, or need any more discussion. Do you want to vote on
14 this? If there is no further discussion, let's vote on it.
15
16 **MR. RINDONE:** I think you have a hand up, Mr. Chair.
17
18 **CHAIRMAN POWERS:** Sean.
19
20 **DR. POWERS:** I'm sorry, and it's been a while since the original
21 motion and this modification, and can Bob explain to us where he
22 got that number from again, what is the basis?
23
24 **MR. GILL:** That came from the Great Red Snapper Count interim
25 analysis that we had, and it was for the structured bottom, all
26 structured bottom, SPR 26 percent, utilizing the three-year
27 average.
28
29 **DR. NANCE:** It's from the table that Matt presented yesterday.
30
31 **MR. GILL:** Yes, the results catch slide, and it's third from the
32 bottom, I believe.
33
34 **MR. RINDONE:** It's Slide 21 on Tab Number 4(a).
35
36 **DR. POWERS:** Okay, and that basically doesn't use either of the
37 uncharacterized bottom scenarios. Got you.
38
39 **CHAIRMAN POWERS:** Okay. Any further discussion? With that,
40 then let's vote on it. Harry.
41
42 **MR. BLANCHET:** My concern with this is that we know that there
43 are snapper that are being harvested by the fishery off of known
44 structure, and this is not including any of that as part of this
45 estimate. We can argue about what fraction of that off-known
46 structure is in the fishery, whether it's something on the order
47 of 5 percent or on the order of 40 percent, but there is some
48 fraction of it out there.

1
2 **CHAIRMAN POWERS:** Sean Powers.

3
4 **DR. POWERS:** That's the same reservation that I have, Harry, is
5 that we know that, and we had discussions and suggestions from
6 Tom and others, and that was kind of my basis for my support of
7 the previous one, was to set the OFL higher, recognizing the
8 uncharacterized bottom, so it gives us flexibility in the ABC
9 and gives the council the flexibility for, at least, when
10 they're thinking about it, if they have a better estimate from
11 the fishermen on the uncharacterized bottom that is exploited,
12 then they can do that.

13
14 I won't offer a substitute, but, if this one fails, I probably
15 would be in favor of the 13 percent, but I have the same
16 concerns that you do, Harry, that we're ignoring something that
17 we know is happening.

18
19 **CHAIRMAN POWERS:** Thank you. Sean, you said you don't wish to
20 offer a substitute motion for the 13 percent?

21
22 **DR. POWERS:** Not at this time, no.

23
24 **CHAIRMAN POWERS:** John Mareska.

25
26 **MR. MARESKA:** I just support the sentiments of Harry and Sean as
27 well, but, by going with this motion, basically, you're saying
28 that there will be no change in fishing behavior. Given that
29 the commercial and recreational fisheries know that these
30 additional fish are out there, I believe there is the potential
31 for them to change their fishing behavior, and so some portion
32 of the uncharacterized bottom needs to be included.

33
34 **CHAIRMAN POWERS:** Okay. That 13 percent -- What's on the screen
35 right now, that lines up with one of those columns, and is that
36 the all-structure-plus?

37
38 **MR. MARESKA:** As I recall that from yesterday, that was 15
39 percent, and that was the initial cut, which, actually, I don't
40 have a problem with 15 versus 13. The 13 was basically an
41 estimate of the Type 3 unclassified bottom in the random forest
42 model estimate, which I did have heartburn over.

43
44 **CHAIRMAN POWERS:** So what I'm really asking is if somebody
45 wishes to have an OFL that reflects one of the all-structure-
46 plus scenarios, and presumably the ones we're talking about is
47 13 or 15 percent, you have the information there that those
48 numbers could be substituted into a substitute motion, or could

1 be put into a substitute motion. If you have the inclination,
2 now is the time to do it. John Mareska.
3
4 **MR. MARESKA:** I have already said my piece, but my name just was
5 not withdrawn.
6
7 **CHAIRMAN POWERS:** Okay. Sean Powers.
8
9 **DR. POWERS:** I will propose that substitute motion, Joe, and
10 it's the same one, but just replace it with the 25.87. I think
11 copy-and-paste and just change that number.
12
13 **MR. RINDONE:** Somewhere in there, it needs to be plugged in that
14 it's using 13 percent of the UCB.
15
16 **DR. POWERS:** That's fine.
17
18 **MR. RINDONE:** So using 13 percent of the UCB, and using -- It's
19 kind of a run-on sentence, but we know what he's saying.
20
21 **CHAIRMAN POWERS:** All right. Does there have to be a second for
22 this?
23
24 **MR. MARESKA:** I will second it.
25
26 **CHAIRMAN POWERS:** Okay. Thank you, John. Bob Gill.
27
28 **MR. GILL:** I withdraw my name, Mr. Chairman. Thank you.
29
30 **CHAIRMAN POWERS:** Sean, I kind of skipped over you. Did you
31 want to say anything more about this?
32
33 **DR. POWERS:** I mean, I am concerned, like many, that we don't
34 know exactly how much of the uncharacterized bottom -- It is a
35 point of uncertainty, and, like I said, if the council feels
36 like this is an overestimate, they can act as well to reduce it
37 in the ACL.
38
39 **CHAIRMAN POWERS:** All right. Thank you. Doug Gregory.
40
41 **MR. GREGORY:** That's an interesting surmise, that the council
42 will think this is too conservative. I think it's not
43 conservative enough. The UCB was sixty-some percent of the
44 total point estimate in that study, and so 13 percent of that
45 let's say is like 7 percent of that study. Rounded off, let's
46 say it's seven million pounds, and so we think, given an extra
47 seven million pounds of the UCB, that that's not overgenerous,
48 and we're increasing the current ABC by 66 percent? I would

1 vote against this motion.
2
3 **CHAIRMAN POWERS:** We're not voting on the ABC. This is the OFL.
4
5 **MR. GREGORY:** I understand.
6
7 **CHAIRMAN POWERS:** Okay. Great. All right. Sean.
8
9 **DR. POWERS:** I just want to emphasize that point, that this is
10 the OFL, and, I mean, we're going to discount it. Well, this is
11 the proposed OFL. I mean, there's another opportunity to,
12 obviously, discount it as much as we think.
13
14 **CHAIRMAN POWERS:** Thank you. If there is no other comments,
15 then let's vote on this motion.
16
17 **MS. MATOS:** Andrew Ropicki.
18
19 **DR. ROPICKI:** Abstain.
20
21 **MS. MATOS:** John Mareska.
22
23 **MR. MARESKA:** Yes.
24
25 **MS. MATOS:** Will Patterson.
26
27 **DR. PATTERSON:** Yes.
28
29 **MS. MATOS:** Ken Roberts.
30
31 **DR. ROBERTS:** Yes.
32
33 **MS. MATOS:** Jim Nance.
34
35 **DR. NANCE:** No.
36
37 **MS. MATOS:** Robert Leaf.
38
39 **DR. LEAF:** Yes.
40
41 **MS. MATOS:** Bob Gill.
42
43 **MR. GILL:** Yes.
44
45 **MS. MATOS:** Harry Blanchet.
46
47 **MR. BLANCHET:** Yes.
48

1 MS. MATOS: Luiz Barbieri.
2
3 DR. BARBIERI: No.
4
5 MS. MATOS: Benny Gallaway.
6
7 DR. GALLAWAY: No.
8
9 MS. MATOS: Walter Keithly.
10
11 DR. KEITHLY: No.
12
13 MS. MATOS: Camp Matens.
14
15 MR. MATENS: Yes.
16
17 MS. MATOS: Sean Powers.
18
19 DR. POWERS: Yes.
20
21 MS. MATOS: Jim Tolan.
22
23 DR. TOLAN: Yes.
24
25 MS. MATOS: Judd Curtis.
26
27 DR. CURTIS: Yes.
28
29 MS. MATOS: Kari Buck.
30
31 DR. MACLAUCHLIN-BUCK: Abstain.
32
33 MS. MATOS: Jack Isaacs. You need to enter your PIN again,
34 Jack. Steven Scyphers.
35
36 DR. SCYPHERS: Yes.
37
38 MS. MATOS: Joe Powers.
39
40 CHAIRMAN POWERS: Yes.
41
42 MS. MATOS: Kai Lorenzen.
43
44 DR. LORENZEN: No.
45
46 MS. MATOS: Doug Gregory.
47
48 MR. GREGORY: No.

1
2 **MS. MATOS:** David Chagaris.
3
4 **DR. CHAGARIS:** No.
5
6 **MS. MATOS:** Lee Anderson.
7
8 **DR. ANDERSON:** No.
9
10 **MS. MATOS:** Jack Isaacs.
11
12 **DR. ISAACS:** Yes.
13
14 **CHAIRMAN POWERS:** Thank you. **The motion carries thirteen to**
15 **eight with two abstentions and one absent.** So we have an OFL.
16 We're on a hot roll, and I don't want to break for lunch. Do we
17 have a motion for the ABC? We have Will Patterson and then
18 Luiz.
19
20 **DR. PATTERSON:** I have a couple of comments here. Isn't the ABC
21 just F rebuild for red snapper? The second is that thirteen-to-
22 eight is not an overwhelming majority, and so I think we need to
23 be really clear in the report about the discussion here and the
24 balance of trying to find an approach that some folks thought
25 was precautionary enough, while others thought was not overly
26 precautionary, and so that sentiment needs to be captured in the
27 report very clearly.
28
29 **CHAIRMAN POWERS:** Yes, and, I mean, that sentiment will be
30 captured in the minutes for hours of debate, I'm sure, too, but,
31 yes, it needs to be. As far as your first thing about F
32 rebuild, my interpretation is we are to supply the estimate of
33 the allowable biological catch, which is taking the OFL and
34 whatever uncertainty we wish to consider in determining that.
35
36 Because of all the issues we talked about, about not having an
37 assessment, I don't think we're bound by anything, in terms of F
38 rebuild and that sort of thing. We are to give our best advice
39 relative to the ABC, and so I don't feel constrained, at all, by
40 F rebuild or particular F values and things like that. Luiz.
41
42 **DR. BARBIERI:** Thank you, Mr. Chairman. **I actually emailed -- I**
43 **sent, by email, a motion for ABC.** If I get a second, I will
44 explain, through discussion.
45
46 **DR. LORENZEN:** I will second.
47
48 **CHAIRMAN POWERS:** Okay. This was a motion from Luiz and a

1 second from Kai. Go ahead, Luiz.
2
3 **DR. BARBIERI:** I know that this is not going to be a popular
4 perspective here, but, as a fisheries biologist, I feel that
5 this is the most sensible way for us to proceed. To me, this
6 reflects my perception of the trends that we see in the bottom
7 longline survey as being representative of what's going on out
8 there.
9
10 Several other members brought up issues that may be impacting
11 the stock, but, one way or the other, I think that some of the
12 reductions, some of the impacts that we have seen over the last
13 few years, need to be taken into account as we move forward,
14 without having an assessment, a full stock assessment, that can
15 really characterize all the dynamics of this stock and to take
16 this into account, and I think this follows some of the
17 rationale that Kai presented earlier.
18
19 Some of the bottom longline recommendations, based on using 2020
20 data and using some of the other moving average values there,
21 came up with potentially a reduction from status quo, which is
22 15.1 million pounds. This offers a small, very small, increase
23 that basically represents status quo, taking into account that
24 we don't need to be -- If the abundance, the high level of
25 abundance, indicated by the Great Red Snapper Count is true, we
26 don't need to be as precautionary as we probably would have to
27 be, as advised by the trends in that bottom longline survey.
28
29 To me, this is a compromise that keeps us modestly above the
30 status quo, but it still integrates all the precautionary
31 principles that we need to put in place here, given what we see
32 from the data.
33
34 **CHAIRMAN POWERS:** Thank you. Doug Gregory.
35
36 **MR. GREGORY:** I will pass at this time.
37
38 **CHAIRMAN POWERS:** Is there any further debate about this, in
39 which case, Doug, now is your only chance?
40
41 **DR. ANDERSON:** May I just ask, what is the existing ABC?
42
43 **MR. RINDONE:** 15.1 million pounds, and so this would constitute
44 a 300,000-pound increase over the current ABC.
45
46 **DR. ANDERSON:** That is a modest increase, yes.
47
48 **CHAIRMAN POWERS:** All right. Is there any more discussion?

1 Dave Chagaris.
2
3 **DR. CHAGARIS:** Again, I mean, obviously, this is based on the
4 bottom longline survey, but any competing motion would likely be
5 based on the Great Red Snapper Count, and I keep going back to
6 our confidence in the estimate, because, in that regard, it is
7 all predicated on that abundance estimate, which we have
8 uncertainty around.
9
10 I just wanted to mention that I did send the request for
11 alternative scenarios to Matt, and my hope was that those could
12 be considered as an ABC value, and so I'm not sure if we want to
13 see the results of those first or vote on this one separately.
14
15 **CHAIRMAN POWERS:** If you want to make a substitute motion, you
16 can, and put in a different number that 15.4, or different
17 wording, and I'm quite happy to look at new information, but is
18 it really new information? My suggestion is -- Well, because
19 you just got it, I will give you a little bit of time to look at
20 it.
21
22 **DR. CHAGARIS:** No, I'm good. Sorry, but I haven't seen the
23 results yet. I have made the request, via email through Ryan,
24 and I CC'd you, and so he has information to update the
25 spreadsheet model.
26
27 **CHAIRMAN POWERS:** Okay. Well, let me -- We'll take the question
28 on that in a little bit and go to Andy Strelcheck.
29
30 **MR. STRELCHECK:** Thanks, Joe. I would be interested in the SSC
31 kind of discussing this motion further, and I have certainly
32 have heard, over the last several days, the concerns about
33 declining trends in the bottom longline index and other
34 information that's been shared.
35
36 There's also, obviously, been lots of reference to the
37 uncertainty regarding the Great Red Snapper Count estimates, but
38 we do know that the Great Red Snapper Count did conclude that
39 the population is considerably larger than what we previously
40 estimated the population size to be. How much larger,
41 obviously, is to be debated, and so I'm struggling to recognize,
42 obviously, the new scientific information that's being presented
43 to you and being considered this week with a fairly modest
44 increase, obviously, that's being proposed in the motion.
45
46 **CHAIRMAN POWERS:** Luiz, to respond to that?
47
48 **DR. BARBIERI:** Yes. Andy, very good points. This is one of

1 those things where you don't have all the information, and you
2 try to make the best of it, and so, to me, all the
3 uncertainties, all the issues, that we discussed this week in
4 detail regarding the final outcome of the Great Red Snapper
5 Count really, in my view, puts those results at a level of
6 uncertainty that I am not sure they pass the test to be used for
7 management advice explicitly, and so they're not integrated in a
8 quantitative, numerical way. This is number one.

9
10 Number two is the fact that this allows us to continue using the
11 interim analysis approach that our Science Center has presented
12 to us, presented to the council, and this is what we have on the
13 table as the procedure, and I think this procedure follows a
14 national-level perspective that the agency has developed to
15 implement interim analysis as a way to adjust catch level
16 recommendations to the most recent conditions, based on trends
17 from fishery-independent indices.

18
19 To me, this would allow us to stay within that framework that I
20 believe is solid, and it's robust, and then, finally, this
21 avoids us having to get into a situation where that conflict
22 between do we have a much larger stock then that's less
23 productive, or do we have a smaller stock that is more
24 productive, and so what level is sustainable?

25
26 To me, when we try to manage based on reference points, to me,
27 they have to come out of either a stock assessment or some other
28 process where we can see that the full dynamics of the stock
29 have been integrated into it, and so those are my points here.

30
31 **CHAIRMAN POWERS:** Thank you, Luiz, but I would also mention that
32 the interim analysis has been structured based on the stock
33 assessment, the previous stock assessment, which does not, of
34 course, deal with the Red Snapper Count. Doug Gregory.

35
36 **MR. GREGORY:** I will be brief. Luiz said it much more
37 eloquently than what I could do, and that's the same thing that
38 I was thinking. We've got a research track assessment coming
39 up, and that's the place to integrate the Great Red Snapper
40 Count. I mean, we're virtually flying by the seat of our pants
41 and trying to make a decision on this this week. I do not think
42 that's appropriate.

43
44 That's my concern, and I think the study is a great study, and
45 it's going to be a game-changer, like everybody said, and it's
46 going to change the assessment, but it needs to be done in a
47 deliberate, methodical manner, and the Great Red Snapper Count
48 is still interim, and a lot of data is missing, or was imputed,

1 and there's a lot of question on point estimates, and not just
2 the variances, and so I support this motion. Thank you.

3
4 **CHAIRMAN POWERS:** Thank you. Kai Lorenzen.

5
6 **DR. LORENZEN:** It's sort of a little bit in response to Andy
7 Strelcheck's comment, and I know, of course, the thoughts of
8 many other people who are looking at this, and it's really to
9 bear in mind that we -- There is a lot of information about the
10 dynamics of this fishery that we have accumulated over forty
11 years and that is basically synthesized in the stock assessment,
12 and so, as we're bringing in that new estimate of abundance from
13 Great Red Snapper Count, what will happen is, as we combine that
14 with the existing assessment, it will change some of the
15 components of that assessment and our understanding of how this
16 stock works, so to speak, but it's important to realize that it
17 will not change the catch advice, to any extent, even vaguely
18 near the difference in abundance between the Great Red Snapper
19 Count estimate and the previous estimate from the stock
20 assessment.

21
22 It will have some influence, but it will be fairly moderate, and
23 I think that's just how the stock assessment works, and then we
24 have to bear that in mind, because we're still, essentially,
25 explaining the dynamics that we know occur, and have occurred,
26 and I believe the new model may be slightly better at explaining
27 some deviations here and there, but it's not going to put us
28 into a completely different reality.

29
30 This motion takes all that into account, and, as a result of
31 that consideration, it suggests an ABC above what the interim
32 analysis, based on the bottom longline data, suggests, and so it
33 is taking into account the Great Red Snapper Count results, but
34 in a very conservative fashion. Thanks.

35
36 **CHAIRMAN POWERS:** Thank you. Lee Anderson.

37
38 **DR. ANDERSON:** I heard earlier that somebody wanted to increase
39 the -- On the basis of the undefined bottom or whatever, the
40 unclassified bottom, and there's a lot of fish out there, but I
41 haven't heard anything about have the fish been taken from those
42 areas, and so we have a bigger stock, according to the count,
43 but is it a stock that is utilized by the fishers? I think I
44 would support this motion, also.

45
46 **CHAIRMAN POWERS:** Thank you. Benny Gallaway.

47
48 **DR. GALLAWAY:** I was just going to request perhaps Dr. Patterson

1 and Dr. Powers speak to the nature of the increase in the
2 overall population estimate, and I thought my understanding was
3 a large majority of that increase occurred in the eastern Gulf
4 of Mexico and consisted of large numbers of small fish over the
5 mid and south Florida shelf.

6
7 **CHAIRMAN POWERS:** Thank you. Sean, can you address that?

8
9 **DR. POWERS:** Sure, and, again, Will would know better for
10 Florida, but, by far, the vast majority of the increase in the
11 east is from Will's study. We have some increase on the
12 uncharacterized bottom in our region, but, by far, the increase
13 is off of Florida.

14
15 I did want to speak to this motion. Kai mentioned that it uses
16 the Great Red Snapper Count, and I might have heard that wrong,
17 but this motion, obviously, does not, and it uses the bottom
18 longline survey, and it is one of the more conservative
19 approaches we can use.

20
21 I want to remind everybody that we are only doing this for one
22 year, and so we're only setting it for one year. We will get
23 the integration, and we will have time to refine the point
24 estimates, as well as the variances, from the Great Red Snapper
25 Count, and we will have integration with the stock assessment,
26 and so it's only one year, and I don't think the questions that
27 we have are real, and they will be resolved by integration of
28 the stock assessment and the Great Red Snapper Count, but you
29 realize there are socioeconomic considerations that we're
30 supposed to take into account as well.

31
32 I don't think -- I know we, at least I do, believe that, based
33 on the results of the study, and if you think about the FES and
34 what that's going to do to the stock assessment, and there are
35 more fish out there. Most of us believe that firmly. The fact
36 that we're going to increase just for a year doesn't bother me.
37 To what degree we're going to increase, obviously, is debatable,
38 but this scenario really is the most conservative, and it seems
39 to ignore the findings and the establishment that we have more
40 red snapper out there. Thank you.

41
42 **CHAIRMAN POWERS:** Thank you. Will Patterson.

43
44 **DR. PATTERSON:** Thanks, Joe. This statement is in response to
45 Joe's question about whether we could address this, and I don't
46 want it to be perceived as a response to Sean's statement, but I
47 said that, when we had our last meeting, and this review was
48 suggested, and then Dr. Simmons and her staff and the council

1 made it happen, that I supported it, and that I would recuse
2 myself from any discussion or votes on the Great Red Snapper
3 Count, and I just voted, a minute ago, on a motion that I regret
4 now having voted for.

5
6 The reason is because I don't think I could make any comments
7 here about how to use this information that wouldn't sound like
8 I was advocating for the acceptance, and whatever degree of
9 acceptance, of the result of the Great Red Snapper Count, which
10 I was a part of, and so I'm going to recuse myself from any
11 other votes or comments about this, because I don't think I can
12 remove myself from -- I can't be fully objective about it, and
13 so I'm going to abstain.

14
15 **CHAIRMAN POWERS:** Thank you. So I wish to wind down discussion,
16 and so we have Doug Gregory and then Luiz.

17
18 **MR. GREGORY:** I applaud what Will just said, and, in fact, I've
19 been debating whether to ask for a NOAA General Counsel opinion,
20 or somebody more informed with National Standard 2, to advise us
21 if the co-PIs really should be voting on these motions. It does
22 seem odd, as Will pointed out, and, again, I applaud Will for
23 what he said. Thank you.

24
25 **CHAIRMAN POWERS:** Before we -- I am certainly open to asking for
26 legal advice, but, before we get to that, this particular
27 motion, indirectly, is making a comment about the Great Red
28 Snapper Count, but it's not actually in the motion itself, and
29 it's basically saying that we want to use the interim analysis.
30 Still, I mean, from Will's standpoint, the implication is
31 clearly there. Dr. Simmons.

32
33 **EXECUTIVE DIRECTOR SIMMONS:** Thank you, Mr. Chair. It was our
34 intent to allow the PIs to vote on this part of the meeting. I
35 thought we laid that out in the peer review process. If there
36 was confusion on that, I apologize, but I believe, if we go to
37 the substitute motion that passed in the first part of the
38 meeting, that that was the only piece that we were asking the
39 PIs that were involved in the Great Red Snapper Count to abstain
40 from. Thank you.

41
42 **CHAIRMAN POWERS:** Thank you. In terms of the PIs, they do have
43 -- You do have the option to vote on this. Individually, of
44 course, you can abstain, for the reasons that Will mentioned, or
45 others, and I will leave it up to them.

46
47 **MR. GREGORY:** So whose decision was that, and how informed is
48 that decision, based on National Standard 2 Guidelines, because

1 that's something we haven't had a lot of experience with.

2
3 **EXECUTIVE DIRECTOR SIMMONS:** Mr. Chair, that was a decision
4 internally that we came up with with the Council Chair, in
5 discussions, and we deliberated about it with Ms. Mara Levy at
6 NOAA General Counsel and based on National Standard 2
7 Guidelines. It was a request, and it is not a requirement, but
8 it was a request, and so those PIs could have said no, but it
9 was a request by the council, and they agreed. Thank you.

10
11 **MR. GREGORY:** Thank you.

12
13 **CHAIRMAN POWERS:** Thank you. Luiz Barbieri.

14
15 **DR. BARBIERI:** Thank you. Will, briefly, I just want to sort of
16 explain some of the rationale here, because there may be people
17 overinterpreting what the message here is as well. The issue of
18 the Great Red Snapper Count being integrated into management
19 advice involves process, and we reviewed the analysis that the
20 Center put together, and I think it was well done, and well
21 thought out, but, in my view, there is still enough questions
22 left open about impacts on sustainability of the stock and the
23 choice of reference points to be made.

24
25 There are issues about, for example, separating the proportion
26 of the stock on the western Gulf where we basically agreed that
27 the uncertainty over there was much larger than on the eastern
28 Gulf, and then I personally was very uncomfortable with the
29 estimates that came out of Louisiana, because of the way -- All
30 sorts of conditions dictated that to happen, and it's nobody's
31 fault, really, but the conditions dictated those estimates to
32 not really even meet the bar of a lot of the work that was done
33 in the other regions that they considered.

34
35 To me, if I take all of this into account, and I look at the
36 all-structure-plus, it's difficult for me to tease that out and
37 pull Louisiana out of that analysis, for example, and how that
38 will impact the whole process there, and so, to me, all of these
39 things -- Since we're going to have a research track assessment,
40 all of those issues can be resolved during that assessment
41 process, through a data workshop or similar type of workshop
42 that can discuss those things and see what's appropriate from
43 that analysis to be integrated, versus others that are not ready
44 for that stage. Thank you.

45
46 **CHAIRMAN POWERS:** Thank you. Kai.

47
48 **DR. LORENZEN:** I just wanted to clarify, and there's a bit of

1 confusion here, often, about two quite different things, and one
2 is abundance, and so the Great Red Snapper Count gives us an
3 estimate of abundance, as does the stock assessment, and those
4 are different, and we know that. We acknowledge that, and,
5 while both of those have uncertainties associated with them,
6 we're not discounting any of those estimates.

7
8 The other thing is the productivity of this stock and the
9 sustainable yield that can be taken from it, and we know that
10 the differences implied by the abundance estimate from the Great
11 Red Snapper Count and that estimate in the stock assessment --
12 Once those are translated appropriately into differences in
13 productivity, those will be much, much smaller than the
14 differences in abundance that we're seeing, and so it's very
15 important to bear in mind that the difference in abundance will
16 not translate into an equivalent change in productivity or
17 sustainable yield. Thanks.

18
19 **CHAIRMAN POWERS:** Thank you. Will Patterson.

20
21 **DR. PATTERSON:** I was going to make a comment, but I'm going to
22 just refer back to my previous statement, with respect to what
23 Carrie has mentioned recently.

24
25 **CHAIRMAN POWERS:** Thank you. All right. We have a motion on
26 the board. We will vote on it now.

27
28 **MS. MATOS:** Kari Buck. Judd Curtis.

29
30 **DR. CURTIS:** No.

31
32 **MS. MATOS:** Jim Tolan.

33
34 **DR. TOLAN:** Yes.

35
36 **MS. MATOS:** Sean Powers.

37
38 **DR. POWERS:** No.

39
40 **MS. MATOS:** Camp Matens.

41
42 **MR. MATENS:** No.

43
44 **MS. MATOS:** Walter Keithly.

45
46 **DR. KEITHLY:** Yes.

47
48 **MS. MATOS:** Benny Gallaway.

1
2 DR. GALLAWAY: Yes.
3
4 MS. MATOS: Luiz Barbieri.
5
6 DR. BARBIERI: Yes.
7
8 MS. MATOS: Lee Anderson.
9
10 DR. ANDERSON: Yes.
11
12 MS. MATOS: Dave Chagaris.
13
14 DR. CHAGARIS: Yes.
15
16 MS. MATOS: Doug Gregory.
17
18 MR. GREGORY: Yes.
19
20 MS. MATOS: Kai Lorenzen.
21
22 DR. LORENZEN: Yes.
23
24 MS. MATOS: Joe Powers.
25
26 CHAIRMAN POWERS: No.
27
28 MS. MATOS: Steven Scyphers.
29
30 DR. SCYPHERS: No.
31
32 MS. MATOS: Jason Adriance. Jack Isaacs.
33
34 DR. ISAACS: Yes.
35
36 MS. MATOS: Kari Buck. Harry Blanchet.
37
38 MR. BLANCHET: No.
39
40 MS. MATOS: Bob Gill.
41
42 MR. GILL: No.
43
44 MS. MATOS: Robert Leaf.
45
46 DR. LEAF: No.
47
48 MS. MATOS: Jim Nance.

1
2 **DR. NANCE:** Yes.
3
4 **MS. MATOS:** Ken Roberts.
5
6 **DR. ROBERTS:** Yes.
7
8 **MS. MATOS:** Will Patterson.
9
10 **DR. PATTERSON:** Abstain.
11
12 **MS. MATOS:** John Mareska.
13
14 **MR. MARESKA:** No.
15
16 **MS. MATOS:** Andrew Ropicki.
17
18 **DR. ROPICKI:** No.
19
20 **MS. MATOS:** Kari Buck is not on. Okay. She's absent.
21
22 **CHAIRMAN POWERS:** The motion carries eleven to ten with one
23 **abstention and two absent.** As Will reminded us, via the earlier
24 vote for the OFL, this is obviously very much a difference of
25 opinion, and that needs to get carried forward to the council.
26 Go ahead, Carrie.
27
28 **EXECUTIVE DIRECTOR SIMMONS:** Thank you, Mr. Chair. One thing
29 that we will need to think about, and if there's any way the SSC
30 could help us with this, because we'll be needing to write this
31 up in the report, to reconcile this as -- The way we're
32 interpreting it is the first motion for OFL, you're recommending
33 as BSIA, based on integration of the Great Red Snapper Count and
34 the portion of the uncharacterized bottom you felt comfortable
35 with, but the ABC recommendation was not based on that. It was
36 based on the traditional interim analysis with the fishery-
37 independent bottom longline survey. Staff will work on that,
38 but, if we could have any additional discussion for that
39 specific aspect of it, that would be informative. Thank you.
40
41 **CHAIRMAN POWERS:** We've had a lot of discussion. Bob Gill.
42
43 **MR. GILL:** Thank you, Mr. Chairman. To Carrie's comment, BSIA
44 was not discussed, and I don't think it should be inferred from
45 the discussions or the votes.
46
47 **CHAIRMAN POWERS:** Interesting. Mara.
48

1 **MS. MARA LEVY:** Thank you. I guess I had the same impression as
2 Carrie. I mean, I don't know how you make a recommendation for
3 catch levels if you're not also saying that your recommendation
4 is based on the best scientific information available, and I
5 think, at some point, you and the council and the agency are
6 going to have to reconcile the fact that one catch level, the
7 overfishing limit, is presumably based on information from the
8 Great Red Snapper Count, while the ABC is being based on
9 different underlying information, and so I think that is an
10 issue that is going to have to be addressed.

11
12 **CHAIRMAN POWERS:** It's your interpretation that those statements
13 are based on different sets of information. Via the discussion
14 we've had, quite obviously, the decision points that we've come
15 to and the amount of uncertainty that we want to include and the
16 result of the ABC -- I mean, it is including the whole suite of
17 things that we've been talking about for the last four days, and
18 so I'm not sure how to address your comment.

19
20 Quite obviously, what we're saying is the best available
21 information, which included the interim analysis, and which
22 included the Great Red Snapper Count, have led us to these
23 decisions. Quite obviously, those decisions are not consensus,
24 but this is what we have. Ryan.

25
26 **MR. RINDONE:** Thank you, Dr. Powers. Under National Standard 2,
27 management decisions have to be based on the scientific
28 information available, and catch recommendations that are
29 implemented as part of the fishery management plans certainly
30 fall under that umbrella of management decisions that must
31 follow BSIA.

32
33 Under National Standard 2, this OFL and ABC recommendations
34 presumably would be, respectively, following the best scientific
35 information available, and so that's how the subsequent
36 management action would be reviewed, and so, if you guys do not
37 think that these catch limits are based on the best scientific
38 information available, then any subsequent management action
39 would certainly struggle to pass review as a result of that, and
40 so the decision is -- I don't know if it's de facto or not, and
41 I kind of defer to Mara on that, on what the interpretation
42 might be, but we certainly do have some clarity that's needed
43 here.

44
45 **CHAIRMAN POWERS:** Doug Gregory.

46
47 **MR. GREGORY:** Granted, this is a bit unusual, but couldn't we
48 declare both actions based on best available information? OFL

1 is not setting a catch target, or a catch limit, and it's saying
2 what overfishing is, and the ABC is setting the catches, and so
3 we could say that the Great Red Snapper Count is the best
4 scientific information available for setting an overfishing
5 limit, which implies sustainability and everything else, and
6 then the bottom longline, which, again, as Luiz has eloquently
7 put, is the accepted national procedure for doing interim
8 analyses. That's the best scientific information available for
9 determining catch recommendations. Maybe the lawyers can tell
10 me that I'm imagining all of this, but it seems straightforward
11 to me. Thank you.

12
13 **CHAIRMAN POWERS:** I sort of interpreted it that, when we make a
14 decision like this, these sorts of motions, with all the caveats
15 about the voting and things like that, effectively, we are
16 making the decision that we have utilized the best information,
17 and that includes the whole suite of things that we have talked
18 about for the last four days. Kai Lorenzen.

19
20 **MR. RINDONE:** Dr. Powers, if I may, to Doug's point, and sorry,
21 Kai, to jump in, but so that this can be chronological.

22
23 **CHAIRMAN POWERS:** I'm sorry, Ryan, but what did you wish to say?

24
25 **MR. RINDONE:** Just to address Doug's point before Kai, if Kai is
26 okay with that.

27
28 **DR. LORENZEN:** Sure.

29
30 **CHAIRMAN POWERS:** Go ahead, Ryan.

31
32 **MR. RINDONE:** Insofar as it relates to the use of the NMFS
33 bottom longline survey for an interim analysis for red snapper,
34 that has never been done before, prior to this meeting, and so
35 there is no national standard, or any other standard, for doing
36 interim analyses for red snapper prior to this meeting.

37
38 Insofar as it relates to specifying what constitutes the best
39 scientific information available for OFL and that being
40 different from the ABC, as long as the SSC feels that it has
41 done a thorough enough job of describing why it thinks that one
42 source of information is appropriate for one and another source
43 of information is appropriate for another, then we can use that
44 when we're creating an amendment to the fishery management plan
45 to redefine what the catch limits are, and that's effectively
46 what we'll do, is we'll take large chunks of this discussion for
47 justifying why one survey was used to inform one side and
48 another for the other catch limit.

1
2 **CHAIRMAN POWERS:** Thank you. Kai.

3
4 **DR. LORENZEN:** You know, both the sort of less-than-usual level
5 of coherence in these motions and, of course, the very narrow
6 margins, I think reflect the fact that we have been undertaking
7 this whole thing in a very unprecedented manner, because we
8 basically were provided with a new piece of information, and we
9 have to reconcile that information with information from the
10 existing stock assessment and the interim analysis, and,
11 normally, one would have an analysis that combines these things,
12 and then make judgment on that.

13
14 In this case, we had to basically reconcile those different
15 pieces of information on the fly, and I think we have achieved
16 something that is reflective of that information, and it's
17 reflective of the diversity of opinions and judgments on the
18 committee, and I think, given the way this was set up, it would
19 have been very surprising to arrive at something that follows
20 our ordinary procedures and level of coherence. That said, I
21 think we have arrived at a reasonable outcome here. Thanks.

22
23 **CHAIRMAN POWERS:** Thank you. I want to make a comment. On
24 October 1, the Great Red Snapper Count results, preliminary
25 results, which were pretty much identical to what they are now,
26 were released to the public, and NMFS, on their website,
27 presented this information, and, basically, committed to
28 assisting the SSC in integrating this into management advice.
29 That was six months ago.

30
31 In our January 6 meeting, we, the SSC, asked to have some sort
32 of in-depth review of this, and it wasn't NMFS that asked for
33 it, and it wasn't the council that asked for it. It was the
34 SSC. That was integrated, and then we got into this meeting
35 this week.

36
37 The final information, or not final, but the information that
38 was complete enough for us and the consultants to provide a
39 review, we really didn't receive until three days ago. I feel
40 that that review was a super-human effort, in terms of the
41 constructive criticism and the usefulness of it for developing
42 the science, and eventually to develop the management advice
43 based on that, but we, the SSC, have been asked to respond to a
44 crisis that was known about six months ago, and the response, I
45 think, as Kai mentioned, is what one would expect with all these
46 sources of uncertainty.

47
48 That is one of the reasons that I personally would opt -- I was

1 on the losing side, in terms of the ABC here, but I would opt
2 for some small increases, larger than what was implied here, but
3 the issue, to me, was, given that we have been put in this
4 untenable sort of position, the best we could do was to allow
5 some catch, at some level, over the one year, and then come to
6 revisit it, but I think what I am really saying is, given this
7 crisis, quote, unquote, crisis, that we knew about, or that the
8 council and NMFS knew about six months ago, and it really didn't
9 come to fruition, in terms of how the SSC could deal with it,
10 until this week, the responses you get, in terms of our votes,
11 very much signifies the uncertainties that that process itself
12 has imposed on us. Thank you.

13
14 With that, I believe we're at the point of, if there's no other
15 comments on this agenda item, I believe we have finished, and we
16 can move to Other Business.

17 18 OTHER BUSINESS

19
20 **MR. RINDONE:** Thank you, Dr. Powers. I have one thing for Other
21 Business. That is just to remind the SSC, and anyone else that
22 has any interest, that the SSC's three-year term is expiring
23 this summer, and the application process will go live on the
24 council's website next week, and current SSC members that wish
25 to continue to be on, or to be considered to continue to be on,
26 the SSC, will need to reapply, and all of the instructions and
27 everything for how to do so will be captured on the SSC portion
28 of the council's website. If anyone has any questions about
29 where to find that or what to do, et cetera, please don't
30 hesitate to reach out. Again, if you're a current member that
31 wants to be considered for continued appointment, you will need
32 to reapply.

33
34 **MR. GREGORY:** What is the deadline for receiving applications?

35
36 **MR. RINDONE:** April 30.

37
38 **MR. GREGORY:** So basically about three weeks. Thank you.

39
40 **MR. RINDONE:** So four weeks from Monday.

41
42 **CHAIRMAN POWERS:** All right. Thank you. Any other business?
43 It's been interesting. John Mareska.

44
45 **MR. MARESKA:** Thank you, Mr. Chairman. I was just curious about
46 what the SSC's involvement would be in the integration of the
47 Great Red Snapper Count into SEDAR 74, and would we receive
48 updates as the process is going along, rather than waiting until

1 the operational stock assessment, to kind of see how things
2 progressed, so that we don't have another four-day meeting?

3
4 **MR. RINDONE:** Dr. Powers, I can help shed some light there.

5
6 **CHAIRMAN POWERS:** Yes.

7
8 **MR. RINDONE:** We post the webinar links to all of the public
9 stock assessment meetings, which is almost all of them, except
10 for the ones where no decisions are made, and maybe we'll just
11 try and talk about a schedule or something like that, but all
12 the ones where any information is presented and any decisions
13 are being made by any of the panels, those are all open to the
14 public.

15
16 We post all of those webinar registration links under the stock
17 assessment portion of our Meetings tab on our webpage, and the
18 information for all of that is also available on the SEDAR
19 webpage, and anyone can listen in on those, and, for things like
20 the assessment webinars, I also create summaries of those, in
21 case you want to get caught up on the goings-on.

22
23 As far as providing the SSC with periodic updates on the
24 progress of the assessment, that is not something that we've
25 done in the past, because these things are open to the public,
26 and because anyone can participate, and, for all of the SEDAR
27 assessments, SSC members are also participating, and so that's
28 why that hasn't been a habit in the past. Then we have on the
29 screen right now the page for finding all the information about
30 the current assessments.

31
32 **MR. MARESKA:** Thank you, Ryan.

33
34 **CHAIRMAN POWERS:** Thank you. If there's no other business, I
35 will take a motion to adjourn.

36
37 **MR. GILL:** So moved, Mr. Chairman.

38
39 **DR. NANCE:** Second.

40
41 **CHAIRMAN POWERS:** Is there any objection to adjourning?

42
43 **MR. GREGORY:** Thank you for all you have done.

44
45 **DR. NANCE:** I second that.

46
47 **DR. BARBIERI:** Completely. This was a tough week, Joe, and you
48 did a phenomenal job. Thank you so much.

1
2 **DR. ANDERSON:** I agree completely.
3
4 **DR. ROBERTS:** Thank you, Joe. We appreciate it from Louisiana.
5
6 **CHAIRMAN POWERS:** Thank you.
7
8 **EXECUTIVE DIRECTOR SIMMONS:** Thank you, all.
9
10 **CHAIRMAN POWERS:** With no objection, the meeting is adjourned,
11 and thank you for your input.
12
13 (Whereupon, the meeting adjourned on April 2, 2021.)
14
15 - - -