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CARIBBEAN FISHERY MANAGEMENT
SCIENTIFIC AND STATISTICAL COMMITTEE
PUBLIC HYBRID MEETING
COURTYARD MARRIOT
ISLA VERDE, PUERTO RICO

NOVEMBER 29 – DECEMBER 1,2022

The Scientific and Statistical Committee of the Caribbean Fishery Management Council convened at the Courtyard Marriot, Isla Verde, Puerto Rico, Tuesday morning, November 29, 2022, and was called to order by Chairman Richard Appeldoorn.

Call to Order

RICHARD APPELDOORN: Okay, I'd like to call the meeting to order, everybody. Today is the 29th of November 2022, and this is the SSC meeting for the Caribbean Council.

Before we get any further in the roll call on the agenda, etcetera, I'm going to read the guidelines for conducting meetings, both in person and in Zoom. For those who are connected online remember that you should mute your sounds until you're recognized by the Chair. Participants can indicate that they wish to speak either in the chat or by raising their hand in the reactions feature. The chat will be monitored sometimes by myself, but mostly by Graciela, I think, or Liajay, to make sure that we identify those who requesting to speak or there's technical difficulties that we need to attend to.

The chat should not be used to address the committee or to make public comments, unless permitted by myself as Chair. Sidebar conversations in the chat and comments in the chats will not be read and will not be part of the record unless permitted, again, by myself as Chair. When you've been recognized to speak, please state your name for the record, because we're recording everything, before you make your comments. All speakers are expected to conduct themselves in an orderly and civil fashion. That means speaker's, comments are expected to address specific agenda items and refrain from making personal attacks on others. Any conduct that interferes with the expeditious and orderly process of the meeting may be subject to an individual being removed from the meeting. Such conduct may include, but not as limited to, improperly speaking without being recognized by the chair behavior or remarks that are just courteous, disrespectful or disparaging. And by participating in today's meeting, all participants have been deemed to accept these rules.

So, with that I'd like to start off with a roll call and we'll start with Walter.

Roll Call

WALTER KEITHLY: Walter Keithly, SSC member.

VANCE VICENTE: Vance Vicente, SSC Member.

MICHELLE SCHÄRER-UMPIERRE: Michelle Schärer, SSC. Good morning.

JORGE R. GARCÍA-SAIS: Good morning, Reni Garcia, SSC Member.

SHANNON CASS-CALAY: Shannon Calay, Southeast Fisheries Science Center.

KEVIN MCCARTHY: Kevin McCarthy, Southeast Fisheries Science Center.

ADYAN RIOS: Adyan Rios, Southeast Fisheries Science Center.

GRACIELA GARCÍA-MOLINER: Graciela García-Moliner, Council staff.

RICHARD APPELDOORN: Richard Appeldoorn, SSC chair.

JUAN J. CRUZ MOTTA: Good morning. J.J. Cruz, SSC member.

TODD GEDAMKE: Todd Gedamke, SSC member.

KATHERINE M. ZAMBONI: Kate Zamboni, NOAA's office of General Counsel.

SARAH STEPHENSON: Sarah Stephenson, Southeast Regional Office.

LIAJAY RIVERA GARCÍA: Buenos días, Liajay Rivera, Council staff.

CRISTINA OLÁN MARTÍNEZ: Cristina Olán, Council staff.

IRIS N. OLIVERAS: Iris Oliveras, Council staff.

NELSON CRESPO: Good morning, everyone. Nelson Crespo, DAP Chair Puerto Rico.

JULIAN MAGRAS: Morning, everyone. Julia Magras, Saint Thomas/Saint John Chair DAP.

GERSON MARTÍNEZ: Good morning. Gerson Martínez, standing in for the Chair.

CRISTINA OLÁN MARTÍNEZ: Christina Olán, for the record. I am going to read the names of the people in Zoom. Carlos, and we need to confirm if he is Carlos Farchette. Erik Williams. Jason Cope.

JEREMIAH BLONDEAU: Good morning, is Jeremiah, Southeast Fisheries Science Center.

CRISTINA OLÁN MARTÍNEZ: Thank you. Julie Neer, María López-Mercer, Martha Prada, Nancie Cummings, Nicole Greaux, Rachel Eckley, Rich Appeldoorn, he is here in the room. Sarah Stephenson, Sennai Habtes. And also, we have Marcos Hanke.

RICHARD APPELDOORN: Can we have the agenda on the screen? I hope y'all got that. Can you blow that up a bit for us in the back?

LIAJAY RIVERA GARCÍA: Better? More?

Adoption of Agenda

RICHARD APPELDOORN: Now, yes. Thank you. So, I know there's some recommended changes to the agenda that the members of the Southeast Science Center would like to propose. Kevin, you want to make those?

KEVIN MCCARTHY: Yeah. Thanks, Rich. So, what we're proposing is we start this morning reviewing the Spiny Lobster update assessments, I think that'll be a little more expeditious because it is a strict update. So, unlike the last couple of meetings we've had, where we've really taken a deep dive into the data, this hopefully will not involve that because it is a strict update and all we've done is extend the time series, so there haven't been any changes to what was accepted for the last assessment, SEDAR 57. So anyway, we're suggesting that we move that up to start with. That's likely to take all morning because if you all do decide to accept this as informing management, then we can work through your ABC control rule and you'll end up with an ABC at the end of the day, which can then move forward. So, that's the thought there.

Whenever we're done with that, likely the afternoon, we'd like to have the NCRMP RVC folks, the dive survey folks that we've talked about that a lot in use as an index of abundance for Queen Triggerfish, but we'd like them to present to the SSC a little more background on the survey because, you know, I can't represent their work, I don't know it as they do. So again, that's likely in the afternoon. And then following on that, we'd like to get started with the Queen Triggerfish for Puerto Rico. And again, there, you know, I think we're at a point where Nancie has done the

recommended work, so we may be at a decision point recommending it for management or not as you see fit. And if so, we'll again, work through the ABC control rule. And then, all of the Virgin Islands Queen Triggerfish work, which is going to require more guidance from you all, we're not as far along on that, we'd take up tomorrow.

So that's the recommended revisions.

RICHARD APPELDOORN: The committee's okay with all that? I have two questions for the committee for two things that are not currently on the agenda. One of them concerns the plan listing of Queen Conch under the ESA as threatened. Final comments are due like in about two weeks, I don't know the exact date, and so if anybody on the committee would like to discuss that issue, we can put that on the agenda. I'll tell the committee that I've written a rather lengthy draft comment to that report which is very critical of it. But that's my own opinion, it doesn't necessarily reflect the committee. If the committee wants to hear about it, fine. If not, I'm certainly fine with that as well.

And the other similarly is for Nassau Grouper. There's uh, what do you call it, the critical habitat designation. If people want to discuss that, again, that was not on the agenda, but if anybody on the committee wants to say anything about that to the committee, we can add that to the agenda. So, anybody feel motivated for either of those two?

VANCE VICENTE: Sure, I do.

RICHARD APPELDOORN: Which one or both?

GRACIELA GARCÍA-MOLINER: Use the microphone, please.

JORGE R. GARCÍA-SAIS: Me too.

VANCE VICENTE: Vance Vicente. Yeah, I support the agenda to include the Queen Conch composed rule, ESA comment directed period station, and as well as the Nassau Grouper critical habitat designation, particularly, or specifically since the proposed critical habitats converged with already the designated critical habitats for other listed, threatened and endangered species such as Hawksbill, green turtles, and leatherbacks.

RICHARD APPELDOORN: Okay. So, they're now included under other business and depending on how time goes and through the week we may adjust when we get to those to make sure that we do get to those. Graciela?

GRACIELA GARCÍA-MOLINER: So, Mr. Chair, I think that there is a request specifically from Kate Quigley for the presentation at 3:15. So, if we can keep that slot to that time, then depending on how much time it takes on day two for the SEDAR 80, I don't know if we should also keep at least the presentation that J.J. gave to the National SSC at the same time slot, because those two things kind of go together.

So, you'll begin the second day, if I'm not mistaken with SEDAR 80 and then that should probably continue in the afternoon for at least an hour or two. So, we just need to watch that time slot, especially for the 3:15, which we've been requested to keep it at that, because they'll be joining us remotely.

RICHARD APPELDOORN: Okay, we'll juggle this as we get further on, and we see how the time is playing out. I think we also have some constraints with J.J. and Tarsila as well, so we don't want to cut their time down either. Okay, Kevin.

KEVIN MCCARTHY: Thanks. So, we're going to endeavor to get through the presentations for the assessment stuff as quickly as we can. And I think maybe if- we've got some natural breaks, I think, in the presentations for questions, so if we can operate that way, we'll probably get through them faster. That's the plan. We want to have these things be, you know, half-hour, 45-minute presentations. So, we'll do our best on our end to keep things moving along quickly.

RICHARD APPELDOORN: So, I kind of missed the beginning. So, you're requesting that we kind of limit our questions to natural break periods and—

KEVIN MCCARTHY: yeah, I think so. I think that'll move things along. Not that we want to not, you know, have a good discussion, but I think if we break up the presentation too much, it's hard to, you know, get through it.

Approval of Verbatim Transcriptions

RICHARD APPELDOORN: We will try. So, with, with those changes, is the agenda now acceptable to the committee? Anybody dissenting? Okay. I'm not seeing any dissensions. So, we will accept the agenda as amended.

Next item is the approval of the verbal transcriptions. These are all sent out, I'm not sure, was it directly or were posted on? Both were posted on the meeting Google Drive. Thank you. I hope you all had a chance to read them. I certainly had no problem with

the, I think actually the new recording transcription system does a really good job. And once the actual names are put in place, you can follow the conversations just as they were. So, any objections to the acceptance of the verbal transcripts from both the August and October meeting? And again, I'm not seeing any opposition to that, so let's consider those approved.

And with that we're going to go to Spiny Lobster 57 update, Puerto Rico, Saint Thomas and Saint Croix. Who's presenting Kevin? Adyan.

SEDAR 57 Spiny Lobster Update Assessment— SEFSC

ADYAN RIOS: Good morning. I just need one second while I log into the meeting. Join us on Zoom. And share screen permission.

Okay, perfect. Good morning, everyone. We'll get started, jump right into it with the SEDAR 57 Caribbean Spiny Lobster update. So, here's an overview of the SEDAR 57 assessment benchmark of the update itself, so the work that's going to be included in this presentation. We have a summary of the work conducted, which is providing the overfishing limit, the OFL, and acceptable biological catch, the ABC, for 2024 to 2026, utilizing the already established methods from SEDAR 57.

We specify 2021 as the terminal year for data inputs and made assumptions for 2022 and 2023 landings as those are not yet known. And we prepared and provided three reports in preparation for this meeting.

I think it might be what pin, what video you have pinned. So, I think it needs to be, I might have two, right? So, this one is under my name. Okay.

So, just for an overview as to what the methods were for the SEDAR 57 benchmark, we used stock synthesis version 3.3, the maximum sustainable yield proxy, the status criteria and the acceptable biological catch were specified using the third Tier of the Council's control rule under data limited accepted assessment available.

MSST was assumed to be 75% of the S SPR30%, so the MSY proxy. And the maximum fishing mortality threshold was assumed to be equal as well as to the fishing mortality when the stock is at the spawning potential ratio of 30%.

So, here's an overview of what we'll be looking at today. It's everything going through one through three and colors, and that'll be compared to what's been presented to you in the past. And so

just for that overview of what's been provided in the past is the SEDAR 57 stock assessment report which was completed in August 2019. That was a benchmark assessment with landings through 2018 and length data through 2016. In February of 2021, the landings data alone were updated to provide updated projections for the generic framework amendment one. And so that was the benchmark assessment that was presented previously with landings through 2020 and lengths remained through 2016. And in today's presentation, as in the reports of this update, of the current strict update, we're going to take it in a couple steps because it's useful since we're updating both the length composition as well as the landings to do one at a time and be able to interpret the effect of those two components. And so, in today's presentations, we will start with a comparison of zero and three, so the very, you know, what was already, what is already part of the framework amendment as well as the final result of the whole update process. But we'll also take the steps of comparing those, the steps along the way to get there.

First, we'll start with Saint Croix. And here's what I'm referring to as the, you know, what was in the framework amendment as well as the values that result from the update using the identical methods. I also have this in a table here. And so, what you see in black and in the top part of this table are the values from when the model was updated, just landings and the length composition remained through 2020. And here in green is when the landings and the length comp go through 2021 and we make assumptions for 2022 and 2023, which will return to when we get to that third step. But here this provides context of, you know, what the beginning and the end of this process looks like and provides context of, you know, applying the same methodologies and the same ABC averaging, the same methodology of a three-year average of the ABC applying the same scalar and P* method. For these results, it's quite similar, it's a reduction of 2.4% in the period for 2024, 2025, 2026 compared to the average that was used during 2021, 2022, 23. And as we look at the data, you'll see why. But essentially what occurs in this is that there's very similar results to very similar values and very similar interpretation of the ramp down to MSY or the ramp down to what that sustainable long-term harvest is because the stock is currently not overfished. The landings are low compared to what the model suggests is possible for MSY.

So here we have the data and so just a kind of forest level view. We've got diving on the left and traps on the right for Saint Croix. And we see that trend of increasing, declining and then increasing in the most recent years. And here we are comparing, you know, the values that were input through 2020 that made it into the framework amendment and as well as what happens when we

just bring those landings through 2021 in red? And you see that the most recent year has been added. And some of the assumptions that were made for those most recent years when the projections were updated have also been slightly modified based on the new data extraction.

Here we also see a time series of the number of carapace lengths that are incorporated into the TIP data set. And we see that we have relatively low in number of length data in the recent years.

Jason's stuck on slide four. Okay. We are on slide seven.

LIAJAY RIVERA GARCÍA: Okay, Liajay Rivera, for the record Council staff. We recommend for participants to check their internet speed first, and if not let us know. Also, we can, maybe if we can, also have the presentation shared afterwards or if it is already uploaded in the folder for them to see. So that's another option for them.

ADYAN RIOS: So, continuing on slide seven on the right panel. This figure is showing the number of carapace lengths that are included per year. And we do see that there are relatively few lengths added into the time series after 2016. So, these years make up 12% of years, but the length composition data are only 2.5% of all the lengths over this whole time period. Um, and so we know, we'll see that for all islands to some extent, especially in 2020.

So again, providing this kind of stepwise comparison. I know this plot is quite small on slide eight, but we will zoom into it on slide nine. And so, I'm just kind of using this slide to orient you to the color scheme that we'll be seeing, which is the benchmark in black compared to the update of the landings data only. And then we'll make the update to the length data and then we'll also make the assumptions for 2022 and 2023 in that—

So, right—oops, I went too far. Okay. Now we'll zoom in on slide nine. So, if you look at the plot on the far left, you'll see that this is what happens to the projections. On the left we have the data, and then in the dotted lines where that break happens, that's where we switch to it from data inputs to model projections. And so, by updating the landings data through 2021 and keeping the same model parameters that were used in the benchmark, as well as in the previous time that projections were provided, you can see that the slightly higher landings in 2020 and 2021 just result in a slight reduction to what the-- very, very slight. So, it's almost like it's just a delay of one year that the trend of the projections because it's the current, the landings in 2021 are similar to what

they were at the time, a little bit higher but that allows us to interpret the change of just updating the landing. Then we update the length comp, and it doesn't have much of an effect on the model. It doesn't affect the parameters very much at all. But also keep in mind that there was very little new length data that went into the model.

Here we see the assumption made for 2022 and 2023 just maintaining that most current year. And you see the effect that it has on the projections. So, it's essentially, again, just kind of, it kind of looks like a two-year delay because while the long-term sustainable harvest, which is, you know, at that MSY, that long-term MSY is kind of at this level where my mouse is. Um, the projections allow kind of higher landings than that for some time because the landings are currently below where they could be. So, there's kind of a buildup of biomass. And then so that is what describes that ramp down towards that long-term MSY.

So now that we've updated the model, we can also look at what the overfishing and overfished interpretations are from this information, and we can compare that to what they were in the SEDAR benchmark as well and that is what is shown here. In the top panel we have the relative biomass. So, the spawning stock or the number of spawned each year divided by the number that are spawned when the stock is at that MSY proxy. And the dotted line shows, well, being below that dotted line would imply that a stock is overfished. We don't see that. We see that this is above both in 2016 where the benchmark ended as well as 2021 where the current update ends.

And then the bottom plot is the F over FMSY proxy. And we see that the F increases in that, you know, similar as to when the biomass or when the spawning numbers decline but then the F declines with a slight increase in recent years. And so, the bottom plot, if you're above that dotted line, that would imply overfishing, but we do not see that here.

And just for context, as well as, this is also included in the report, this shows the parameters estimates that are, the five parameters that are estimated in this model by stock synthesis and the percent difference is shown on the right. And none of these were even, you know, the model did not change very much. The percent difference is less than one for each of those parameters.

Next, we'll look at the same information for Saint Thomas and Saint John. Take questions. Yeah, we can take questions on the first one or go back to any slides. The information that will be presented for the other islands will follow the same order.

RICHARD APPELDOORN: Any questions from the committee? Adyan, you're on a roll.

ADYAN RIOS: Okay. So next up is Saint Thomas and Saint John. Let's get the mouse over here. Ah, there we go.

So here we have the-- we are on slide 12. Again, showing that you know, beginning, which is the benchmark when the landings were updated through 2020 compared to what the OFL and the ABC look like when the landings are updated through 2021 and with the assumptions made through 2023.

Providing the context of what that change is. In Saint Croix it's a decrease a 6.6% decrease in what that average is. And we will, you know, look into the steps along the way to interpret that. But again, it also, the model is quite similar and does result in, again, just what appears to be that time shift. Um, so we've got the, I don't think I said this in the last time, but the top line plotted here is the OFL and the line below would be the ABC following the same scalar and P* method and those and then the averages, the three-year averages, as previously utilized.

Next on slide 13, we have the data. And so, updating the one year of data is not as we do, it's not, it's slightly more of a difference in 2019 and 2020. In addition to that final year of 2021, based on the latest data extraction, there wasn't some additional data that went into our data sets, as well as some of, I think this final year had not yet been finalized, so we made some assumptions about information that went into the previous update. And so now we have the final data for those years. And you can see how it's slightly higher for the diving in Saint Thomas.

Nope, this plot is mislabeled. This one needs to say traps. Let me double check that. Yes, it's definitely Saint Thomas and it's definitely just a mislabeling that I fixed in the report that went out, but I did not fix it in the presentation. So, let's just continue for now and then I will correct that, and resend out the presentation.

So here we have the number of counts of Spiny Lobster lengths, and you can see that they're quite high in the beginning of the new years that were added. So, in 2017, 2018 moderate in 2019, and then in 2020 and in 2021 they are quite low. That said there's still a lot of new length data being added in here. There's 17% of lengths in these new 12% of years that have been added to the update of this benchmark assessment.

Again, just reorienting you to the colors and providing the small versions that we will look into in more details. That just, you know, step one, updating the landing. Step two, updating the length data and step three making the assumptions for 2022 and 2023.

Oh, we are on slide 15, so there's a bit of a delay, but it's going to come in one second. So, I'll just start in the top left. So, you see the difference in the 2019, 2020 and 2021. Slightly higher values in that time series of data that goes into the model and how that affects the projections. We see that the, on the top right, that second step, is updating the length data and how that just slightly decreases the projections. And then the third step of providing the values for 2024 through 2026 just kind of pushes it forward.

The stars there, just to kind of show that, you know, once we've added the length data through 2021, the model is updated, right? You've got the length comp and the landings through 2021. And on the tables where we compare projection, sorry, on the tables where we compare the parameters, the model parameters, and the status determinations, so those time series plot that are shown later, that those come from the purple model.

So that's what's next. Next, we'll see the relative spawning output over time, as well as the relative F over time.

Let me try getting off of my VPN. That might do it. Okay.

And here we have the relative spawning output in the top left with that vertical line. If the values were below that, it would indicate an overfished status. However, the values are above and the relative F in the bottom panel to the left above that dotted line would indicate overfishing. And we have the parameter estimates as well as the percent difference shown in the table in the top right. And the variable that changed in the model, the variables were associated with the selectivity, and they changed slightly, so there was a 5% and a 10% change in those parameters, but those parameters are very small values and they very, very only slightly affect the selectivity.

Um, and so there's everything. So, most of the model is quite similar with the exception of what we see in this, how that parameter change affects the output with that slight shift to be slightly, the purple in the top is slightly below the estimates in red and the purple in the bottom is slightly above the estimates in red.

Questions? We have a question here.

RICHARD APPELDOORN: Yes, Julian.

JULIAN MAGRAS: Um, Julian Magras for the record. Just a quick question. Adyan, I'm trying to understand the 6.6% decrease from 150,000 to 140,000 bones because you're estimating, I think, what you're saying, the 22-23 landings. The reason why I'm asking that question is because we haven't had a good lobster run in a very, I would say about four years. And this year, finally, we are seeing that run and it's been occurring for the last three months. And it's happening in all the islands, all the platforms. And I'm wondering now if the numbers that are going to be reported are higher than what you are guesstimating, is that, are we going to revisit and then increase backup from that negative 6.6%? That's my question.

ADYAN RIOS: So, I'll turn it over to Shannon and the SSC as to how the process of revisiting to the most recent data.

KEVIN MCCARTHY: Um, so we're scheduled, right? Sorry. Oh, sorry. Kevin McCarthy. Sorry, Julian, I can't do both. So, we are scheduled for a full benchmark assessment of Spiny Lobster in 2024. So, we're going to revisit everything in 2024. So, we'll have, obviously, for the, right now, the estimated landings for some of these years, we'll know them by then. You always have to estimate going forward to do the projections, but you're right, we'll have those, we'll have finalized landings and a full benchmark. There are some additional data sources I think we can incorporate in 2024 that we didn't have available to us when we did this initial assessment back in 2016 or 17, whenever it was last done. So as a strict update, we're following exactly what was done before but in 2024 we're able to look at every data set there is and explore some new ones.

JULIAN MAGRAS: Thank you.

RICHARD APPELDOORN: Thank you, Kevin. Any other questions? Then proceed Adyan.

ADYAN RIOS: I'm having a technical issue.

LIAJAY RIVERA GARCÍA: Do you want me to share your presentation?

ADYAN RIOS: Yes, please. On slide 18.

Thank you. So again, going through the same order of information now for Puerto Rico, we see the difference between the SEDAR 57 benchmark with input landings through 2020, as well as, the result

from the SEDAR 57 update with provisional input landings for 2022 and 2023. So, the landings updated with the data through 2021, and it results in a following through to the ABC in a negative 2.4% difference.

Next slide.

We have the data going into the model summarized here with the diving and traps time series and the update to the information for 2020 and 2021. And on the right, we see the number of lengths going into the model for each year and we see that there are 14% of lengths in the 13% of years that are made up from this 2017 forward.

Next slide.

Here, we have an additional step in the process because we also ran a sensitivity to the correction factor for 2020. And so, the sensitivity involves the correction factor, the same method used for the SEDAR 80, which was the average over the most recent number of years. And so, we'll see that in more detail, but that's what the comparison between blue and purple is. And so here we have, in the top left, to right, we've got blue, sorry, we've got black to red, then red to purple, then purple to blue, and then blue to green. And on that first side we saw black to green. And so, on the next side we'll just see those same figures zoomed in.

Next slide please.

That would be slide 21. So, the update of the information in 2020 being slightly lower, in 2020, compared to what was included previously, what was assumed previously for projections. So, 2020 was lower, but then 2021 was higher. However, that, those two have kind of the one value being below what the model's projected to be the sustainable harvest and one value being high above, that kind of levels out to have a similar outcome to the implication of what one high year did following a low year. Sorry, not yet. Go back one, we're still on 21.

And then going to step two in the bottom, we can see what the effect is of updating the length composition data is on the projections and it's not noticeable. The models are very similar. And then in step two B we take this model that's been up to date through, with the landings and the length comp through 2021. And we also compare that to what the landings, what the projections are if the landings were to use a different correction factor in 2020 and in 2021. And then lastly, we have the assumption of that same level of removals for 2022 and 2023 in order to provide the projections for 2024 forward.

Next slide.

Here on slide 22, we have the time series of the relative spawning output and the relative F, which allows us to interpret the status determination criteria for the most current year. And so, we saw at the end of SEDAR, at the SEDAR 57 benchmark, that's the information in red, that the stock was neither overfished nor overfishing, so the stock was, the spawning output was above that dotted line and the F was below it. And that's still generally the case. However, the stock is very either overfished or very nearly overfished based on the update benchmark now. I'm sorry, not overfished, undergoing overfishing. So, the bottom plot, but it's, that's very subjective to what assumptions we make on this 2021 year. So, it is slightly, just very slightly, sensitive to that, as you can see in the plot on the blue, on the far right. So, if we assume slightly lower landings in that year, the model interprets it as slightly less fishing in that year.

And next slide.

This just provides the table of what the parameter estimates are compared to the benchmark model from SEDAR 57 and the current assessment update. So, when the landings and the length comp are through 2021. And so, that's what's shown on the left. And then on the right is comparing that update to the sensitivity. And so, the effect of the sensitivity is very limited on the, you don't really see a big percent difference in any of the parameters. In the table on the left, we do see a slight difference in the parameter of the slope that is used to specify the retention but again, that parameter it's, that slope, is just affecting the increase going from no selectivity to full selectivity at the size limit. And so, it's, although we see that there's a 12% difference, it's a very subtle change in the slope that the retention itself is almost identical because it's not very sensitive to the change in that parameter. And that's all.

Questions

RICHARD APPELDOORN: So, I have a question.

ADYAN RIOS: Yes.

RICHARD APPELDOORN: Back on slide 21, for Puerto Rico.

GRACIELA GARCÍA-MOLINER: Richard your name. Identify yourself, please.

RICHARD APPELDOORN: Yes. This is the Chair. [laughter] So, this wasn't something that I saw as being very prominent in for the other two platforms, but here we have the landings going down in 2020 and going up in 2021. I'm wondering if this is a Covid effect. If that's the case, then that decline in the first year, which is offsetting the increase in the second year, while representing the landings wouldn't really be representing what the future pressure would be. So, when you average those out and it looks, you know, the same across because they all offset each other, I'm wondering whether that is really reflective of what we would expect to see coming out of the pandemic and would not future landings potentially be higher? And wouldn't that give us a problem when we look at where we are relative to the overfishing and overfished limits?

ADYAN RIOS: That's a great point, Rich. And that leads us to kind of determining what assumptions to make for 2022 and 2023, when keeping it at the level of, the assumption that's currently made is keeping it at the level of 2021. In the bottom right, you see those three consecutive green dots. However, we can also see that 20, the years prior to 2020, right before the pandemic, there were high landings. And so, whatever's happening right now would be useful to incorporate to the extent possible in order to make this estimate an assumption of 2022 more realistic to what we think is happening.

RICHARD APPELDOORN: Uh, yes, Reni.

JORGE R. GARCÍA-SAIS: Is the landings data with the expansion factor?

ADYAN RIOS: Yes. The one in the top left of the red is the regular methodology used with the expansion factor. And then the one in blue uses, replaces the 2020 correction factor, which as we saw for SEDAR 80, had a very unusual value for the North coast and there was limited sampling to develop that correction factor in 2020 and so, that was the reasoning for that.

JORGE R. GARCÍA-SAIS: I was wondering if there is a, if you consider an uncertainty around that expansion factor to incorporate it in the landings data.

ADYAN RIOS: So, one of the assumptions in SEDAR 57 is that the landings are essentially known, right? That's one of the assumptions. But the uncertainty is captured in the control rule, so in order to account for the kind of uncertainty that we're aware of that exist in these numbers, it's kind of done on the far end of what the outputs are to say, you know, we, we understand that

these model inputs have uncertainty and so kind of the P* and scalar approach uses, is one of the mythologies to account for uncertainty in those data.

RICHARD APPELDOORN: Shannon and then Nelson.

SHANNON CASS-CALAY: Yes. Thanks Rich, this is Shannon. So just to make sure that Adyan's point was well understood. You know, what we elected to do with SEDAR 57 was recognize that we were not able to fully incorporate all sources of scientific uncertainty in the model itself. And so, what we did is expanded the CV that's used to create the ABC. So, I think that in SEDAR 57 we used a Sigma_min of 0.5 and the Tier 3 control rule was two times Sigma_min. So, in an effect we used a CV of one to create the ABC, which is a very wide PDF on the OFL. I know I speak in jargon, my apologies. so that's the manner that it was incorporated in this assessment. And, you know, we are looking at other ways, other approaches, in future assessments, but this was a strict update, so we used the same methodology as used in SEDAR 57.

JORGE R. GARCÍA-SAIS: Somehow, I feel uncomfortable about starting with such a big uncertainty and then running a model not knowing really what that uncertainty is. You know? Just for the record.

RICHARD APPELDOORN: Thank you, Reni. Nelson?

NELSON CRESPO: Nelson Crespo for the record. I'm wondering, I know you have to play with the best information you have available, but I don't think we have, we are not going overfishing. Right now we are having a really, this year, we are having a really good season with lobsters and I was fishing for lobster for more than one year right now and no one, no port sampler passed by my house to take a look about my catches. How can you use an expansion factor and be confident if nobody passes by my house? I know many peoples around the island are having really, really good catches. I think the resource is healthy and I think, you know, we have to dig a little bit more. I know you are also using an old model of expansion factor and that have to be accurate.

RICHARD APPELDOORN: Shannon. Thank you, Nelson.

SHANNON CASS-CALAY: So, the stock is not overfished, it is well above the MSST. It is in the most, in the terminal year of the assessment, it is very close to the overfishing threshold of FMSY or FSPR30. One could, I mean, SSCs do frequently apply a three-year average rather than look at the current year, especially if there are factors in play such as Covid pandemics. So, I wanted just to point out that although this stock assessment does indicate

that the stock it's rather fully utilized by the fishery, and in fact a well-managed stock will oscillate right around your management reference points. So, you know, you basically are at a point where you have fully exploited the stock, even if there is some overfishing, the consequences are not severe as long as the stock doesn't continue to deplete to an overfished status, which is where you have to take the more, you know, draconian measures to rebuild the stock. We are well above the level that would require a rebuilding plan. So, in fact, the stock is very close to where you want it to be in a well-managed stock.

RICHARD APPELDOORN: Yeah. Thank you, Shannon. I would add that, you know, what we're looking at is basically kind of an average situation. And as Julian had pointed out, and Nelson has corroborated that fishing for lobster's been good this year. So that extra catch is not necessarily reflecting, of course, that's not in the model yet, but that extra catch is not reflecting extra fishing pressure, it's reflecting greater abundance because of greater recruitment of the individuals. And so, these are, you know, the kinds of biological variabilities that exist in the systems, and we try to take care of that as best we can in our interpretations, which is why it's important to get information from the fishers on what they're seeing. Julian, you had a question?

JULIAN MAGRAS: Julian Magras for the record. I know in one of the previous meetings we had some discussions about revisiting the expansion factor and see if that equation needs to change. And the reason why I'm bringing that up because over the last six years for Puerto Rico, they have had two sets of accountability measures that have been put in place. And my concern for my fishers in Puerto Rico is, is the expansion factor driving them above that number that kicks them into accountability measure area. And I know there was a lot, a lot of discussion across the board and that we were going to revisit the expansion factor and see if it needed to be changed, tweaked and I'm just trying to see where we at with that. Because if the fishers are reporting better and your expansion factor is driving them to overfish or they're catching more, that expansion factor is going to drive that number to go cause them to overrun the ACL and then your accountability measures kick in. So, I'm just throwing that out there for some kind of discussion and see where we at with that because, you know, I don't want them to continue landing in the area where, that it seems like they are over harvesting when actually is the expansion factor that's driving them in that range. Thank you.

RICHARD APPELDOORN: All right. I'll make a comment to that. I don't think anybody's particularly happy with the expansion factor

that's being used now but it's really critical to keep in mind that that expansion factor was designed to do one thing and that was to estimate overall catch and as you try to split it out by individual species, you're going to find out that it is going to be less reliable the more you push it to its limits. Certain fisheries, so we're talking about Puerto Rico now, lobster fishery might be one of those, the deep snapper fishery might be one of those that you potentially have a subset of total fishery that behaves slightly differently, that they report better, or they report worse or whatever it is. And so, your concern, that's always there, is that is something that we're looking at for total fishery applicable to individual species, and the answer is going to be, not nearly as much.

And if you have problems with the overall estimate, you're going to have problems, obviously, even more so with individual species estimates. The way out of that is to collect better sampling, which is why the port sampling program ongoing in the Virgin Islands, has been done in Puerto Rico, is going to be so important because that's going to be the thing that says, "Here's how we need to modify our data collection systems such that our correction factors can be estimated on a per species basis."

And so, I'm not sure it's worth struggling with trying to correct the Puerto Rico correction factor as it is, as we should really try to move using the methodologies, the statistics, and the technologies that are available to just revamp how we're collecting these data. And that's what we've been trying to work with. The Southeast Center has been doing on this, you know, slow trajectory that is now getting into kind of an exponential growth phase over the last, I don't know, 15 years or so. And you know, we need to keep that kind of momentum going and if we do, I think we'll solve a lot of these problems rather than trying to try to fix something that really isn't fixable in the way it was originally designed. Vance?

VANCE VICENTE: In this recent analysis [inaudible] in the most recent years has there been a determination between the, a correlation between the catch per unit effort and the actual landings.

ADYAN RIOS: So, the catch per unit effort have not been reinvestigated, but that's something to look into in the be in the next benchmark assessment.

RICHARD APPELDOORN: Hey, Adyan, I have one more question. Well actually, it's two. The lower right graph, I have trouble reading at this distance and so-- but that's using the correction factor,

that's using all the updates, shall we say?

ADYAN RIOS: Yeah, so I kind of going forward with the sensitivity. So, the building on the sensitivity run, which is shown in the upper panel in blue compared to what it was previously. And so, this just takes that most current year and keeps it at that level for two years.

RICHARD APPELDOORN: Okay.

ADYAN RIOS: So, the same could be done for blue as well and it would be very similar.

RICHARD APPELDOORN: So, the question I had is, which one of these graphs or scenarios is used to model the next, the date of the next slide that showed potentially approaching overfishing? The graph, the next slide I believe it's.

ADYAN RIOS: Oh, there we go.

RICHARD APPELDOORN: So, which one of those four graphs on the previous slide is driving these graphs?

ADYAN RIOS: So, the SEDAR update in purple is when we have 2021 for the length comp and the landings data with the 2020 correction factor as it comes from the data. So that's what purple is. And so that can be considered kind of like the data have been updated, right? So that's why the benchmark in red is being compared to purple, on the far left. And then on the right, purple is being compared to blue. And blue has a different correction factor for 2020 and 2021, compared to purple. And that correction factor results in a slight reduction of the total harvest for those two years. And so, the F of that terminal year is slightly lower.

I would also point out that, again, these are two years with very few length data. And so, as we get more length data and as we move towards that benchmark, we'll have a richer amount of data in these more recent years. But right now, these are, you know, the model is heavily driven by the trends of the majority of the data, which still come from the majority of the time series.

RICHARD APPELDOORN: Okay. But the projecting forward—

ADYAN RIOS: There's no projection here on this side.

RICHARD APPELDOORN: I know this is what I'm asking. If we're assuming catches-- if we assume the scenario in that green previous lower right graph, catches would stay at this level?

ADYAN RIOS: Yes. At the blue point. So, right on that dotted line. Right at that level of one. So--

RICHARD APPELDOORN: Okay. So, as Shannon says, basically on the line. Reni?

JORGE R. GARCÍA-SAIS: Yeah. Can you tell me what was the correction factor? What's the percent, you know, the fraction that you used to make the correction?

ADYAN RIOS: The correction factor—they're coast specific. So, it gets, we do have those, but they're coast specific, so they affect the gears differently. Like for one gear, it might be an increase in another gear, well, a large increase. And for another gear it might be a small increase because the correction, because the specific gears are allocated differently.

So, like if you have a lot of your landings coming from the West, and we don't have a big correction factor in the West, then it doesn't change very much. But, for some gears it might have a lot in the East, and there might be the correction factor in the East. And so, I do have information on that, that we can kind of prepare for a tabular form, but it really dives back into the correction factor. Um, so I will see what the group prefers.

JORGE R. GARCÍA-SAIS: Okay. Because it seems to me like, I mean, I want to have an idea of how large it is, you know?

ADYAN RIOS: Yeah. Mm-hmm.

JORGE R. GARCÍA-SAIS: To start with. Then I know that we have a sample size problem with the expansion, with the determination on the expansion factor. And then you're telling me that you actually divide furthermore by area, by fishing area. And then furthermore by sampling device or-- You know, every time that you make a division on that, you even, you decrease the sample every even more. And when you reduce that sample size, your uncertainty increases, in each case. And then, my concern, again, is, first, I don't know what the expansion factor is. It may be large. The one, you know, about 10 years ago, I remember that somebody told me that it was 100%. I mean, are we still in that kind range?

Is 40%, 50%? Because I'm worried about trying to understand these models, when the uncertainty to start with is so big that we don't know what we are doing, you know? So, and then Julian brings an excellent point, you know, which is, actually, the end result of this may be an overage, which is based on a landing that is

estimated way above its reality. And then the point that Richard brings was even more important in this specific case because I believe, and I may be wrong, but there's fishermen here that can correct me, lobster is one of those things that is pretty well reported. You know, I mean, there's not a lot of lobster going unreported except maybe for a few small percent of recreational fishermen that don't report it because they get one, two lobsters, you know? So, most of the lobster catch in my view, in my take, is reported. I may be wrong, but there are fishermen here that can correct me if I am wrong with that.

RICHARD APPELDOORN: Yes, Todd.

TODD GEDAMKE: So, couple comments and a couple questions directed at the Center. Reni, first, I just want to make sure that you get, you said 10 years ago you thought that maybe someone told you it was about a hundred percent the expansion? So, the last two meetings, we spent many hours discussing this percent, this exact expansion factor. So that's the whole report on the port sampling program. So, all of those numbers were discussed very recently this year and numerous times. So, I think the question should be, for the Center is, all the port sampler report that was done three and a half years ago to address these questions regarding the expansion factor, where does that stand right now and how can Reni be assured that all the process and the work that's been done is going to go into his understanding of the expansion factors?

JORGE R. GARCÍA-SAIS: Is that I don't remember what the number is. That's all, you know? I mean, I've forgotten it.

TODD GEDAMKE: Reni, the number doesn't really matter, the specific number. Because there's four different coasts. There's, each year it is way more coast.

JORGE R. GARCÍA-SAIS: Okay. Tell me, one coast, tell me the West Coast, that's all I'm going to ask. Anything else.

SHANNON CASS-CALAY: So, we do have those numbers available, and we are, we can show it if the SSC finds it useful. So, if you would like to see those numbers by Coast and Gear, we have them available right now. Now, the issue really is, to me, that what we have available right now, are the statistics as reported by the territories. And that is what we have to accept right now as best available science because it's all that is available to us. So, until such a time as we're able to review the report that MER consultants worked with NOAA on and ensure, you know, whether there's any information there that can be used to calibrate new time series, for example, we are forced to use the information

that we have available to us.

Now I know that we have asked for that report to be part of the CIE review process and so we don't know what date that CIE review will be scheduled yet, unless Kevin knows more than I do.

KEVIN MCCARTHY: This is Kevin. So yeah, that's going to be scheduled for, it's probably going to be March-ish because they need months to set the thing up. So, the review itself will be in the spring and then it takes some amount of time for the results to come out. I'm not quite sure how long the process takes once they get the information, but it's a springtime sort of thing. We have to fit in the schedule. There are tons of things go through the CIE reviews and so we've had to fit in the schedule when they let us in. But if you want to restate your question, Todd, I can try and answer it.

TODD GEDAMKE: No. And I don't need to restate that. I expected that answer and I appreciate it. I just want that the committee to understand that the Center is reorganizing, struggling with people. We're looking at a five-year turnaround here for something that is critical and raised over and over and over.

And I would also like to say again, that I don't believe any other data source is independently evaluated by a CIE. So that I find extremely strange that that is, the time series is not done. So, and the, Shannon mentioned for the SSC, she also mentioned that the stock for the Puerto Rico, the stock is fully utilized by the fishery. Um, and by that language and that terminology is solely based on the MSY that is being estimated out of the model in there. But the reality of it is, is that this SSC accepted a model that's set in an upper limit that has already been breached, and you have a really good run that's coming up.

So, I would ask a direct question to you. Is there any possibility if you go 30% over last year's landings, that you're not going to be shutting the fishery down next year? Is there any possibility if you go 30% above with 27 fish measured? So, yes. Is there any possibility if you take this year's landings and go up 30%, that you're not going to be shutting the fishery down in 2023 and 2024?

SHANNON CASS-CALAY: There would have to be accountability measures, if we exceed the ACL. Those accountability measures apply to the federal fisheries and closures could occur. That's true. If the ACLs are exceeded, closures can occur. Those closures would be in federal waters. Puerto Rico doesn't typically close their fisheries when the ACL is exceeded, the territorial waters. Which is one reason that the ACLS has been exceeded.

TODD GEDAMKE: The question is though, is that is a hundred percent certainty if they're having a good fishing year? Yes?

SHANNON CASS-CALAY: If they exceed the ACLs, they will-- accountability measures are required, and they include closures.

TODD GEDAMKE: So, Nelson, for you and everyone else in Puerto Rico, if anyone catches more than they did last year, you're going to be shut down for the next two years for accountability measures.

And this is where there's dancing around of language on things. And the reality is the model that was put in place, I think the comment was made, we thought we set it high enough before. This was supposed to be the example of how you don't end up in accountability measures. Steepness on these, so that was one that we were hoping to get in there. So, thank you on that.

And I also, Julian, I'm really glad we got a chance to revisit expansion factors. Could we go to slide seven?

RICHARD APPELDOORN: We want slide seven back.

TODD GEDAMKE: Oh, sorry. Go Saint Thomas, I think slide seven. Back. It's the landings time series. Yep. Keep going, keep going. It's the landings time series at the beginning of the presentation. That was Saint Croix. Alright, never mind. I'll look through the presentation and bring it back up later or flip forward. It's-- you had a landing. There you go. No, not that one. Oh, back one. Right there.

Okay. So, what you have there are two plots showing the time series, basically a time series of F over FSPR and there's another one in there that's for Saint Thomas too. But the 2008 time period, and I just want to make sure everyone never forgets that in 2008 is when MSY was reauthorized, we ended up doing all of this and we had dramatic changes in the landings that occurred in the V.I. Has the Center done anything to evaluate a 70% drop in Saint Thomas during that time period, given the fact that there's only about 10 fishermen that are actively driving the fishery. So, if there's a 70% drop, you're looking at a 70% loss of income for all 10 fishermen in Saint Thomas. So, I'm wondering, has, has there been any evaluation of the expansion factors in the Virgin Islands.

SHANNON CASS-CALAY: There are no expansion factors in the Virgin Islands. It's considered a census. And we use the data as reported and there has been no new evidence brought into any data preparatory workshop to allow us to evaluate the quality of that

data. So, we take it at face value. So, I do want to--

TODD GEDAMKE: Shannon, based on fishery's 101 principles, and this is what happens in the CIE when we were looking at these things before. Based on Fisheries 101 principles, if you have a sustained landing for 30 years from the same 10 people in any fishery, take 10 of us here, and you have a million pounds being landed year after year after year, and that million pounds now goes down to 250,000 pounds. What are the explanations? What are the possible explanations for that? Just, just not, no, no jargon. Just you've got a 75% drop in landings. How could you explain that?

SHANNON CASS-CALAY: Rich?

RICHARD APPELDOORN: Go ahead Shannon.

SHANNON CASS-CALAY: Thank you. So, Todd, I think you and I are well aware of the data limitations that exist in the Caribbean. They have not, you know, we are-- the Center is not in the business of research projects to imagine what the landings might be. Now obviously there are many possible scenarios. They are everything from economics to misreporting. We all know the possibilities, but the Science Center is asked to use the data that is available and to present the best information we can to the Fishery Management Council to give you information to manage your fisheries.

We have an open process that anybody may participate in to come to SEDAR to bring products. We have the ability to do Council requests. If the Council would like us to examine the socioeconomic influences, that could be a Council request that goes to the Science Center, that would be worked on. But I think what we are asked to do is come forward with the data that are available to be evaluated. That is a public process. The SSC is invited to participate in that process. The local scientific community is invited to participate in that process. We show the data that are available to us at that time. They're evaluated, they are accepted by that process, and we move forward. And now, you know, we are updating an assessment because the Council requested it and we have updated it without changing the basic assumptions made during the SEDAR 57 process.

So, you know, we are happy to bring this information to the Council. The SSC may decide whether or not to use that information to manage fisheries. But this is not, you know, this is not our pet research project that we do for our fun. This is a process that has an established mechanism and we have executed that mechanism as we were intended to. And if there are improvements to be made, they are improved through the process. It's not that the

Science Center, in a vacuum, takes the data from the territories and just manipulates it. We don't do that. We use the data that we are given unless someone tells us there is a better way to do it. And then that process is evaluated through SEDAR.

TODD GEDAMKE: So are you-- Mr. Chair, my question still stands by the way, it's not been addressed. I just want to make that absolutely clear.

SHANNON CASS-CALAY: What do you want me to say, Todd? There are possibilities. It's either--

TODD GEDAMKE: Name them.

SHANNON CASS-CALAY: **--**the economics have changed in such a way that the landings are lower than they had been over time, or that when the imposition of the ACLs, that there's now misreporting occurring. This has been discussed over and over and over and over and over again, but the reality is that we have to manage fisheries based on the data that are available. And this is what we have available to us at this time.

TODD GEDAMKE: So, Shannon, could you please explain to me what would cause a 75% drop in landings? And this is why-- because I am, you have people that are sitting behind you that are looking at this and you watch the failure of a lobster ACL come into place and all of them immediately get jammed up. And when you have reporting or whatever, you want to call it economics. First of all, I'd recommend anyone that uses this argument to go to Saint Thomas and go to Saint Croix and meet the people that fish there, because there's no way that those 10 people are not feeding their families during that time period.

But it is extremely difficult to sit here and listen to the experts put it back on someone else. And the job of an analyst is not just to take data and plug and chug as much as one would like. An analyst is supposed to evaluate the data and make sure that these situations don't arise. And we're going to end up in these same situations again if we don't take into account the reality of it, which is what we all know, and as you said, over and over and over and over, and we we're going to continue to do it.

So, I just want the SSC to be clear right now, as we evaluate what we're doing, take into account what happened with the lobster, take into account the assumptions that were made, what was pushed on the committee or what was suggested, and that we're going to be in the same situation now, with looking at some other things. And there are fundamental-- for those of you that don't understand the

modeling or for those of you that are Googling steepness, there are fundamental basics here that just don't make gut level sense. And I think it's important for us to keep that in mind. Thank you

RICHARD APPELDOORN: Adyan, you had your hand up and Nelson?

NELSON CRESPO: Thank you, Mr. Chair. Nelson Crespo for the record. What, at the end of the road, I am really concerned that we peeled knees, you know, promoting all the fishermen to provide the best reports that they can, and we feel that that's worth nothing to us because we are going to be penalized because we provide better catches and that is really frustrating because if you don't provide, if you don't provide a your catch, you're going to have a decline. But if you report what you catch is going up. Osea, you're going to be penalized if you don't report what you catch or if you report what you catch, you're going to be penalized.

How can I explain to the community, to my fishermen, how this work? They are not going to understand me. Nobody is going to understand. And it is really frustrating, in the field I have hard discussion with all the fishermen that they don't understand, and they prefer to not report at the end saying, "That's worth nothing to us. I prefer to go out, fish, sell my catch and forget the rest because I'm going to be penalized anyway."

RICHARD APPELDOORN: Thank you, Nelson. Shannon.

SHANNON CASS-CALAY: So, the catch is important. There are other issues. You know, there are other-- this model is really informed by the length composition data. There were CPUE series that were evaluated during SEDAR 57, and they were not selected to be used in the stock assessment model. It may be that in the future assessments we are able to use CPUE indicators, but what I'm really getting at is if the landings had been high, but we saw an increasing trend in the mean size of the fish, it would indicate then that the population is actually increasing, and the likelihood is that the catch advice would have also increased.

But what we actually saw was static to decreasing length, mean length, in this fishery, which is the reason why the ACLs are lower than what we recommended last time in Puerto Rico. Because we have seen no evidence that the population are getting older. That there are more older fish, more larger, older, sorry, spiny lobster.

So, what I'm really getting at is, it's not really only about the length and the catch. You know, what we really need to start improving these assessments and make them more liable in the future would be catch pre-unit effort series such as fishery-independent

indices. That would be very, very helpful. And that's what we're trying to move forward with in the Caribbean too, is to try to set ACLs that we could later adjust when fishery-independent information is available to suggest that the stock is actually increasing.

So, you know, I recognize that you look at a figure like this and you say, these landings are very small, this is bad. But in fact, the ACLs that come out of the U.S.V.I. are far higher than the recent catch history. They're saying you could actually increase your landings substantially in Saint Croix and in Saint Thomas/Saint John because you're actually, this stock assessment says, "If you believe this landings history and you believe the length trend we've got, then you could actually grow this fishery here in the U.S.V.I."

In Puerto Rico, we don't see that. In Puerto Rico we see a stock that has already, you know, had catches taken year after year after year and the stock is pretty much at equilibrium at the MSY that is estimated by this model. So, I did want to say one thing and I'll relinquish the floor.

So, Todd mentioned that he was not aware of any other catch information that is evaluated by like a CIE review. We have a parallel situation going on right now in the Southeast, which is the FES MRIP recreational statistics, and we have exactly the same processes going on with all of the states who have catch surveys now, of their own, in the Gulf of Mexico, for example. And those are all going through a review process, with statistical reviewers who are not only verifying that those estimates are appropriate to use, but they're trying to identify good ways to back calculate so that a time series can be constructed.

And so, you know, it is absolutely the common practice at the Science Center when a new source of information becomes available that it be reviewed through a formal process. It doesn't have to be CIE, it could be another formal process, but it needs to be reviewed before we can just, you know, start using a new process without review. So, that's the way it has happened in the Gulf as well, it's not at all unique.

RICHARD APPELDOORN: Todd.

TODD GEDAMKE: I'll just touch on that really fast. You're not reviewing the report that suggested that survey to be conducted. You are reviewing the design of the current survey they are using. That's not what this report is. That report is a research project that made some suggestions. You would have the survey design, CIE

reviewed, not a preliminary paper on it.

So, Shannon, you just said that in this case the landings are not really driving it. It's basically a length-based model. Is that correct?

SHANNON CASS-CALAY: So, Todd, I think you know the answer to that. Which is that the landings are providing us a magnitude that scales the catch recommendation at the end, but to some extent.

TODD GEDAMKE: Could you just repeat that? Magnitude that scales the catch recommendation at the end.

SHANNON CASS-CALAY: Okay, cool. I feel like we're doing combat biology and I don't think that's necessary. So, I think that the only question in front of the SSC right now is whether or not to use the information that was provided to you. And I don't, you know—So, yes, the catches are important. The trend in the length composition data is important.

What I was attempting to say to Nelson is that even if the landings in Puerto Rico were higher than the ACLs, which they have been, if the length composition data had also been showing that the population was increasing, then it is possible that our catch recommendations would've also increased because then the population would be increasing, the stock assessment would recalibrate and say, "Okay, the MSY is actually higher than we expected." But instead, the length composition data was essentially flat to decreasing in recent years.

The mean size was actually flat or even decreasing. And so, the stock assessment model says, as you would expect, that the catches are higher than what we, the ACL, the catch recommendation, the mean length is going down, so the population is actually slightly less healthy than what we thought in 2016. And so, the new catch recommendations are slightly lower and Puerto Rico. But it's not always the case that an increase in catches will always lead to a perception that the stock is in worse condition. It depends very much on the trend you're getting from the indices of abundance and from the length comp. And this model has only length comp in catch.

TODD GEDAMKE: So, I apologize for what you're interpreting as combat science. I think we have a very short period of time, and we go round and round and round a lot of things. I think it's extremely important for the folks that are in this room that have to go back to the communities to understand this. And in lobster, in particular, we have a very good year occurring right now. What is the length structure of a recruitment year going to look like?

SHANNON CASS-CALAY: So, you want me, okay. So of course, they would be, a lot of the animals would be small if you have a good recruitment year. However, you know, you also have to count for the fact that we have a selectivity function and that, you know, we get fishery-depended data. Ideally, we would get a full representation of the length composition in every year, from the smallest, all the way to the largest animal that the fishery collects. I don't know that that's the case, because the data we get is probably somewhat truncated. But yes, of course, the mean length may decrease even when you get a big recruitment year and I understand that's a possibility.

TODD GEDAMKE: So next year, again, they have a really good year. The two factors that are being included in this are landings, which are going to go up, and a length structure which is going to go down. Yes? And in that case, is there any possibility that you don't end up with closures?

SHANNON CASS-CALAY: Well, I mean, that's exactly the questions that the SSC should be discussing, right? Is what do you, you look at the suite of information that's been presented to you, you look at the information you might have from the fisheries, and then you try to make a decision about whether or not this information can be used to create an ABC for the future or not.

But if you have evidence that in 2020, for example, or 2021, that there was an enormous pulse of recruits, we could take a look at the length composition data we have and see if it could be interpreted that way. And if so, we could make different decisions, perhaps, about what one assumes in our projections. So, I mean, this is exactly the kind of information that the SSC should be discussing, and not just the two of us.

TODD GEDAMKE: Yeah. And I'm going to end this right now, Shannon. I just want, let me just repeat the last statement you made, which is that the data could then be evaluated internally, and you could make different decisions or assumptions about it. Um, and so anyway, I'm done. Thank you. I think--

JUAN J. CRUZ MOTTA: Thank you. J.J. Cruz. Thank you, Todd. Thank you, Shannon, for somebody that is not a fisheries biologist I'm learning a lot from the exchange. But then I also, Todd the question for you. I mean, the same questions you asked Shannon, I would like to know what will be your answers? Specially like Shannon said, “Look, I believe based on the data, that the stock is not overfished or it's almost there.” What would be your opinion? Based on the data.

TODD GEDAMKE: Sure. And I apologize to Shannon, and I hit things really hard here, not even for this argument. I'm setting up the next one.

In this case, there's nothing to do. This SSC has already voted to put this into law. The minute you put it into law, Shannon can make statements that says, "the stock is fully utilized by the fishery" because they have then determined that MSY is this value. So, once we vote to accept something, it's on the books, changing that, modifying it-- I mean, I used the word phony assessment or a straw man assessment in a previous argument, and someone got very upset by that.

But the reality is that if we're not comfortable with these values, if we're not comfortable at where this thing is, if we voted into place, changing that is virtually, it's going to be impossible. It's going to sit there for years and years and years without changing. Because you're going to have these, which are going to be updates and getting back another benchmark back on it.

So, in this case, my point is simply, it's reducing to, I mean, reducing to a length-based model. I mean, there's a lot of points which we're going to address in other situations. And the Center has made statements that I just wanted to make sure that I got those comments. So here, there's-- I mean, we've had this discussion. I got outvoted in so many times, I don't even know what to do. So, I just want to make sure that the logic continues from one step to the next on this.

RICHARD APPELDOORN: Shannon.

SHANNON CASS-CALAY: Thanks. So that's not really the case at all. In fact, you know, we are trying to have Spiny Lobster as one of the highest party stocks. And we have recommended that it be assessed about every third year, which means that every three years you'll have an opportunity to reevaluate any part of the stock assessment that you think there might be better, newer information.

So, and we're also very much talking about new harvest control rules that are informed by fishery-independent data and how to get that information. And so, Todd is correct that once you put something on the books, that there is fishery management that does occur for a period of time. But we recognized how crucial this fishery is to the Caribbean and have recommended that it be updated every third year, which would give you the opportunity to change the catch recommendations every three years.

And in fact, the Council can request an update at any time, which is what this assessment is. Essentially, the Council asked, for us to update this assessment outside of the SEDAR calendar. And so, there is always opportunity to consider new information. As soon as the Council is aware of it, they can write a request, ask the Science Center to reconsider, and the SSC can look at it again. So, this is very much a living process with ample opportunity to reevaluate.

RICHARD APPELDOORN: Graciela.

GRACIELA GARCÍA-MOLINER: So, to follow up with Shannon's comments, there are ongoing efforts specifically for the Spiny Lobster not only the increasing sampling, but also the aging. SEAMAP has revamped its protocol to make sure that that Spiny Lobster is included. We have the mesophotic and the deep-water ROV work that its ongoing right now. So, there are a number of issues that are, a number of studies that are coming up and hopefully will provide more information to the Science Center to improve on the assessment of the lobster.

We will hear tomorrow about the economic indicators that are being worked on for Puerto Rico and the Virgin Islands. So hopefully that would be another set of data that will come online. In addition to that, the EBFM work, that is ongoing, also it's looking at the combination of the multi-specific fisheries that we have and the status, the ecosystem status report it's also looking at those indicators and using, hopefully very soon, the landings information to see if there are explanations for the variability and the changes that we have seen in the fishery.

I don't know if we are having a commercial fishery census coming up in the next few years. I'm hoping that we do because they need to be updated and we recognize that there have been dramatic changes in the socioeconomic aspect of the fisheries in Puerto Rico and the Virgin Islands. But we need to document those to actually provide that information to the Science Center.

There have been also a number of issues with the local governments and that's also been taken care of. You know, there is quite a bit of effort going into such an important fishery for the area. Just that it takes a little bit of time to bring everything up to date and to have everything, working together.

TODD GEDAMKE: I just want to do a direct one because I was in the middle of a conversation about the EBFM previously here, and it was brought to the attention of some of the SSC members, what the S Center needs to use EBFM, and it was a multi-year process, and

I know you spent lots and lots of time doing this. So, I'd like to hear from the Center as to how that will be included in the work as we move forward.

RICHARD APPELDOORN: Go ahead, Shannon.

SHANNON CASS-CALAY: Okay. So, there are a variety of attempts going at the Science Center. A number of things could be done, right? The most obvious are, that ecological or socioeconomic indicators can be directly included in single species stock assessment. So that's baby steps, baby steps. But you know, to do something so-- you know, let's put it this way. Right now, Magnuson is written on a single species concept and to really make the next step to do something that's much more ecosystem-based requires some steps that are legislative in nature too.

But the Science Center is at least attempting to look into flexible management strategies that would allow us to use, you know, to-- we're looking at basically data limited harvest control rule strategies that would allow us to manage based on fishery-independent information. The next steps for ecosystem-based fishery management require that Council to determine how they want to use ecosystem-based information to directly manage the fisheries. So that's a cooperation that has to happen between General Council, between the Councils, and between the Science Center.

But the data right now require improvement across the board. You know, if we're worried about the extractions from the directed fisheries for this stock assessment, for example, you know, the extractions are also important in ecosystem concept because human beings remove a substantial amount of animals from the water as much as maybe some predators do, right? So clearly there are important improvements to be made to the data collections in the Caribbean to inform both single species management, as well as, ecosystem-based fishery management.

TODD GEDAMKE: So again, I'll just rephrase it. How would you use it? That sounds-- I understand that there's management and this and that, but I think the direct comment made to people that were very interested in using this was, "I need a specific relationship to affect a specific variable in the model." And I think that when everyone dances around this and says, "Oh, we're going to use this and it's going to go to the Council," How do you, like what-- you said that in those exact words, I need a specific relationship to affect a specific variable, so you know, how would that work?

SHANNON CASS-CALAY: Okay. So, SS has a capability of including

environmental signals, and the one that we most often use is red tide. And red tide has a dramatic effect on natural mortality. It's an episodic mortality and so, we can actually include it either as a threshold event in SS or as an annual trend. And we can see the impact of it in our fishery-independent indices as well. So, we can actually estimate the red tide mortality within the stock assessment model, and it's done in the Gulf routinely for the shallow water groupers, especially.

We could do the same exact thing with a trend in diadema, if we understood what parameter of the stock assessment model it is most likely attached to, right? Is it a cause of episodic mortality of adults? If we had a time series and if we had a mechanism, it could be included today in the stock assessment model. And that's what we need to have more attention to, in the SEDAR process. If you have ideas for how, for environmental signals that you think impact these fish stocks, then we need to be exploring those in the SEDAR process. We need to be presented with the data. We need to be presented with the feasible mechanisms.

RICHARD APPELDOORN: All right, we got several people in queue here. I'm going to go with J.J. first and then Nicky, and then Jason's been online.

JUAN J. CRUZ MOTTA: Thank you. J.J. Cruz here. In terms of what the Science Center can do, I don't want to speak for them, but based on the current legislation, as Shannon said, there is nothing they can do from an EBFM. Basically, because everything is geared to a single species, right? The next step, you were talking about, and there are very nice, amazing models we heard about when we went to Alaska, about how environmental conditions can be considered into the stock assessment of a single species. And that's definitely an improvement. However, that's not what a true EBFM approach would be, especially for the Caribbean, which is the management of the whole assemblage, right?

And now this is my opinion. There is nothing, nothing in the world that we can do to predict what is going to happen with an assemblage under different scenarios. There is no way we can estimate or come up with parameters for a multi-specific scenario. With what we know now, perhaps in 100 years, with the development of AI or something like that, perhaps, but not now. So, and this is again, my opinion based on my short experience trying to come up with ways to implement EBFM, the mindset has to change from a predictive approach to an assessment approach based on an adaptative management on developing the necessary, not the necessary, but adequate indicators.

And, by the way, one of the things that we brought up to the joint SSC was, there are ways to come up with multi-specific indicators. We have the tools to describe the fisheries from a multi-specific point of view, and we can track that on time. The difference is we cannot predict what is going to happen under different scenarios. The only thing that we can do now is to follow that through time and then make recommendations as we go about.

So, in summary, if we use the same approach of trying to predict, there's nothing we can do from a EBFM or ecosystemic point of view. So, to do something, we first need to change that mindset. And a lot of what we want to talk about tomorrow, is about that. The complimentary approach that could inform management that add to what you are doing to the stock assessment.

And I want to take this opportunity just to say, coming back to the topic. I don't know if it's too soon to propose, I know there are differences, perhaps Reni, Todd are not convinced about this, but in order to move forward, I don't know if it would be a good time, chair, if you think it's a good idea to put as a motion to vote on whether this is a good tool to be used as a management or not, or further discussion is needed. I'm saying this because all the concerns that you have brought forward was things that we have been talking about since the first day I was here. And then yeah, they're all true. But at the end of the day, we have to decide whether we going to use that or not. Thank you.

RICHARD APPELDOORN: Thank you, J.J. Nicky?

GERSON MARTÍNEZ: Gerson Martínez, for the record. My concern due to the conversation I just heard, to my knowledge, everything that is being proposed used in this meeting is used by or is determined by the best available data. And I heard here today that Puerto Rico's going to get hurt because of the best available data. And Saint Croix is showing now discrepancy in that data. Fish and Wildlife is the only person that can tell you a hurricane pass, two hurricanes pass, three hurricane pass, 50 fishermen, were in jail for drug trafficking, others left the island. A lot of things come into play, but if we have the best available data to determine something, why we have to speculate on what is going on or what is not going on.

So, I'm in a learning process. I don't want to step out of place, but I know tomorrow it might be a different story for us when it comes to other issues. But today, that best available data permits me and my fishermen to continue fishing. We have a three and a half carapace size over many other countries and that three and a half carapace size has determined that our fishery stays healthy.

And I prefer, and this is not a motion, I cannot make one that that carapace size be raised other than loosen the ability for Puerto Rico to lose two years of commercial fishing, that people cannot bring bread in their table because something was misunderstood or over reported by people that don't live of fishing. Because we do have people out there that are rotten apples that do other things that needs to put these numbers to put money in the bank. And we are the ones that depend on fishing is the one that's getting hurt. They don't care if we lose two years of lobster fishing, but we as commercial fishermen who file our taxes and pay big money at the end of the year and have to put table not only on our table, but other families, I think don't attack the process, just work with it. Give us the opportunity to keep showing you the numbers. And I know that probably in the future somebody's going to invent a formula that say we were wrong, or we were right. So that's all I have to say. Thank you.

RICHARD APPELDOORN: Okay. Todd, do you have a direct comment to that?

TODD GEDAMKE: No, I was going to actually second J.J.'s comment of moving on. I don't, we've made our peace, I think--

RICHARD APPELDOORN: Right, I'm just going through the people that already raised their hands. So, Jason, you had some comments.

JASON COPE: Hi everyone. Yeah. Jason Cope, SSC. You know what? At this point I was going to now third, what J.J. and what Todd just said. I mean, I think with the important understanding that we're here, we have a process, I think Shannon outlined the process very well, very clearly, but we also have a lot of research topics and concerns and I think a lot of those things get revealed as you move forward with benchmarks. You see more and more what's going on, and it highlights or emphasizes certain things even more that need to be prioritized research topics. So, I think we should move on.

We understand what the process is but with the idea that we've also learned, maybe, that certain things need to be emphasized for the next benchmark or next research when people have research capacity to look into these things, right? Emphasize those things. But there's also been, and I don't know where this goes, there's also been some desire for more communication on certain topics and how to communicate those things with the community and I think that's a very interesting, important thing. I don't know if that's within the SSCs purview or just something we can capture again in our statements regarding research and needs for the future. But

maybe if we can just do process and then capture in the research and needs section of a statement, these are the things that came up. Thanks.

RICHARD APPELDOORN: Thank you, Jason. So, I'm asking a question. The SSC needs to make a decision, I'd like to know what our options are on those decisions. It's to accept or not accept the, and what the consequences would be. Reni, short you said?

JORGE R. GARCÍA-SAIS: Short, yeah. Shannon, I'm pretty sure that, you know, I know this correction factors have been a burden. You know? I know, you know, I know. And I'm not trying to change decisions in one way or another. But let me ask you, you must have had to run these models without the correction factors. Is that true or not?

SHANNON CASS-CALAY: Is it hard to run these models without the correction factor?

JORGE R. GARCÍA-SAIS: No. If you have, you know, I mean, I know that you have in your mind the same doubts that I have about the uncertainty around these correction factors and of the known variability of the correction factor as you apply to the different species.

Knowing that lobster is a keystone, you know, species in our fisheries, in our economy. I mean, wouldn't you be interested in running these models without the correction factors? Because when you say that you work with the best available data, I take that, but then I say, wait a minute, the correction factors is not data.

That is an extrapolation exercise. That is not real data, that is number you come up with, you know. So, if you run the model with the real data, with the landings, with the reporting landings, and you swallow the error, or the uncertainty associated with the misreporting or the non-reporting or the whatever it is that the reporting error is. What would be the end result of the model?

SHANNON CASS-CALAY: I mean, I don't know what the end result of the model. I don't, let's take that separately for the moment. The models could be run without the correction factors. What Adyan was just about to say is, you know, that if we gave you the catch advice without the catch, without the expansion factors, then you'd have to monitor the ACLs using the unexpanded landings as well to make sure that the currency is the same. It's a pretty big deviation in an update assessment. It is certainly, it would basically require the SSC to agree that there is a better way to estimate the catch that the best science information available is

not the data Puerto Rico provides. It's a big step to take in an update assessment context. And I don't know offhand what the effect on the stock assessment would be, unless you've already run it and you know.

ADYAN RIOS: No.

JORGE R. GARCÍA-SAIS: It's a big step to consider that an expansion factor will work the same for a lobster than for Lane Snapper or for Red Hind. I mean, there is a gap, you know, there is a huge difference. And then what may be reasonable for one species may not be for the other one and when we are considering this kind of priority species in the landings, well, you have to refer to that, you have to consider that somehow. I don't know. And then we don't, and then we just apply the correction factor, you know, across the board, with the same magnitude, with the same weight and that's what I'm opposed to. You know? That's what I'm concerned. I don't know if-- frankly, I'm in doubt, serious doubt.

RICHARD APPELDOORN: So, Reni, I'm going to summarize what I thought Shannon said and put doubt to your doubts. She said we're dealing basically with a length-based model, and that the catch stuff is used to scale the management advice. And therefore, that's why she said, if you don't use the correction factors, then you monitor without correction factors. If you use correction factors, you monitor at the level with correction factors. But that's what the correction factor is doing. And you're-- let's take a very simplified assumption that, okay your error is a hundred percent, but that's constant. If that was actually the case, then the correction factor would not affect at all the assessment. It just affects where you're going to draw the line at where the levels are. And then how you monitor relative to those levels. But it does not affect the assessment.

Now, in reality, we know it's not a constant, it bubbles up and down, but it's always large. So, but that's, you know, the fact that it's large isn't affecting the assessment, the effect-- the question is, is bopping up and down generating variability that is somehow affecting the outcome? And we know that in addition to just statistical variability in that process, we do have real life variability like this, uh, we assume a recruitment event going on from what is being told to us by the fishermen. So that's where we're having problems and that's where Todd is saying, "look, we're getting stuff coming in that's telling us that we're going to have a disconnect between the landings and the length-based information, and we don't have the other indicators that would correct for that." And if that's the case, then, you know, it could lead to this overage problem that he's been talking about.

So, I think we need to move on from there. I'll take a question from Nelson and then I'm going to go back to my original question. We have to make decisions. What are those decisions? The options for the decisions that we're facing for us. So, Nelson.

NELSON CRESPO: Thank you, Mr. Chair. I'm curious, can you show the number for the last seven years before using the expansion factor for the lobster?

RICHARD APPELDOORN: Thank you. Okay. For those-- you didn't have your mic on, so your answer was, after lunch you could provide that. Okay, Shannon?

SHANNON CASS-CALAY: Yeah, we can absolutely show that. I do want to agree that, you know, what Rich said is true, if essentially the correction factor is a scaler with some variability from year to year, but essentially an average scaler that applies throughout the entire time series. The fact that the landings are higher in the expansion factor is not causing a more pessimistic outcome if it's just a routine scaler. What it will do, if you use, if you use the uncorrected landings, then the ACLs that we'll recommend from the stock assessment are very likely to be lower but should be monitoring them in that unexpanded currency. Right? You'd be monitoring them without those correction factors then. And so, there are some nuances here because the correction factors are not exactly the same from year to year, and so I don't know exactly what the effect would be on the stock assessment, but the fact that the landings are high because they're expanded is not what's driving the stock down. In fact, that's-- what's driving this assessment is the fact that there are trends in the length composition data that indicate that the stock, the population health, has varied through time. But it's not just that the magnitude of the landings is high, the stock can support a high level of landings in Puerto Rico, but you're about at that level now that according to this assessment, which obviously could change if we get new information, this stock assessment suggests that you're about the level of landings that this stock can sustain from year to year.

TODD GEDAMKE: Shannon, could I just suggest putting that the same, exactly, to illustrate your point. Could you put the mean length over the time period that you're going to bring up after lunch, just so we can. I think that's a good one to do landings and length, since that's the parallel you're drawing.

ADYAN RIOS: Yeah, we can provide that.

RICHARD APPELDOORN: So, I'm going back to my question then. Open to anybody on the committee or the Center. you're asking us to make a decision. I want to be clear about what the decision is that we need to make, are there options on that and what the consequences would be? Walter?

WALTER KEITHLY: Thank you, Mr. Chairman. This is Walter. It might be useful, in our deliberations, if we looked at the motions that were made by the SSC with respect to SEDAR 57. As I recall, there are four or five motions made and we may be able to follow those motions to see if there's been any reason for the group to suggest that they're no longer appropriate. Or the outcome of those motions.

RICHARD APPELDOORN: So, let me use that as an intro to further my question. If we decide that we now think, in light of whatever some of those motions were not appropriate, where does that leave us?

SHANNON CASS-CALAY: So, are you asking what could be done or are you asking what this body needs to do? Because it--

RICHARD APPELDOORN: I'm asking, in the end what this body needs to do. And part of that could be making recommendations about what needs to be done, but that's not moving us forward on the issue at hand. It just would help later on.

SHANNON CASS-CALAY: So, you know, the previous-- Basically, it isn't advisable to continue to use projections from a 2016 stock assessment without update. So basically, you're in this situation right now where if you do not use the results of this, you'll have to determine from some other process through your ABC control rule what the OFL and the ABC will be. And so, you'll have to go back through and determine whether you think it can be a Tier 4 assessment, Tier 4A, Tier 4B. So that's where you'll be, I'm afraid. Because the only other option, I don't really know of another option given that the last stock assessment that was accepted had a terminal year of 2016. And so we're getting \ very far away from the terminal year of the data of that stock assessment.

So that's what I see as moving forward is, you know, you basically can consider whether this stock assessment update is useful and can create OFL and ABC from your control rule, either probably in Tier 3 as was done before, or whether you default to back to Tier 4 and say that catch only is better scientifically then what this

stock assessment is able to provide.

RICHARD APPELDOORN: Well, thank you Shannon. Jason, I'm going to ask you to read or explain your comments that you put in the chat.

JASON COPE: Sure, yeah, happy to. Jason Cope, SSC. Well, I kind of put two different things in here. I think I'll get to the last thing I just put in. I'm not sure what the arguments against using these updates are. The prior assessment has all the same issues, if not more, because it has less information. And as Shannon just mentioned, if you're going to then somehow go back to the future and use catch only which seems highly suspect, I just don't see where the argument, I don't see a clear argument that says why we shouldn't use these updates versus something else that would be the only other things that we could use. So, but what I do hear are very good arguments about what type of research needs to be done and highly prioritized research in order to make this a better assessment in the future. I don't think that is the same thing as those are being arguments against using these updates. Thanks.

RICHARD APPELDOORN: Jason, do you have like a bullet list of those research recommendations or [crosstalk]?

JASON COPE: Yeah, I don't, I mean, I heard expansion factor's being an issue. One thing that pops up, and this is something I wrote in here, would be, and this is just like a wish list, right? One of the things you would love to have in anything that has a strong length-base driven result is the ability to tease out recruitment from fishing mortality. We don't always have those sorts of things. We certainly don't have it here but mentioning like some sort of recruitment index or something. If people are feeling like they are able to monitor recruitment in some real way, formalize that into some sort of index or something into the future, right? That could be stated.

So, some sort of recruitment index, because this is probably going to be length-based mostly for the near future, at least until you get a really robust fishery-independent index, right? So, this is going to be a length and catch only model for a while. You would love to be able to have, in addition to that, outside of an adult index of abundance or a sub-adult or whatever, a recruitment index, right? So, that would be something really nice to wish for and try to figure out how to do.

I think the catch, there's this issue about reporting catches being kind of-- I really felt that comment about reporting catches seem to be hurting folks and we want people to feel like what they report is highly valued because it really is. But if the historical

catch catches stagnant, but has issues, right? Revising or reconsidering the historical catch reconstruction here seemed to me like something that was maybe not explicitly being said but would be something to reevaluate in the next benchmark. That would then help reset the value of the newer information coming in and how folks feel like that information is being weighted properly.

These are just things off the top of my head, there are way better experts as far as data and all those sorts of things in the room that could probably make that list even bigger. But those were some of the big things that popped out. I'll stop there.

RICHARD APPELDOORN: Thank you, Jason.

LIAJAY RIVERA GARCÍA: Erik Williams is waiting for a turn to speak.

RICHARD APPELDOORN: Yeah, go ahead Erik.

ERIK H. WILLIAMS: Yeah. Can everybody hear me? Thanks, Rich.

RICHARD APPELDOORN: Yeah, we can hear you fine.

ERIK H. WILLIAMS: Okay. Yeah, this is Erik Williams. So yeah, this is a tough spot to be in. You know, there's the process and we have developed very heavy process-oriented ways of dealing with stock assessments but there are times when SSCs and stock assessment review panels sort of make decisions based on what they know at the time and new information comes in that makes us question that process. I see this as potentially falling into that category somewhat. Certainly, a lot of concerns have been raised. The data, certainly we all agree the data in this region is suffers quite a bit and we wish we had a lot more information, but we don't. So, we do have to be careful about making sure that the data we do have does tell us what we expect it to tell us. And in that respect, I think one issue that starts to pop up in my mind and just, and I've been vigorously reviewing the SEDAR 57 report and looking at some of the data while all this conversation's been going on, and one of the things that stands out at me is, that length information is, I'm not sure what it's telling us because it's unimodal and almost constant through time. So, you know, this notion that we would pick up some recruitment signal, I don't know that the data bears that out. I'm not seeing any recruitment signal come through in that data. I see, yeah, you might see some minor shifts in mean length one way or the other from year to year, but I don't know if that's indicative of a year class signal or not.

The other thing that alarms me with this update is the sample sizes

have really dropped off quite a bit, partly because of Covid, and so, then I worry about whether the representation of those length samples is appropriate when sample sizes start to drop, do you end up with a bias or anything like that? One figure that stood out to me, and this is not in the presentation, it was in the report, was figure 4.2 for the Puerto Rico length comp data. And there, you can kind of see the mean size is dropping quite a bit in the last two years and you're not seeing some of the biggest individuals.

The question is, what's driving that? You know, and what's the dynamics behind that? And there can be several explanations. It could be that there is a big year class coming in. Could be also that the big individuals are disappearing because of extreme fishing pressure. But again, what I circle back to is, is this data telling us the right population dynamic information that we need, to make an informed judgment about what is really going on with this stock? And I don't want to-- and this is where the whole process gets sort of tricky is, you know, obviously there was a SEDAR 57 assessment, it was reviewed and approved, and I wasn't there. I don't want to re-litigate that necessarily, but I do wonder if maybe one thing we could do is, one recommendation that might need to come out of this, is that we expedite another assessment for spiny and probably put it in as a benchmark assessment and sort of re-look at some of these things because it does look like new information might be changing our view of that assessment. And that's kind of where I'm landing right now, so I just thought I'd sort of express that. Thanks.

RICHARD APPELDOORN: Thank you, Erik. Shannon?

SHANNON CASS-CALAY: Yes, thanks Rich. This is Shannon. So, I agree Erik and I wanted to clarify that on the SEDAR schedule, it is listed currently as an operational assessment. It could be changed to a benchmark assessment. And I do think that is warranted and it just does require a discussion at the SEDAR steering committee. So, it'd be helpful if this group feels that a benchmark would be more appropriate to make that recommendation.

TODD GEDAMKE: Mr. Chair.

RICHARD APPELDOORN: Shannon, what was the-- to benchmark from what? Operational?

SHANNON CASS-CALAY: It's currently listed as an operational.

RICHARD APPELDOORN: Okay. I just needed the word. Thank you. Todd?

TODD GEDAMKE: I just wanted to do a PSA for everyone. With

recruitment, Nelson, has been actually generating a full year time series currently for trap and we may be able to pick up recruitment out of there. I just wanted to let everyone know that we actually, the Center, has supported a process that we will have stuff going out over the course of the year, and we should start being able to look at recruitment for the future on this. I think that's important to add a little optimism to some of this.

RICHARD APPELDOORN: Yeah, it'd actually be quite exciting. Thank you.

KEVIN MCCARTHY: Yeah. Thanks Todd. This is Kevin. We actually have two of those projects, so the one that you're involved with, and there's another one as well. So, we're aware of a lot of these data needs and we're trying to address them, but it is a process.

RICHARD APPELDOORN: Now, Kevin, don't be cryptic. Where is the other one?

KEVIN MCCARTHY: The other one's in Puerto Rico. They're both in Puerto Rico. We're, we have on--

RICHARD APPELDOORN: Okay. What is the other one?

KEVIN MCCARTHY: The other one is a recruitment index. We're building that. When-- and it's also a cooperative research project. So, that one had started, we got some additional money to start a second one and so that's the one that Todd and Nelson are involved with, in that second one. So, we've got a couple of them going.

RICHARD APPELDOORN: Yes. And SEAMAP is trying to provide periodic age structure indices for the fishery. Todd?

TODD GEDAMKE: And just to anyone in Puerto Rico, we are actually bringing two extra units down right now. We would love to get some of the guys fishing North. This is just a-- if there's anyone in Puerto Rico that wants to get involved in this process, we have equipment that will be available. And if you would like to get your view of the world from your fishery, please contact me or, we've got a couple other folks around. But I think this is the wave of the future, having the commercial guys working with us on collecting these data. And it would be awesome if we could get some of the, the bigger guys in other places around. So, we'll have equipment for the next year.

RICHARD APPELDOORN: All right. Jason, you had your hand up?

JASON COPE: Yeah, Thank you. Sorry, I've dumped a lot in the chat

as well. I'm not going to cover all of that. One, just what Todd said. I think it's just super exciting, any of this cooperative research opportunity is just fantastic. So that's really exiting to hear. I guess one thing I wanted to, as we're going through this statement, writing a statement up and this process right now, I really do like the idea of upping the prioritization of this Spiny Lobster assessment beyond operational. But one thing, I just want to make sure, is when we write down the things that are needed to make that happen, one thing that I have found, and I'll just tell you as a stock assessor, doing an assessment, people coming back and telling me, "oh, you need to do a full benchmark again, and you need to solve all these problems." And then no one's collecting any of the data-- they're unsolvable problems and the timeframe given me to do the next benchmark. So, it's like there's no point in doing a benchmark that quickly because you're not going to get a different answer because we can't get the information needed to solve those issues.

It sounds like, to me, from this discussion, there are a lot of things happening on some of the big question marks here, that it would be valuable and reasonable to upgrade from operational to this benchmark status, for the next assessment. I just wanted to be sensitive to the fact that when we do list things out that need to happen, making sure that progress, sufficient progress, is reasonably made to make that next benchmark matter. Um, and if it takes another year, push it off another year, in order for that stuff to actually really pay off, then maybe that would be the better decision. I don't know the answer to that. Just wanted to bring it up as an important consideration when we do raise it, because yes, we all want the most up to date. We want the assessor to be as free as possible to do what they can and not be so constrained like they were this time. But we also want to not set them up to fail and not be able to do anything new because the information really isn't going to be ready. Thanks.

RICHARD APPELDOORN: All right. Thank you, Jason. Erik, you have your hand up?

ERIK H. WILLIAMS: Yes. Thanks, Rich. Yeah, Jason as always makes good point. You know, I agree with him completely that normally these processes, if you don't have new data, nothing's going to change much. I would say maybe one difference for this one is, I think there's some process modeling things that could be changed in a way to include more possibilities. Let's say that. I think the selectivity is a tough one and can be modeled in many, many ways. And I think there's probably some things that could be done with this assessment, looking at selectivity in some different ways potentially and probably some other things. So, I think aside

from a lack of new data, there might be some modeling advances that might help with event or make this a better assessment with a benchmark.

RICHARD APPELDOORN: Okay. My preference, it being 12:30 is we break for lunch. Still on this for a bit, and we'll come back and we're going to make some decisions. Graciela?

GRACIELA GARCÍA-MOLINER: So please, if you do have any projects going on, provide that information to the Council because social media can be very powerful. So, once we have that information, Christina or the outreach and education panel can turn that into a, you know, social media outburst and you might be able to have more work from the commercial or the recreational fishers as you see needed. Thanks.

LIAJAY RIVERA GARCÍA: Jason?

RICHARD APPELDOORN: Jason.

JASON COPE: Yeah, super quickly. Just didn't want to forget to thank Adyan and the others who worked on these. They're always just a lot of work that goes into presenting all of this stuff and getting it ready so we can pick it apart and get critical. I appreciate their work. So just wanted to say that before you take lunch.

RICHARD APPELDOORN: Yes, thank you for those. It's a very valuable point. So, it's now 12:31 and we'll try to be back at 1:30.

(Whereupon, the meeting recessed for lunch on November 29, 2022.)

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NOVEMBER 29, 2022

TUESDAY AFTERNOON SESSION

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RICHARD APPELDOORN: I'd like to get started again. Sorry for the delay. So, are we good to go? Yes. Okay. So, let's get started again. We're going to get to some decision making shortly, but there were some requests, made right before lunch that I think we have some information to provide on those. So, Walter, you had-- okay, so yeah, we had some requests on information concerning correction factors and landings and some of the SSC recommendations initially for SEDAR 57. So, we'll go through those. And then I

think Sarah can also give us some information relative to the kinds of decision we need to make and what our options are for that. So, Adyan, could you update us on some of that info request? Alright, sorry, we'll go through the SEDAR things, these are the recommendations.

So, this is the recommendations that the SSC had initially made relative to the SEDAR 57 assessments that were presented to the committee. So initially we said yes, we supported the assessments, which were based of statistical catch at age, relative to the status determination criteria, is that SDC, of overfishing. And we accepted the F_30%SPR as an MSY proxy.

Next, we accepted the results that overfishing was not occurring relative to the recommended SPR MSY proxy and that populations were not overfished relative to the MSST level. So, and then finally SSC supports recommendations to use the assessments to establish the management reference points using Tier 3. Is there one more? So, we're then moving into Tier 3 and recommending using our, our Sigma_min and then the P*, which comes from the Council. And we didn't look at the research recommendations at that time.

So those are the-- Walter, going back to your request. Those are the recommendations we made initially that led us to be here.

WALTER KEITHLY: Thank you, Mr. Chairman. Now I just wanted to refresh my mind and I thought that may provide us some guidance on what we may want to look at or consider with the update assessment here. That was my reason for asking for it. Thank you.

RICHARD APPELDOORN: Okay. Now, Adyan, if you could go ahead with your presentation on that information.

ADYAN RIOS: So, here's a summary. Oh, that's not the right, we need to go to page 24. So, let's go all the way over there. Is this coming through online? Adyan, for the record.

RICHARD APPELDOORN: Yeah, it's coming through.

ADYAN RIOS: Okay. So here is a summary of the additional information that I was able to develop for today. We're going to have the mean length by island over time. The 2022 correction factor values, as well as the time series of Puerto Rico without correction factors. And then just to kind of circle back to these topics that need to be determined and decided basically what the update is, which is including the length data from TIP and the landings data from logbooks through 2021 for all three islands. Whether to start projections in 2024, as we did in the report and

in the presentation, making the assumption that 2022 and 2023 are equal to 2021 for all three islands. And then just for Puerto Rico, the topic of correction factor, the 2020, which we'll look at in a moment, or the average over 2014 to 2019.

Okay, so I'm able to zoom in here, but I'm just going to first orient you to what we have and then we'll zoom in to see all the specific numbers. We have Saint Croix on the far left, Saint Thomas and Saint John in the middle and Puerto Rico here. And these plots represent the mean lengths over time. And so, we've got the years along the X-axis, and we've got the average length in millimeters, the average carapace length on the Y-axis, and there's a dotted blue line that I overlaid on top of all of these and that's at one 110. And so, these Y-axis are different, and we'll zoom into them a minute, but when you see this dotted blue line, it's always at 110 to show you, basically, we see Puerto Rico on the far right and you see that that dotted line at 110, you see this average sizes below that, we see that dotted line also plotted on the U.S. Virgin Islands plots. And you see that we do have the larger average sizes in the Virgin Islands. And then, for additional context on the far right, and again, I'll zoom in wherever we want to look shortly, but for context on the far right, we also have the sample sizes over time for each of the three islands.

Yes, the minimum size limit is 89, and I believe the length at maturity is 85. It was 92? Yeah, I'd have to look it up in the report, but I saw that question come in, in the chat. Okay, so now I'll zoom in. Oops, let's see.

RICHARD APPELDOORN: Sorry, Adyan, you had top and bottom. Is that trap versus diving?

ADYAN RIOS: Yes, we have traps in the top and diving in the bottom. And so, for Saint Thomas, it'll be, you know, the majority of data comes from the traps. And for Saint Croix, the majority of data comes for the diving. And so let me get a zoom in there.

So, so let's go to diving for Saint Croix first, keeping in mind the lower sample sizes in the more recent years. And then I'll zoom in up to Saint Thomas. There's a light blue line that goes through that kind of is what the model predicts for the mean size to be. And yeah, so, in a lot of years it's flat, some change in an increase and then a decrease here in Saint Thomas but that also needs to be taken into context with the sample size.

Um, in Puerto Rico, we see kind of for the traps an increase in the late nineties and then it's remained pretty stable around that size limit, right around the size limit. And over here we also

have it a little bit, for diving, it's a little bit larger than the size limit.

Okay, so I'm going to go back to 100 and see if there are any questions about this.

LIAJAY RIVERA GARCÍA: Adyan, we have a question in the chat from Jason. That says, "Same growth curves for each area?"

ADYAN RIOS: Yes. These all use growth data from Cuba. So, let's go back to full page fit to width.

RICHARD APPELDOORN: Adyan, it's Rich, the last year of data was 20 or 21.

ADYAN RIOS: In all of these, the last year of data is 21.

RICHARD APPELDOORN: Thank you.

ADYAN RIOS: Oops, looks-- oh, yes, it is 21. However, not all of them show 21 because not all of them have data for 21. For example, in Saint Croix, this one only goes through, it looks like 20, that one year of data for that one year. And so, what I'm showing on the far right is the gears combined, however, there are some years where specific gears lack data. Which represents those gaps that you see.

This one goes through 2021. This one doesn't seem to go through 2021 but that is the lesser, very lesser common gear in Saint Croix. That's the traps. Here for diving, it does go through 2021, but we don't have anything in 2020 and that corresponds to what we see here as well. We don't have any lengths for 2020. And here we have through 2021 for diving in Saint Croix. And we have through 2021 for Puerto Rico for both years.

RICHARD APPELDOORN: Alright, I have a question and then Todd. Looking Puerto Rico, just hold it right there. The top graph is showing a decline in 20, maybe a slight increase in 21. The bottom graph is showing an increase. Well, I can't really see the, what the blue line's doing. Maybe it's just, it looks like they're doing, those last two years are doing different things, but I maybe the means are, yeah. Okay. So, the mean is basically staying the same, but you're getting a lot more variability up on the higher end.

ADYAN RIOS: So, this also, yeah, this also factors selectivity, although the selectivity of the two gears are quite similar, they are slightly different. And then, it also comes down to sample

size. There might be a higher sample size for one gear versus the other. And so, this plot is misleading in that sense and that's also why I kind of threw this information in here on the far, in that, you know, those last two years have the least amount of information and SS will take that into account.

But we'll know that these years don't need to be fit as well because there's less information for there to be fit.

RICHARD APPELDOORN: Alright, Todd, you had a question?

TODD GEDAMKE: Yeah, no, Adyan, you just hit exactly my point. Those bars represent mean and what? Top part of the bars represents?

ADYAN RIOS: Yeah, so I think these, it's an SS output, so it's not what we're putting into the model. It's-- can another SS user also inform me what exactly those bars are?

SHANNON CASS-CALAY: Well, let's just confirm, we'll confirm what that is. One second. I think I know what it is, but why state for the record something incorrect. I'll just look it up.

JASON COPE: Yeah, it's based-- this is Jason Cope. It's based on the data waiting and the sample size. Was this Francis weighted by chance?

ADYAN RIOS: No reweighting because there's only two model inputs.

JASON COPE: No re-weighting. Okay. Okay. So, this is based solely on the sample size of each year. And it's the mean length. confidence intervals, I believe.

TODD GEDAMKE: That's why I asked because as Adyan just said, and I appreciate that, it's misleading, these plots. So, if you go up to the top one with traps, exactly what Richard was just looking at. Zoom in on that last two years. You have bars which extend as high and as low as every other value in there. You have a tiny drop. You have a drop in mean length, which is dropping it down. But now slide over-- Just everyone focuses on those last two years with two means being dropped down and bars, which are, maybe confidence intervals, but if you look all the way to the right at sample sizes, now I can't imagine that those are confidence intervals. Look all the way to the right for sample size. Up, up upper right, right. Oh, is that Puerto Okay, yeah, sorry, sorry, sorry. Yeah, go down.

So yeah, you're looking at 400 fish, 300, fish 500 in the last

year, maybe a thousand. And then the year before that, a handful. So, comparatively you would expect with much lower sample sizes that confident intervals would be higher on those last two years as opposed to what appears to me to be bars that look pretty consistent across the board. We don't need a belayer to this or keep on going with it. I think it's just important that, sample size is so critical here, that I would recommend plots either be labeled with sample size or as we've done in the past bubbles to indicate where we have data and where we don't. Because that--being a model output, to me, that's misleading rather than the raw information that's going in.

RICHARD APPELDOORN: Thank you, Todd. Go ahead, Adyan.

ADYAN RIOS: Okay. Next up we have the Puerto Rico landings time series. I also have some additional information on the far right here. So, on the left we've got thousands of pounds on the Y-axis and year. And so, this is the Puerto Rico landings time series with and without correction factor. And so blue is reported landings, the total reported landings. And then when the correction factors are applied, they result in the orange which is underneath the gray in most years. And then the difference between the orange and the gray, is what I'll point to on the right that we'll talk about. I'll start in the bottom. And so, this information in the right is all about 2020. And so first we have what ends up being the scaler of the correction factor that comes from the data set. So, this is just the 2020 correction factor compared to also what the correction factor is when we do that average between 2014 through 2019 as a sensitivity to derive the 2020 correction factor.

And so here you see what the correction factor was in 2020. There was very little sampling in 2020, particularly in the North. Very few trips were sampled to be able to develop that correction factor for the North and so that's what led the recommendation to derive the sensitivity correction factors. I also provided a percent change of to what happens between using one correction factor versus the other, across those coast. And the biggest reduction is in that North correction factor, which goes from being close to six, to being close to 1.7. So that's 70% more, right, is how the North coast values would be obtained using this, the sensitivity correction factor. We had a 1.5 for 2020 in the East and a that goes to be a two, so that's an increase in 35%. So, the other main ones also declined. So, the South and the West. So, these correction factors, this is what the scaler of the inverse of the correction factor ends up being. That's how we get the expanded data from the reported data.

And then just to provide that context of how those are applied is

and how that orange line is derived, is we take each of these correction factors and apply it to the landings by coast. And so, I'm providing percentages here for each gear to show that diving is 27% in the-- 20% of landings in 2020 are in the East, 20% are in the South, and 40% are in the West for traps. 58% are in the East, 29 in the South, and 12 in the West. And so, that's why, you know, depending on applying the correction factor by coast and by gear you end up with slightly different scalers for each gear that comes to the sum. And then when you total them, there's a difference there, which is that the sensitivity one is slightly lower than the original one. So, it ends up kind of similar, but slightly lower.

And so that's what I have available. I'm working to just not wonder but see what the model results look like without the correction factor. So, using this blue time series. And so, I'll have similar plots of, you know, of comparison, you know, like how we do step one to step two to step three. That's another step that can be plotted for inspection if we want to see that, but we can also go back to the topics the overview here and maybe talk a little bit about that. What's left to be seen is very Puerto Rico related, which relates to kind of the final point. Maybe we could focus, or maybe the group could decide like the first two topics related just to Virgin Islands and then come back to Puerto Rico with additional information if requested or can also discuss decisions for Puerto Rico now as well.

RICHARD APPELDOORN: Thank you, Adyan. Any questions for her on what she presented? Seeing that there doesn't seem to be any, either here or online—Okay, Reni?

JORGE R. GARCÍA-SAIS: Just wants to know for the people who worked on this model, are you comfortable with using this two last years of data on the model with implications that it may have on the overall conclusion of the status of the Spiny Lobster in Puerto Rico?

ADYAN RIOS: I defer that question back to the SSC because I made a simple assumption, so like a parsimony, you know, to kind of say like, not predicting a positive or a negative trend, but I just kept it at what the data tells us it has been in the most recent year.

JORGE R. GARCÍA-SAIS: Well, my question is, is that data enough? Is that amount of data, is that sample size, good enough for you to be comfortable with, "Okay. It's a real value, it's a real trend?"

ADYAN RIOS: Yeah. I think the answer to that is, yes, with the context of what we're giving the model is still driven largely by where the data are coming from. And so, the parameters that are estimating and providing, kind of the understanding of the population dynamics and the fishery dynamics that we're able to estimate with this model, comes from not just from these recent years of data, it comes from that entire period. And, you know, if we have upcoming years with better sample sizes, then we would expect to be able to re rescale those parameters to try and better estimate and fit to that data. And so that highlights the importance of more, better data in future years. Not better, more data in upcoming years but as of now, the data that we're putting in, do seem to be correctly being fit by the model to the extent that the model can, given that it's really what's driving it is the whole time series of data.

JORGE R. GARCÍA-SAIS: Yeah. Yeah. But what I see is that in the case of Puerto Rico, the data shows that we go into an overfishing condition just in the last year or last two years. I can't remember correctly. So that's what I am asking, whether that sample size is, for you and for the purpose of the model, is enough, is good enough, with the implications that it has, is that good enough to be considered for the model? Thinking otherwise, I mean, without these past two years being considered in the dataset the going over the overfishing limit or going over overfishing consideration would not happen. You know? So, those two years become very important for the overall result of the model and the conclusions of the model. So that's what I'm asking, you know. Do you think that you have enough data, the sample size is large enough for you to use them?

RICHARD APPELDOORN: So, Shannon, you're going to respond to that?

SHANNON CASS-CALAY: Yeah. Thanks. This is Shannon. So SSCs typically have a choice to make. Oftentimes the most common approaches are to go ahead and use the terminal year of the stock assessment, but probably even more frequently, we use an average of the most recent three years. Other times there may be something that happens like an oil spill that makes the decision more complex than that.

But I also want to mention that's, you know, Sarah, can describe exactly how the management works because in fact you're using a three-year average to determine overfishing. Not a single year, but maybe Sarah could explain.

RICHARD APPELDOORN: Yeah, go ahead Sarah.

SARAH STEPHENSON: So, with the SSCs acceptance of the SEDAR 57, that got recommended to the Council and the Council requested that we develop an amendment to the FMPs. And so that amendment not only included the OFLs and ABCs for 2021 to 2023, but it included updates to how the accountability measures are triggered, meaning what years of data we use compared to the years of data that was specified in the FMP.

So, for Spiny Lobster, they didn't want to wait until a few years down the road to be able to use the three-year average of landings. They wanted to be able to use that right away. So, the amendment includes a second action to use the most recent three years of landings, and you compare that to the ACL that's in place. And so that determines whether or not an accountability measure would be triggered.

Trigger doesn't necessarily always mean that gets applied. There's certain, you know, conditions that the accountability measure also includes such as if the overage was due to enhanced reporting versus enhanced catch. So, there are some slight little things that we look at. So, it's not just an automatically, if you're over, we close, but generally if you're over and it's determined that that overage was due to just enhanced catch, the accountability measure would then be applied. So, the amendment is going allow us to just use a three-year landings instead of ramping up to that. So, does that, does that help answer your question?

JORGE R. GARCÍA-SAIS: Yeah, I was referring to the sample size in terms of the length measurements.

SHANNON CASS-CALAY: Well, Adyan may wish to elaborate, but this is Shannon. So, the length measurements are really used in this model in two different ways. One is to estimate the selectivity of the gear. In that case, we only estimated one selectivity over all time for the gear. So, it's not really heavily influenced by the low sample sizes in the most recent years because we've only estimated one selectivity using all of the length composition data.

But the second way it contributes is that trend you see in the mean length, which indicates something about the mean age or size of the population or its population health. So, you know, you like to see trends in mean length that are increasing, typically, that would indicate if there's no massive changes in recruitment from year to year that the population is experiencing less fishing mortality and allowed to grow to larger sizes.

So that's the two ways that the length composition data are used in this assessment. And you're correct that the sample sizes are

quite low, especially you see in Saint Croix in the length composition data, which means that the information that this model is receiving about that mean length is very limited in the case of Saint Croix, especially. These models would benefit from more and more representative information about length composition data.

RICHARD APPELDOORN: Thank you, Shannon.

JORGE R. GARCÍA-SAIS: I agree with you.

RICHARD APPELDOORN: But the question I think is in terms of Puerto Rico, which is, you know, as you said at the limit and going back to Todd's point that we have very little length information for those last two years, as you can see from the graph there, so how much confidence do we have that that point is really right up against that limit line versus what should be a larger degree of uncertainty in that estimate? And from what I'm understanding, we either accept that or not. There's no way to say, "oh, but with the uncertainty it could be much less and therefore we're not worried about running over or something."

SHANNON CASS-CALAY: Okay. So, you know, I think that that is a very rational discussion to have within this SSC because that data limitation is concerning. Clearly that's a low sample size. So, we have limited information about the population trend in those last two years that comes from the length frequency data.

So, we could do a sensitivity run that basically, you know, remove that data to see how different the assessment model would be. But the reality is that the data are limited and your ability or inference about population size, from the length competition data in those last two years, is quite limited.

RICHARD APPELDOORN: Thank you, Shannon. Are there any other questions?

LIAJAY RIVERA GARCÍA: Erik.

RICHARD APPELDOORN: Erik, go ahead.

ERIK H. WILLIAMS: Yeah, thanks, Rich. I will say this, and again, this is me looking back at the SEDAR 57 stock assessment, looking at all the stuff in front of me, that those length samples have almost no bearing on the stock, the fishing mortality status. It's almost entirely driven by the landings. In fact, if you were to plot that gray line shown right now, or whichever line's being used, with the Fs, you'd get probably a 0.95 correlation between the fishing mortality rate landings. This model is essentially

reverting to a really basic production model. Those length composition data are providing almost no information.

The other thing, you know, if you look at the, go back to the SEDAR 57, which I don't mean to relitigate that, I know that's sort of a, could be considered a process violation. But the recruitment that's being estimated in that model is flat. There's almost very little year to year variation in the recruitment estimate. So, this model is resorting to essentially just a fishing mortality derived from landings levels. And so, if the landings do go up, that F will absolutely go up and it will go above that line. It's almost a one for one prediction. It's not the length. The length sample sizes are not the issue here.

RICHARD APPELDOORN: Thank you very much for that, Erik. So, Sarah, right as we broke for lunch, you mentioned what the scenarios are in our decision, potential decision making, and I would ask you to repeat that for the committee as a whole.

SARAH STEPHENSON: Yes, of course. Liajay's going to put the amendment on the screen. The amendment includes those decisions that the SSC made back in 2019, and it used the OFLs and the ABCs that were recommended. You remember, you recommended both, a variable catch, which means it changed from year to year, from 2021 to 2023 and a constant catch, which was based on the average of those years. You recommended two ABCs to the Council. The Council then accepted the constant catch one and we moved forward with the amendment.

You can see their number four, is it the one that has Tier 3? You recommended that it be a Tier 3 stock and in hand with the accepted assessment. So, this amendment is going through now, and if you decided to not accept the update today, then what would stay would be what's described and written here in the amendment. So, it would still be a Tier 3 stock and the OFLs and ABCs that were recommended for 2021 to 2023 would continue until the next full SEDAR assessment for lobster.

So that's kind of what you're deciding today. Do you want to accept the new numbers based on the updated landings and length information, or do you want to not accept that and then continue to rely on, basically the same model, but with older data, I guess you would say. Um, so that's kind of your choice.

But if you don't want to move forward today, that's what's going to happen. It will still be a Tier 3 stock as opposed to falling back to a Tier 4 because you have originally accepted the SEDAR 57 stock assessment for all three islands.

RICHARD APPELDOORN: And if we don't like either one of those? I mean, you know, Erik just told us that you look at the data that's being used for this and it's not really telling you the information you thought it was. Which means basically, you know, why are we even looking at this? So is there another option or regardless of what we do, if we don't accept the new stuff, it will stay at Tier 3.

SARAH STEPHENSON: This is Sarah again. I'm assuming if you don't accept the update and you now are not confident in your original as acceptance of the, you would take those recommendations back to the Council meeting next week and give it to them and they would decide, do they want to not go forward with this amendment? At which point it would then remain a Tier 4 stock. But that gets a little bit messier because we've already made stock status determinations for these stocks based on the assessments. I don't know how that part would change, but--

RICHARD APPELDOORN: Okay. We have comments by Jason and then Erik.

JASON COPE: Well, yeah, I'm just, I was just clarifying. It sounds like there's the impression that these old assessments don't say anything. They're just not giving a lot of dynamic information. The length compositions do tell you something about stock status. Of course, that's rolled into the life history and so forth but that's what-- you get a stock status out of lengths, the catches then scale the population in order to fit through that stock status. That stock status may be not super informed, depending on the growth and the sample sizes and all that stuff. But that's how these bits and bits work together.

And the fact that you don't see a lot of contrast right in the lengths means you kind of have this sort of constant F thing that's kind of working its way through the population rather than one that's jumping around. And so, I don't know, I guess I just wanted to clarify that the length compositions, they do tell you something. If you threw them out of the model, you're not going to get, you have to give, you then have to give the model stock status. That's how these catch only models work, right? You don't have any lengths. You have to give it stock status and then it does the exact same thing. It fits that stock-- it reconciles the catches with that stock status to tell you what your sustainable levels of catch are. When you replace that guess of stock status with lengths, right? You're using data to inform that. Now you wish you had ages because you'd have an even better estimate of what that stock status could be and depending on your growth curve,

right, is going to depend how well the lengths form stock status. But that's the basis of our length only models. They tell you stock status; you combined it with catch, the catch scales the population to meet that stock status.

So, I just wanted to make sure we understood that these things do go together and talk to each other, but if you don't have a lot of contrast in it, right, the population's not moving around a whole lot.

RICHARD APPELDOORN: Well, thank you for the clarification, Jason. Erik.

ERIK H. WILLIAMS: Yeah, thanks Rich. This is Erik Williams. Yeah, Jason's right. And I wanted to also reiterate that, yeah, we don't want to toss this out. This is still a valuable stock assessment. It is sort of got some simplistic assumptions behind it, but it is telling us that the catch levels are at a level that we think is near the maximum sustainable yield.

The concerns I voiced about it come from the suggestion that there may be something like a big recruitment event happening. If you look at the assessment as it exists now and look at the past data, you don't see any of that pattern. You don't see like a big recruitment coming through the length comps. And that's why I've been, some of my language has been couched around the fact that these length comps seem to be uninformative, because they're sort of unimodal. You don't see a big year class passing through them. But that's not to say, I'm not doubting that maybe there is a big recruitment event happening. The question is how will this model react to it? How will it pick that up? And I'm even wondering about the catch dynamics because if there was a really big year class coming in and one of your primary fisheries is a trap fishery, you can get some really weird density dependent catch things going on when you have a big year class entering and things like that.

So don't throw the baby out with the bath water. You know, this is still a useful assessment, but I think it needs to be cautioned with maybe some new information that's on the horizon that might change the way we're looking at this model and the way we're using this model. So that's just wanted to sort of lay that groundwork of where my comments sort of lie on this whole thing. So, thanks.

RICHARD APPELDOORN: Thank you, Erik. Sarah, I wanted to go back just to clarify something. You said in the amendment that they were going to be using the most recent three years. Is that then a running average? Is that what's going to be used to assess if there's an overage or not?

SARAH STEPHENSON: So, when the amendment is effective, yes. For Spiny Lobster, we will use the most recent three years of landings and compare that to the ACL. And that would determine if an accountability measure, which is a closure, needs to be applied.

RICHARD APPELDOORN: Okay. Thank you. So, what I'm seeing is, you know, based on the information that we've been given and the options that Sarah went through is that we have: A) we are accepting the new update as presented with which she used a new landings numbers and length information, or we are not going to accept that, in which case it's going to be using the old information or if we really can't tolerate the situation, we throw it back to the Council and say, "We don't like either one of these."

So that's my understanding of where we are. And so, I'd like to hear, I mean, I just don't want to throw it out for a vote. I'd like to hear people's comments, so there's some little discussion before people finalize where they think they are. So, Jason, you got your hand up?

JASON COPE: Yeah, I'll throw something out there. Jason Cope, SSC. So, my understanding here is that, again, we've outlined, there is this process, and Rich kind of just outlined that process in these kinds of alternatives that we're thinking about. I just want to make it clear in my mind, processes outlined what an update is, and the analysts have provided that they've done exactly what they should have done, they added the things that they should have. Seems to me that there are questions about whether those added inputs are the best available information to therefore kind of make this update the best available model for decision making.

So, it's not that the model itself, right? It's just not what we're here to evaluate as Erik has mentioned. But it's useful for us to point out, so much time has passed, that there are a lot of interesting things that will be looked at next time. But for our decision making here, am I summarizing that right? That there is a lack of feeling among folks, that know this data much better than I do, that they don't feel like this has improved what we have before. So pre-updated version versus the updated version.

But the other part of that though is I understand there's not great feelings about it, but then I'm not really hearing anyone with a solution on, "oh, and here's what needs to be fixed." It's mostly pointing out, this is really difficult information to integrate into the model, we're having a hard time measuring it, monitoring things, understanding what's going on. But we don't really have

truly an alternative suggestion that, "oh, we should have used this information instead of what was presented." I just want that to be clear because if we don't have a true viable alternative, we're basically just pointing out the fact that this information is really vague, difficult to measure, whatever, things that we can outline, but in absence of an alternative, it's the best thing that we have at this moment. The model through the process we've said is already set. We already agree that it is the best available model to use, not going back to some catch only model sort of thing.

And, so I wanted to, I just want to lay it out like that, to make sure I understand it completely what we're talking about. And if people do think that there are viable alternative data inputs that could have been used, rather than pointing out, the very important observation, that what's going in is just hard stuff to deal with. Thanks.

JORGE R. GARCÍA-SAIS: Rich, also, something that I wanted to comment is the fact that given the relevance of the landings data, that 2020 was a really weird year because of the pandemic. I mean, the demand was probably, had been reduced significantly. And that probably, I can even say that it probably extended to 2021, you know, because the pandemic issue, at least in Puerto Rico, was more than a year long. So, 2020 for sure was a year were most of the restaurants were closed and perhaps the demand for lobster also declined because of that. So, without data on capture per unit for CPUE data, I mean that those landings are also questionable. For this last two years, 2020 and 2021.

RICHARD APPELDOORN: So, I would interpret your comments to say that the model's okay, but the most recent data, which has been impacted by other things besides fishing as normal, would be suspect and that you're sort of leaning on not accepting the new numbers, but going with the old numbers, but still talking about accepting the model. So, Todd, you're the only other one with the analytical background of the comment here. We've heard from both Jason and Erik on that, so I'd like to hear your comments.

TODD GEDAMKE: Well, I, like Erik, was not part of the SEDAR 57. I have questions, I have concerns. I think Jason just laid out the decision as best as he can. In that the last two years-- what has been added, everyone's raising questions about it. So, I think the SSC has a pretty good argument to look at that and say, "We don't like what these last three years, there's not enough information in them." I also won't step into the broader one, which is questioning 57, because I'm not informed. I was not there for it, and yes, I have my questions about it, but for me, because I was

not part of the process, I have concerns about the way it's set up. I have real concerns about the length information in terms of it being informative. More important than that, I have real concerns about the process that Jason just talked about in terms of initial conditions and determining stock status or assigning stock status or guessing it's stock status. But those are issues that are, I think that the point is this is an update and that getting back into some of these issues are not what we want to be doing right now, unless the chair so chooses to.

RICHARD APPELDOORN: I don't think I've ever been given such raw power before. Thank you. Okay, so Shannon, I'm going to put this in a potentially three-part process. And I want to know whether I'm doing that right. First would be, are we going to accept the new stuff or not? And then, if we are, there's some questions about what the initial landings data acceptance would be. Is that correct? That's kind of, or is it all kind of a package deal?

SHANNON CASS-CALAY: So yes, you may make a motion about whether or not to use this update assessment for management. That's your, certainly, a way forward. What is a question about initial catch that you were asking me? Oh, you're about the projection years?

RICHARD APPELDOORN: Yes.

SHANNON CASS-CALAY: We need a decision about we made a simplified assumption that 2022 and 2023 landings would be identical to 2021. If the SSC would like to advise us differently, we would be able to update those projections.

Essentially, we have to make an assumption in projections about what the catch or the F will be because you won't be able to manage in 2022. Right? Because it's almost over. So, in any case, we made a simplified assumption, you can say that's sufficient. We can move forward at that assumption. Or you can say we would prefer to use a three-year geometric mean or some such thing.

RICHARD APPELDOORN: Alright, hypothetical situation should we say, "you know, we just don't have confidence in the new data, and we'd like to stay with the original projections," you would still need to have the projections for those years that we don't have landings for to get us up to this point? Or how does that work?

SHANNON CASS-CALAY: No, if you retain, if you reject the update, and retain the previous management recommendation, it is not updated. It is static at that point because projections at that point of an assessment with a terminal year of 2016 are not really defensible. And so, you'd be basically what you have on the books

would remain on the books until the update, until the new assessment in 2024.

LIAJAY RIVERA GARCÍA: Doug Gregory is waiting for a turn to speak.

RICHARD APPELDOORN: Yeah, go ahead Doug.

DOUGLAS GREGORY: Thank you. And I apologize for missing the morning session, so I'm a little bit behind the curve here. I was initially surprised to see an update; it's probably been two years since we did the assessment. I think we had our review workshop in July of 2019. So, this update is coming pretty quickly on the heels of that and given the disruptions we had with the pandemic, that could have extended into 2021 and still may be affected by it somewhat. It a hard decision. I have a feeling of rejecting what's been done in an update other than it's, I wouldn't expect much of it given that it's only been two or three years, or three or four years since the last update and it's, I mean, given what we've gone through. So, I just wanted to—

And back to the 57 SEDAR I understand some of the concerns, but the international CIE people were very comfortable with assuming local stocks and the data seeming to fit and be workable. So, none of them really expressed any concerns, that I recall, about that. So, I think we're, you know, as solid, as ground as we could be with a population like this. So that's all I have to say. Thank you.

RICHARD APPELDOORN: Thank you. Doug. Kevin.

KEVIN MCCARTHY: So, Doug, I just want to point out that the terminal year for that SEDAR 57 was 2016, even though it sort of lingered for a while getting finalized. The data that went into that are now, you know, six years ago was the terminal year. So, that's part of the reason why the Council asked for this update.

DOUGLAS GREGORY: Thank you. Yes. But given the pandemic, I think at some point we have to just roll with the punches and work through this. And it is the updates and the assessments we do in the future where we don't have such social disruption that will really tell the tale as to what's going on. Thank you.

KEVIN MCCARTHY: Yeah, that's entirely your call, obviously and you guys have to have to sort that out, however, you see fit. I was just pointing out the length of time for that last assessment.

RICHARD APPELDOORN: So here we are. We need a motion. I can't make it. So, does anybody want to step forward?

RICHARD APPELDOORN: Jason, go ahead.

JASON COPE: Sure. Yeah, I mean, I would move to accept the update as it is and, I think, we'll have an opportunity, in our statement, to capture a lot of these. We should recognize in this motion that we should consider, I guess, increasing the prioritization of the next full or benchmark Spiny Lobster assessment. Outline, in our statement outline, the things that we think are the big issues. I wrote something up in the chat that I would like to, not in this motion, but at a different time, confirm that that is really the issue that I'm hearing that is going on, because if it is, that's a very, very, very important. One to articulate correctly. Because it's not anything to do with the model. Anyway, sorry, I probably went out outside the lines of a motion, but *I would move to accept the update as Adyan has presented for each area.* Thanks.

RICHARD APPELDOORN: So, the motion would be something like, to accept the update as presented for each area?

JASON COPE: Yeah. for each area presented and I put this motion forward with the full admittance. I don't have-- I am definitely one to get into the nooks and crannies of a model and how it can be used for decision making and so forth. But when it comes to the inputs into the model, particularly, the data, the catch streams, and so forth. I just am not the expert. And so, if someone is suggesting that this updated model should use a different two years because of pandemic issues or whatever, right? I would be very interested in hearing that sort of thing, but I just wanted to throw something out there. It's what's been presented, to my understanding, this is the best that we have and I accept it as the best available information, but I'm much, I'm very willing to hear if others think that a tweak to some of the inputs, especially the catches, in those two years could make an even better available information.

RICHARD APPELDOORN: Erik, you have your hand up?

ERIK H. WILLIAMS: Yeah. Thanks Rich. This is Erik Williams. I was just going to second the motion.

RICHARD APPELDOORN: Sorry. You're going to what? Second?

ERIK H. WILLIAMS: Yep.

RICHARD APPELDOORN: Okay. Thank you. Walter.

WALTER KEITHLY: Yes, Mr. Chairman. Just a question what are we

doing when we say that we're accepting the update? And I'll give you the confusion I'm running into. When we reviewed SEDAR 57, again, we had that set of motions. I voted in favor of the first motion, but then I voted against all subsequent motions.

So basically, I voted that it was the best available information or whatever, but I also voted that probably should not be used for management purposes. Now, if we vote in favor of the motion that was just made, are we saying that it is suitable for management purpose?

RICHARD APPELDOORN: As I understand it through the amendment, we have already made that decision. So, one way for you to express your reluctance there, would just be to abstain or vote no. Sarah. And then is it, Jason? Okay. Sarah, first.

SARAH STEPHENSON: Just to answer Walter's question, I think the process would, Rich would then provide your recommendation to the Council, and if the Council wanted to do a subsequent amendment, then yes, it would at that point be suitable and they would use it for management advice.

RICHARD APPELDOORN: Jason.

JASON COPE: Yeah. Thank you. Jason cope. I appreciate Walter's, what he brought up. And I think maybe it's good to recognize we're at this different point than we were in that original one where we've already accepted something, therefore, if we don't accept this version, we would fall back on that other version that Walter, you had similar reservations for. And if you didn't want to do that, then we'd fall back to something even farther in the past that we'd have to kind of re-litigate in our mind. And so, I very much appreciate his wanting clarification there, I think we're just at a different spot here where we don't have the luxury of teasing those things out because we accepted the last one. I think what we're saying here by acceptance is that this current version using the past modeling, model specification, with the new information, is the best available combination of things that we have to make decisions with.

RICHARD APPELDOORN: So, Jason, I just want to make a clarification on the motion when we say, "update as presented," that's agreeing with the projected landings being the same as the most recent landing.

JASON COPE: Yes.

RICHARD APPELDOORN: Okay. So just to be clear that it's embedded

in that, as presented, statement.

JASON COPE: Exactly. Yeah.

RICHARD APPELDOORN: Okay. Any more discussion on the motion? If not? any abstentions? Walter? Anybody online? Anybody voting no? Todd, anybody else online? Okay. Reni's also abstaining. So, we have one no and everybody else is saying yes.

KATHERINE M. ZAMBONI: Excuse me, Mr. Chair, this is Kate Zamboni. You may just want to ask who is voting yes because there is at least one person who is not here who wouldn't have been able to tell you whether or not he's abstaining or voting no. So maybe for the clarity of record, you could just ask for indication of who is in favor of the motion.

RICHARD APPELDOORN: Let me just go call the committee for their position. Walter?

WALTER KEITHLY: I abstain.

RICHARD APPELDOORN: Vance?

VANCE VICENTE: I vote in favor.

RICHARD APPELDOORN: Michelle?

MICHELLE SCHÄRER-UMPIERRE: Yes.

RICHARD APPELDOORN: Reni?

JORGE R. GARCÍA-SAIS: Abstain.

RICHARD APPELDOORN: Todd?

TODD GEDAMKE: No.

RICHARD APPELDOORN: Jason?

JASON COPE: Yes.

RICHARD APPELDOORN: Erik?

ERIK H. WILLIAMS: Yes.

RICHARD APPELDOORN: Doug?

DOUGLAS GREGORY: Yes.

RICHARD APPELDOORN: Tarsila?

TARSILA SEARA: Yes.

RICHARD APPELDOORN: And the Chair votes? Yes.

GRACIELA GARCÍA-MOLINER: *Seven yes, two abstain, one no, one absent.*

RICHARD APPELDOORN: So, I would certainly like to entertain another motion on a recommendation about a future assessment. We've talked about making it a priority. We've talked about making it a benchmark, but we've also talked about the timing should be such that the new information that people are currently working on would actually be available to be incorporated into that. So, I'm not sure how that motion would look like, but fortunately someone else has to make it. Okay, we have Erik and Jason. Erik, go ahead first.

ERIK H. WILLIAMS: Yeah, thanks Rich. This is Erik Williams. So, I don't necessarily have a motion to make, but just to, and maybe this could turn into a motion, but I think the consideration of when and what type of assessment to do next, is conditional on what kinds of information and when that might come to the table and what kinds of model changes we can already predict might benefit the model. And so maybe some work needs to be done to answer those questions before actually agreeing that we need to do X type of assessment in X years because I think these things are big work efforts that need to be considered carefully and strategically.

RICHARD APPELDOORN: Thank you. Jason?

JASON COPE: Yeah. Well, Erik said it just really, really well. So, I won't repeat what he just said. I fully agree. I just wanted to point out two additional things in the two abstentions and the one, no. Right. There's wisdom in that and I'm hoping that we can draw out some of the ideas from those expressions that might help understand what could be done and what should be done.

And then lastly, in regard to that, maybe this kind of gets into this. What I put in the chat was that, what I'm getting from the expertise in the room and online is that there seems to be worry about the representation or the representativeness of the length data. And I don't know if that's true. I don't know if-- and what I mean by that is that the length data, is fundamentally flawed in some way. It's biased. It's not actually representative of the fisheries that are being indicated by those samples, etcetera. If

that's the case, there's no amount of modeling, really, that the analysts are going to be able to do if they're assuming that the data are representative of those fisheries. So, I think one big issue here is to reconcile whether what I just said is truly what's on people's minds. There's a worry that the data going into the model just doesn't represent reality for some reason. And if that's the case, then you really need to figure out how to address that. Because any future assessment, if that isn't addressed, or at least agreed upon, that it is representative, is going to greatly suffer. And we're going to go in this kind of circle of discontent of what's coming out of the assessment because it just doesn't make sense or something's off or whatever. So, I would like to pin that as a very important clarification or option, or not option, but just a thing that needs to be addressed specifically in the next future assessment. Thank you.

RICHARD APPELDOORN: Uh, thank you Jason. I'd like to ask Kevin, maybe he's the best one to give us a little summary because this is something that was mentioned before. I just want to make sure that we have it fresh in our minds now. I believe you said there were two studies going on that potentially could give a recruitment index. Is that, or is a recruitment index on something else? Or-- I'm trying to get at, you know, what data do we potentially have coming online in a short period that we want to make sure gets incorporated into a new assessment, which would then give us an idea of when that might happen.

KEVIN MCCARTHY: Sure. so, this is Kevin and Todd may want to follow up too. So, there's a couple things that we could get out of this, we could better-- so, they're both trap studies. And so, we could get at gear selectivity, we could better inform that, with some additional data. A recruit index of the kind I'm thinking about would be a little longer term, but we could certainly, you know, we're going to start to see some information. But it'll only be a couple of years. We'll also, depending upon the design of the traps. So, the two studies, one is more fishery-dependent, and Todd, correct me if I'm wrong on that, where we're not telling the fishers that are collaborating where to where to go to fish. Uh, the other one is going to start being a little more fishery-independent where we will have a standard trap design, we'll have that fishing going on in particular places. So, it's not necessarily where the fisher wants to fish. So, they're slightly different in that sense.

Um, but certainly the fishery-dependent one is going to be great at informing gear selectivity. Each of them will start to get at looking at the size structure. If you monkey with the design of the trap, obviously you're going to retain some of the smaller

sizes that might otherwise be lost, so we'll get a better idea of the size structure, not just of the landed animals, but of what is being seen out there that are susceptible being collected by the trap. And if Todd wants to add to that, by all means,

TODD GEDAMKE: Kevin, you hit it on the head. I just wanted to make the index from this, a recruitment index from this, as years out. Okay? So, there is information that could come in on this that will provide thought guidance, maybe some ways of looking at alternative runs or something like that. But an index is not going to give you, you're going to need years of information for that.

Just, and you mentioned the fishery-independent data too. I also want to get, you know, the Center has been very clear on apples and oranges and comparing this and that, different things. Any fishery-independent data that's begin to be collected now too, is also going to be of a different scale or a different process, and it's going to take many years for that information to commence. So, the fishery-independent movements, we're looking at eight, 10 years. Recruitment index, eight, 10 years before you can really start getting solid information on them.

RICHARD APPELDOORN: Okay. And then what was also mentioned was the SEAMAP-C effort to collect actual age composition data from aging lobsters using the gastric, whatever those stones are. So, Reni and Shannon.

JORGE R. GARCÍA-SAIS: Yes, following up on-- Randy Garcia here. Following up on what Jason said about the people that abstain, getting some knowledge for me, future assessment based on models that rely on annual landings or catch data, most incorporate either CPUE data information in the model, or a socioeconomic quantitative, socioeconomic index that can balance these variations the annual catch landings.

Uh, so I believe that we've mentioned this before, this huge variations in annual landings typically respond to socioeconomic events. We are seeing it in the case of lobster, this major reductions in 2018 associated with Hurricane Maria, and then, another reduction in 2020 associated with the pandemic are things that can be quantified but we just fail year after year to not consider incorporating this kind of indices into a quantitative matrix for models and just all these variations go unaccounted for. Thank you.

RICHARD APPELDOORN: Alright, I'll point out that Tarsila is going to be reporting on some efforts in that direction tomorrow. So, it's not all empty news, there's some good stuff coming down.

Shannon.

SHANNON CASS-CALAY: I was just going to remind the SSC that there were CPUE series that were considered as part of SEDAR 47, and they could be improved, and so I do think we need-- they are fishery-dependent at the moment. But what I was getting at is, I agree with you, that CPUE would be a massive improvement for this type of stock assessment model. And so, I do think additional efforts to standardize the available fishery-dependent catch per unit effort information is important.

I would also note that some of our newer interim assessment procedures can use trends in CPUE indicators over much shorter time scales. So, if we are able to implement these series now, soon, to use something like an interim assessment procedure would require two to three, well, three years say, more than, not so many, eight to 10 years. So, what we really need, we need to focus on getting that fishery-independent information on the table. So, a strong recommendation, in my mind, to improve length composition sampling and the acquisition of fishery-independent information, is helpful to keep that in front of the Council as a strong need.

RICHARD APPELDOORN: It, sounds to me that maybe we should not be making a recommendation on going beyond the current plan 2024 update, per se. I don't have a feeling whether, when we do that, it should be operational or benchmark, given that some of the things we would really like to have, we will not have by them. We will have better selectivity, I understand, and we hopefully will have the age composition data. But what we would like to impress upon the Council, and of course the local agencies that are responsible, is the need to put some priority into getting length data and more catch per unit effort data. Shannon, you could probably elaborate a little about, you talked about the need to standardize this, but I assume this is beyond what you've attempted in the past, so I don't want to make it sound like you guys have not done something. I know you have--

SHANNON CASS-CALAY: Well, specifically-- sorry to drop step on your toes. Specifically, there were concerns about a valid unit of effort for the trap index. Is that correct, Adyan? So, we just need to do a little research to make sure that whatever unit of effort we select, whether it's a trip or whether it's by trap, you know, that it is the most valid metric that we can use. Adyan, do you want to elaborate?

ADYAN RIOS: Yeah, just that a lot of work went into looking into effort units for SEDAR 80, and the variables that changed over time were something that made it very difficult to work with when

we were looking at SEDAR 57. And so that, I did want to point out that the explorations and the cleaning up of the whole data set has come a long way with SEDAR 80 as well.

RICHARD APPELDOORN: Okay, thank you. Kevin.

KEVIN MCCARTHY: This is Kevin. So, and following up on that, one of the advantages to having a benchmark assessment over an operational is that a benchmark assessment has an in-person data workshop. The operational have those topical working groups, which we're finding is not as successful as having an in-person workshop. One of the advantages, especially when you start to talk about fishery-dependent indices, which is what we're talking about here, is that you've got fishers in the room with a data analyst who can inform them about the subtleties and the various caveats of the fishery that would impact that index. Um, and so we don't commit some fatal flaw in trying to build an index that is misguided because we don't understand some of the details about the fishery. So, it's really helpful to have everybody in the room talking about those kinds of things. So that is a huge advantage of a benchmark. So, I would recommend that we might want to go that route, especially given the questions that surround where we are, the current state of the analysis for Spiny Lobster, arguably the most important fishery in terms of landings and value and all of that stuff. So anyway, that's my sales pitch for benchmark.

RICHARD APPELDOORN: Julian.

JULIAN MAGRAS: Julian Magras, for the record. And I think that's a great statement that Kevin just made, with having the fishers in the room along with the scientists, you save yourself a lot of time and a lot of questions are answered. And now that we have gone to the island-based fishery management plans, it'll be very helpful and very important that there's a representative from each one of the sectors, the islands, to represent, because each one of our fisheries are different. And then, also, along with that, I know we are looking at doing this for 2024, and if there is any information out there or anything that's needed and the fishermen can help provide prior to this assessment, let us know and we can work from each one of our areas to try to gather as much of this information for when we get into the room, that we were able to lo-- Especially, you know, I hear a lot about the size sequences of the lobsters, now with all that's going on, we can collect a lot of information. We just have to get the port samplers to come and do their part until we can have some independent studies going on also. So that's my comments.

RICHARD APPELDOORN: Thank you, Julian. So, I think we're at the

point where, do we want to make any kind of formal recommendation? Sorry.

LIAJAY RIVERA GARCÍA: Jason has a question in the chat. It says, "When does that decision about the kind of assessment need to be made?"

RICHARD APPELDOORN: And Julie Neer responds, "SEDAR and the Center have already held several master planning calls for the 2024 assessments and built a tentative schedule for a Spiny Lobster as an operational assessment." So, Julie, if you're there, does that mean you can't change?

JULIE NEER: Hi, can you hear me?

RICHARD APPELDOORN: Yes, we can.

JULIE NEER: Yes. Hi. No, we can change it, but we need to make those changes sooner than later and particularly if you're going from an OA to a benchmark. You're scaling the process up as opposed to scaling it down. So, the sooner we can make this recommendation, it still needs to go the steering committee, which is meeting in, the SEDAR steering committee, which is meeting in February. So, it would be good to have your recommendation, then we have a recommendation from the Science Center as well. It would be helpful if the SSC thinks that's the way to go to have all of that information available for the steering committee to make their decision. Because we plan quite a bit out, two years out, obviously, is our goal. Um, because remember you are just one piece of the puzzle for the entire stock assessment enterprise. And yes, you have your own group now down in the Caribbean, but there are still overlap with schedules and timing and some personnel and things that have to be accounted for in the bigger picture. So yes, the sooner the better, would be my answer. Thank you.

RICHARD APPELDOORN: Yes. Well, I'm assuming if we're making this recommendation, we're doing it now and it goes to the Council next week and so they would operate on that, in that timeframe. Thank you, Julie. Do you have a question, Kevin?

KEVIN MCCARTHY: This is Kevin. So, Julie, I think Richard already answered it. I was just thinking about the order of operations. The SSC makes a recommendation one way or the other. It goes to the Council, that then Council then asks the steering committee to I mean, they'd only need to ask if they want to make a change, right. So, it's just--

JULIE NEER: Yes, Kevin, this Julie. Yeah, that's correct. The

Council is the one who officially makes the recommendation to the steering committee.

KEVIN MCCARTHY: Thanks.

RICHARD APPELDOORN: Todd.

TODD GEDAMKE: I just haven't voiced myself on benchmarks, and Jason teed me up in a way that I can't just sit here and not provide, what did he call it? Knowledge, which I don't really feel that's what it is. But on my vote and for, right up front, my recommendation is going to be for a benchmark on this to go back. Jason teed me up with what are the insights in terms of my concerns with this, the data and we've done this over and over and over, the time series is one thing, verse another. The length information, I think it's extremely important. Jason mentioned, is it representative? I think that it's very important to recognize how the data are collected in these, are non-random sampling. They are, you know, there's aspects of it which are of concern and need to be evaluated. That's data in. So, I think that that's one that we already know we have to look at.

There are three components I see in these assessments. And that next one is a model specification, for lobster in particular. This was supposed to be the easy one that we got on the books with a high OFL so that we didn't have any of these problems that we're currently facing right now. And the primary reason for that was that you're really, for lobster in particular, and unequivocally, you're not dealing with a closed system. So, you actually have recruitment that is known to be coming from Belize, Guatemala, and Nicaragua.

So the closed system assumption and the steepness values that were used in there are super, super critical for this. And there's a good bit of argument to suggest that these numbers should be much higher because you have the ability to, the recruitment is coming from other places. In fact, while Walter and Doug Gregory were on a report in 2010 it says, "new evidence indicating Southeastern U.S. stock largely depends on external recruitments from upstream Caribbean population. It precludes reliable estimation of any management reference points. The U.S. stock cannot be assessed in isolation and is not the appropriate geographical and biological scale needed to capture population-wide dynamics." So, this is from a committee in 2010 on the assessment, and Walter and Doug Gregory were both part of that.

So that's one of the concerns that they had then, and I'm continuing now. And then, the other components are parameter

inputs. And I don't think we've discussed parameter inputs really much at all in our discussions here. But Jason did just touch on it saying that if it gets reduced to a length, it all ends up being based on the life history. So, the parameter inputs really need to be closely looked at on this because they are driving the whole kitten caboodle. So, before you even get into the data that's going in your parameter inputs are defining stock status and everything on it and I think it's critical to take a look at those.

RICHARD APPELDOORN: Thank you, Todd. I add one point, I think what efforts have been used to look at the distribution of potential lobster populations is that there's kind of an Eastern Caribbean and a Western Caribbean, although there's a lot of exchange. So, it wouldn't be Nicaragua, Honduras so much as down island, but your point's well taken.

TODD GEDAMKE: But the paper suggests somewhere between 78, 80% external recruitment. For right here.

RICHARD APPELDOORN: Yeah, exactly. Shannon.

SHANNON CASS-CALAY: Thanks Rich. So, we certainly have similar concerns about the closed unit stock, and it might be wise to put as one of the topics of consideration for the next assessment, a unit stock workshop. Basically, it's a separate workshop that occurs before the data meeting that would come to some consensus about the appropriate unit stock to use for the stock assessment.

Now, I just will warn you that that can be time consuming and can add to the project schedule. So, if it's important to you, ask for it, and I would support that decision. But it does often lead to a lengthier project schedule.

RICHARD APPELDOORN: Just out of curiosity, has the Center run into one of these things before?

SHANNON CASS-CALAY: So yes, we've done a number of unit stock workshops and I have to admit that it's always a little bit of a tug of war, so to speak, between geneticists, biologists who look at the mixing of stocks in different areas outside of management boundaries and Councils who want to manage a stock in a management boundary.

And that's why it's important to have a consensus decision before we walk into a stock assessment. At what is the most appropriate stock unit to be using to provide fishery management advice to the Caribbean Fishery Management Council. Now, someday, five or 10 years in the future, perhaps, we might be talking about managing

this through WECAFC, which is intended to be a regional fishery management organization. And that might be a more appropriate unit of a stock unit as a wider Caribbean stock. But I think it's an important decision to make. I think it's important to make that decision early in the process because there is very little point in conducting a stock assessment and arguing about that at the review workshop because it's really not possible to correct at that time.

RICHARD APPELDOORN: Yeah, Todd. Thank you, Shannon.

TODD GEDAMKE: So, I just, I agree. It's really important to get it in early. Do you have these struggles with anything other than lobster? Like is-- because there's other species you're talking. No, no. In other places with lobster? or another species, any other species that has a three-month larval time?

SHANNON CASS-CALAY: Well, obviously a three-month larval time is very long. Most of the fish that we assess might be in the plankton a month. But three months is a very long planktonic phase.

TODD GEDAMKE: So, and that's the argument that was put forward by members of this committee and this SEDAR 8, I believe this is. So, this has already been through the SEDAR process, the review conclusion in 2010 was, you can't use this as a closed system, you have to use external information.

I think Shannon's idea, there's multiple approaches to this. There's literature in Belize that has been set up by Bill Harford, who did this assessment here, for a two-box model, where you just have the recruitment come out. This is not that complex to do. You're literally just changing the recruitment as going in from an open source on the outside. Yes, it's not plug and chug, but nothing is going to be plug and chugged down here.

RICHARD APPELDOORN: Sure, Shannon.

SHANNON CASS-CALAY: My apologies for monopolizing the mic. So, I just want it to be understood though that when we've had these conversations in the past, it's largely been about stocks that transit international boundaries, for example. So, King Mackerel for example, that comes all the way from Belize all the way through the Gulf of Mexico and the Atlantic Seaboard. The trouble is if we do a stock assessment on the International Stock unit, right, say the entire stock in its entire geographic distribution. Then the OFLs and the ABCs that we give have to be parsed out in some way so that the Caribbean Council can manage their fisheries.

And that's always the challenge, right? That's always the challenge. You can, because then it would be, we'd be saying the stock is overfished across a very large geographic scale or is not overfished. So, there's always a need to parse it out ultimately, is what I'm saying. So, all of these decisions create additional work that can be done, and it just does lead to a need to have a lengthier project schedule. So, these decisions can be made in a deliberate and, you know, well-informed.

DOUGLAS GREGORY: Mr. Chair.

RICHARD APPELDOORN: Sorry, go ahead, Doug. And then we have Jason.

DOUGLAS GREGORY: Thank you. Couple comments. Lobster has a planktonic larval period of six to nine months, and that's part, that's the major problem. The 2010 was 10 years ago, 12 years ago. So, it might be worth looking at the data, I know, you're going to, in this workshop that might happen, you're going to be involved with oceanographers as well as geneticists and lobster ecologists and population dynamics people. So, it could be an interesting dynamic there.

State of Florida has historically intended that all their lobster come from the Caribbean, from the larval stage. Since that 2010 meeting and assessment that was rejected by the SSC, some of the players in that lobster ecology camp has spoken out that they now believe some 40% of the lobsters in the Florida Keys are maybe locally generated. And there's some supposition about all that. So that could be interesting. But think about it, if what Todd says, that somebody has a two-box model that lets you assume or have, you know, outside recruitment and continue to do some population assessment more sophisticated than yield for recruit, that would be good. That's worth pursuing. You know, back in the old days that, and this goes back with Joe Powers doing lobster assessments before SEDAR, I think that the fallback position was yield for recruit. And typically yield for recruit suggests normally a maximum size at about age of maturity, the size of maturity. So, somebody mentioned earlier, that's 92 millimeters in the past. A lot of the studies concluded it was 85 to 89 millimeters. And this, so the size limits in the Virgin Islands and Puerto Rico are pretty much right at that now and I think that might be why the stock assessment came out to be as favorable as they did.

So, you might be getting, jumping into a quagmire to try to address this, but at the same time, it might be something interesting and probably something that the Caribbean wide UN group should be addressing. I'm sure they have addressed it. There's been a lot of

oceanographic work done about potential for larval dispersal. So that'd be good. Thank you.

RICHARD APPELDOORN: Thank you, Doug. Jason?

JASON COPE: Yeah, I was wondering, I mean, this, this is great robust discussion on a lot of really specific things that should be done, could be done. I'm wondering if we're back to the motion of suggesting. A benchmark should be highly considered next time. And then capturing, can't do all of these things, right? We've already had some timeframes, like it's going to take this long to get certain things, but there was also a lot of things said that could be addressed in the next benchmark.

And then Kevin pointing out the fact that you gained some ability to harvest information and knowledge from other people from other groups if you elevated to a benchmark. So, there's seems like there's lots of good reasons already in place for a benchmark to possibly happen. Should we revisit the motion of seeing a future assessment should be a benchmark and not operational?

RICHARD APPELDOORN: We haven't visited it yet. That's what we're just, you know, I'm waiting for someone to make a motion on that. Kevin.

KEVIN MCCARTHY: This is Kevin. And I can't, obviously, I can't make a motion, but what I can say is there's another aspect to SEDARs and those are the terms of reference. So, a lot of these kinds of items could go in the terms of reference. So, we want to keep that in mind as well.

RICHARD APPELDOORN: Todd.

TODD GEDAMKE: I think that's a phenomenal suggestion that I don't know exactly how it works, Kevin. I mean, there's some specific pieces that you know we've discussed in here. And I also think this is an opportunity for us to revisit a lobster situation that we know has some things that we might be able to do.

So, I think Jason's point is, let's keep moving on this, let's get this up. I think there could be some discussion as to benchmark or operational with augmented terms of reference. Is that what you're saying, Kevin?

KEVIN MCCARTHY: I'm recommending benchmark and I'm saying not today, but we build terms of reference that hit on the items that you guys are interested in. We don't have to do that today, but we can't push it too far down the road.

TODD GEDAMKE: Okay. Then that's perfect. So, you're just agreeing with the benchmark and us being very specific in the terms of reference. And one of the things that I, you know, I've been in those shoes where you're sitting there going, my gosh, we pull 40 people together and do this stock delineation tool that we may be able to specify some things in there that say, "We would like you to explore one, two, and three scenarios," as opposed to open the whole barn door and let the whole world come in and decide what our, because you could simply just do something that says 25% external recruitment, 50% external, or whatever it may be, but we would have to agree on that. So, I think we're all in agreement on benchmark.

RICHARD APPELDOORN: Any opposition to making a recommendation that the next assessment be benchmark. All right. I'm seeing no opposition to that.

Um, so is there a question that we follow that up with anything specific to that? or I could just present to the Council the nature of the discussion that we've had about that? Kevin.

KEVIN MCCARTHY: I think you all need to decide, this is Kevin. I think you all need to decide if you want to ask for that stock ID work as well. Because that does add, as Shannon mentioned, that does add to the workload, it'll make it for a longer schedule which will likely impact whatever is, I can't remember what's on the schedule for 2025, but it will push into that, which is fine. We have a certain amount of, in the past as Julie noted, we have a certain amount of independence in the Caribbean, in that the Caribbean branch folks are no longer still doing Gulf and South Atlantic work, other than me. So, shifting things around a little bit at this stage, especially if we're talking about 2025 is not a big deal. If we're talking about, we have to change it midstream in 2024, that becomes a bigger deal. So, I think that decision on the stock ID work should be in your recommendation one way or the other.

RICHARD APPELDOORN: Alright, I'd view it as a second recommendation if we want to do that, Todd?

TODD GEDAMKE: Yeah, I was just going to say, once again, that I don't think that that is mutually exclusive, doing a whole big SEDAR five day event versus this SSC saying, we have concerns about this being a closed system. We would like to see explorations that include 25% external recruitment, 50% external or some variability on recruitment.

This is going to, this is going to take discussion and I don't think we want to get into all the nitty gritty here now, but I also don't think that by us voting to do the benchmark that we're necessarily into this stock delin--

I mean, I can't imagine getting all the ecologists and Doug, I appreciated all your comments on that, thank you. But you get, you're going to end up with oceanographers. You're going to end with ecologists. You're going to end up this, and what we're looking at here is going to be, what is the number of external recruitments?

So, there's an ecosystem-- What is the number that we're actually putting into this assessment? And that number will be the percentage of external recruitment. I mean, it's a closed system. We've got a stock recruit relationship that is internal versus one that has external input. So, if we're talking about a difference of 20 or 30% putting together and spending, you know, a few hundred thousand dollars for us to decide whether it's 45 or 60, doesn't seem like it makes a lot of sense.

DOUGLAS GREGORY: May I follow up on that?

RICHARD APPELDOORN: Yeah, go ahead, Doug.

DOUGLAS GREGORY: Yeah, I agree. I was thinking along the same line. [inaudible] just could walk backwards and say, "How would the modeling be affected if it was determined that internal recruitment was less than 50%, 50 to 75%, or close to a hundred percent." And if it's not going to be affected, it's probably not worth trying to get a number or a percentage. Now let me ask a naive question. Most, a lot of our stock assessments, estimate or can't estimate steepness, they go to steepness of 0.99, which in my understanding assumes that it says there's no relationship between the stock and the recruitment trends. Isn't that the same-- Is that the same thing as addressing external recruitment? I mean, is external recruitment similar to saying steepness is 0.99? And if it is, then I think that simplifies everything. Thank you

RICHARD APPELDOORN: Shannon. And I'd really like to take a break at some point.

SHANNON CASS-CALAY: Yeah. Well, I like the way the conversation is headed, and I think that as long as it's recorded in the SSC minutes, essentially, that the SSC would like to see different hypotheses evaluated of proportion of external recruitment, that is something concrete that we can work towards developing that information. So, I like the way the conversation is headed. I think

it probably is a good step to do that analysis before we try to do a stock ID workshop.

TODD GEDAMKE: If I may volunteer, Bill Harford, and myself would be-- I mean, the model's already set up, so we could take a look at that. But, Shannon, would you mind answering Doug's question?

SHANNON CASS-CALAY: Well, I mean, I don't know the answer to Doug's question. I do know that steepness in Spiny Lobster is very close to one. It's about 0.95. So, there is no strong relationship between spawning stock biomass and recruits. So, it's very plausible that the fraction of external recruitment isn't going to be as sensitive when the steepness is close to one. Um, but I haven't done the analysis, so I don't want to answer that question.

TODD GEDAMKE: That's why I punted it to you because my -- Doug and my brain, was exactly like yours. If you're, you know, you're at one, it's unrelated. And I don't work with SS enough now to know how it feeds it back in. But that would be-- that's a good question Doug and I appreciate being stumped.

RICHARD APPELDOORN: Alright, so I can just communicate the sense of this discussion here, if that's sufficient for Council members, I mean, committee members, or do we need something more formal saying, "we would like to have different scenarios looked at in terms of the percent of local versus external recruitment." And just a comment about yes or no would be fine.

As to say, is this a question for me to relate to the Council the discussion we've had on this point? Or do you want to have some kind of formal motion? This is not supposed to be a difficult question.

TODD GEDAMKE: I trust you.

RICHARD APPELDOORN: Yeah. Okay. Thank you. Let's take a break until four.

(Whereupon, a brief recess was taken.)

RICHARD APPELDOORN: I would like to get it restarted, please. So, if you can grab whatever you want and get it back to your chair.

Alright, let's get started. Shannon, do you have now from the committee what you need relative for moving forward? Because I understand that the calculations for ABC, etcetera, would be straightforward as before, or do you need more input on that?

SHANNON CASS-CALAY: So, I will just ask Adyan, do you have what you need to generate the ABCs using the same approaches as SEDAR 57?

ADYAN RIOS: Yes. And I can consolidate it into one, kind of, one page or one slide for everything. Unless you want to use the slides. The ABC is calculated with the same approach, and so it's already been calculated.

RICHARD APPELDOORN: Right? because that's part of the amendment, is that approach.

This assumes, the amendment that exists now also specifies the P* value? and also everything just runs forward -- Okay. So yeah, it would just run forward. So, does that bring us to the next item on the agenda, which I think was RVC?

ADYAN RIOS: wasn't there something that needed to be at 3:15?

RICHARD APPELDOORN: I think it's tomorrow.

ADYAN RIOS: Oh.

RICHARD APPELDOORN: Because if it is, we just missed it. You must have been thinking of the game.

Okay. So, the next item on the agenda, was supposed to be and will be the review of the visual census program which is supplying fishery-independent information. So, Kevin, you want to introduce who's going to go with that?

KEVIN MCCARTHY: This is Kevin. I'm happy to introduce, I'm not sure whether it's Jay or Jeremiah, but I see one of them. Jay's going to present. So, Jay Grove, who's at the Science Center and heads up the NCRMPP RVC survey is going to, is going to walk you through and present with a little more authority and knowledge than I ever could their program because we weren't able to represent it very well when there were questions in the past, and I wanted to make sure that they had an opportunity to address some of the questions and concerns that the SSC has voiced on recent meetings.

And so, I'm just going to hand it over to Jay, with one caveat, I would say that part of the reason I want, another reason I wanted to have this out there, is that the only index of abundance we have in Saint Croix comes from the NCRMP survey. So, I wanted to make sure that it got a good review from you all with the

knowledgeable folks in the room to answer any questions. So, I'll turn it over to Jay Grove. Thanks, Jay.

SL VISUAL CENSUS SURVEY NCRMP

LAURA JAY GROVE: Alright, thanks Kevin. I am going to share my screen to present. Let's see. Alright, can everybody see that?

RICHARD APPELDOORN: Yes.

LAURA JAY GROVE: Yes. Okay, perfect. All right. So, I'm here today to talk about the RVC survey. And I'm not really sure with everybody's familiarity with it. So, I took this approach of, you know, starting at this 10,000-foot level working our way down, not getting too, too weedy, but we have everybody here on the team that's going to be talking with you guys as SSC so we can answer any weedy questions as they come up.

My name is Jay Grove, as Kev mentioned. I'm with Southeast Fishery Science Center and I am the fish PI for the NCRMP RVC data. And here today we also have Jeremiah Blondeau, who is the NCRMP RVC Data Manager, and Jerry Ault from the University of Miami, who is a consultant for us with the survey design and analysis, and he's been working with us implementing this since the nineties, so very, very long time.

So, with any survey there's a goal, right? And the goal of RVC survey is to do a synoptic, robust survey estimate of population level for size-structured abundance, and biomass. NCRMP, which is the National Coral Reef Monitoring Program, and the RVC surveys, how we survey fish, is done in the Pacific and it's done in the Atlantic with this goal in mind. And the data afterwards can be used for a number of different applications, in this case here today, we're here to talk about stock assessment, but it can also be used for ecology, because you can use the data in any grouping that you want. You can look at groupers, you can look at herbivores, you can look at any series of conglomerate of animals that you'd like. You can also take a look at it for spatial management. So, the effectiveness of MPAs.

There's one slide that I'm giving on methods, so it's very brief, but this is the, there are some key points. The key points are, it's a fishery-independent SCUBA survey. It's a stratified random sampling design and it's on hard bottom habitat. So, this is coral reef habitat in the U.S. Caribbean less than a hundred feet. It has a defined survey area. So, where divers are surveying within the cylinder, there are two divers, each with a 15-meter cylinder diameter. And those divers size all the fish species that they

observe within that cylinder. So, whether it's a Blue Tang or a Parrotfish or a Grouper or Snapper, they size it to the nearest centimeter fork length. And the data that comes out of this survey design can be used to produce island-wide, or we call them, domain level, abundance/density biomass length estimates. Presently, we survey every other year in the Caribbean. I'll kind of get into our older data, which is a little bit different later on. And this is a consistent source of federal funding. So, this survey is here to stay in the U.S. Caribbean. So, it is a fishery-independent data set that has been going on for some time and is going to be continuing for the foreseeable future.

Now just broad scale, taking a look at how the surveys allocated. So, it's synoptic survey stratified by habitat and depth. So, the habitats that we're looking at are: aggregate reef, patch reef, pavement, bedrock, scatter coral and rock. In the U.S. Caribbean, we have three survey domains: Puerto Rico, Saint Thomas, Saint John, and Saint Croix. And our goal, if we go back to that goal is, you know, to be able to get density or abundance with a desired variance. We're trying to get this, you know, as precise as possible for our targeted species. So, in the U.S. Caribbean, we use ecosystem species and they're: Blue Tang, Foureye Butterflyfish, French Grunt, Coney, Red Hind, Queen Triggerfish, Stoplight Parrotfish and Yellowtail Snapper. I put those out there because obviously Queen Triggerfish is something that we're talking about here.

So, this survey is actually allocated, and we design our allocation to survey Queen Triggerfish well. However, we use this Neyman Allocation, which allows us to survey a suite of species, well, any species that kind of have the same behaviors like histories, live in the same regions as the species that I listed.

So here is a figure for Puerto Rico and in 2021, we have species occurrence on the left-hand side and coefficient of variation, CV of density on the right-hand side. And there is a vertical orange line, and that is a CV of 20%. So, 1, 2, 3, 4. So 46 species. We have a CV of 20% or better. And there's a box around Queen Triggerfish, which has a CV. I don't know if you guys have seen my cursor or not. It has a CV of probably 13%. So, it's a pretty good CV for Queen triggerfish.

Again, we use a Neyman Allocation. And so, in this example what that means is, this top, the largest polygon on the screen here, is, let's say in this hypothetical example, this is your domain. So, these are you, in this survey, in this hypothetical example, you have three different stratums in this island. And the strata use orange triangles, blue squares, or black circles. And if you

were to proportionally sample within each stratum, so do a simple, random, survey design, you're just proportionally sampling 20% of the whole entire habitat that's available by these orange triangles, 25% are blue squares and 55% are black circles. And if we were to proportionally allocate, that means that you would sample 40 of the triangles, 50 of the squares, and 110 black circles. While using the Neyman Allocation, what we're trying to do is reduce variants in the habitats that have higher variants. So, we want to sample more there to reduce our variants there. So, in this case, in order to address higher variance in the orange triangles, we would put more samples there. So, we would do 75 samples in the orange triangles, which might be something like an aggregate reef, something that has a lot of variability for us. We would sample 45 and the squares. And maybe a reef type that doesn't have as much variance in it, such as pavement, we would sample a little bit less than proportional, so we would do 80 samples.

If we take this one step further. This is kind of our design theory. So, now we went through what the Neyman Allocation is. This is again another example. We have thousands and thousands of grid cells. But you know, in this example, this is incredibly simplified. Let's say these are the grid cells that represent habitat in Saint Thomas/Saint John. And those grid cells are accounting for all the possible aggregate reef, patch reef and pavement reef around Saint Thomas/Saint John. And we randomly allocate the sample within each of those habitats using this Neyman Allocation and those are the black circles within the squares. So, our domain up here, so this is our sample frame breakdown. On the left-hand side, the arrow going down, our domain is all of the different strata. And so, it's this discrete survey area of all the habitat from zero to 30 meters. And again, we sample with a portion of that. So, an example of a strata, we take it down a level, is the domain partitioned into homogenous stratum identity and variance. We have, we sample four, you know, of those sites within there. One of those squares is consistent of a primary sample unit. So that's our 50 by 50-meter grid cell. And it's a statistical unit, that's what we randomly allocate in. And then within that 50 by 50-meter grid cell, we sample two divers, in a secondary sample unit. And so those are our divers in the water on hard bottom. They're not independent samples. The data's averaged.

We head over to the right side here. We do the same process to roll all of these data back up to build up to get these domain wide estimates. So, we can get estimates for density, biomass, abundance, length and we take it by getting the density within a PSU, rolling that up higher to get the stratum sample variance among the PSUs, taking it up even higher to get the main density and variance within a stratum. And then getting the domain weighted

mean density and variance. So that's all the stratums then rolled up to get the entire domain.

So, using real numbers, what does this actually look like? because I think we know that there's more than whatever that was. 20 grid cells. So, this is a table showing the number of mapped 50 by 50-meter grid cells by substrate and depth within Puerto Rico. And so, it's 99,474 hectares. It's thousands and thousands of grid cells as I mentioned. So, you can see that there's a substrate, which is what we've been, I've been calling habitat. There's a depth, shallow or deep. So shallow is less than 12 meters, deep is 12 to 30 meters. That's associated with a code. There are a number of grid cells that are defined as having that combination of habitat and depth, which makes up that strata. And then there's, we can figure out what fraction of that strata contributes to the entire domain total. So, you get, that's your weighting factor here for each of the different strata. And then we use that to be able to look at, to come up with biomass, in this case, for density by strata, for, in this case Queen Triggerfish.

So, we have the strata and we're able to calculate the density, the biomass, the variants, and then collectively all of that, from each of different strata, can be rolled up to get this domain wide estimate. And this is what the data would look like for Queen Triggerfish. So, the top graph, you're looking at density, and you can see we have it for 2001 to 2021 in this figure. I believe we only had up to 2019 available when these, when the data call went out for the SEDAR 80. So, while I'm presenting up to 2021, I think the data that we served was only to 2019. And the lower figure is abundance.

And we can also get size-structured abundance and average length in the exploitable phase. So, there's a lot of different ways that you can look at these data, but we just wanted, I just wanted to present a few of the options and to really describe what you're looking at from the method, from the allocation, to the survey design and how it's broken up, how it's rolled back up, and then what this actually means when you just get a more simplified figure to look at the end.

This box, this yellow box right here serves as a reminder for me to talk about that. These are island wide sampling that occurred during these years. So, there were some changes in our methodology. There was a gear change, here originally historic data was collected using a belt-transect method. And we also had a spatial change where the older data only focused in the smaller region and recent data is island wide. So we did create a working paper as part of SEDAR 80, which is the working paper 2. So that goes into

detail with all publications, references, anything that you would need any more details on, as far as this goes, since I know that this is a quicker overview, but I wanted to show some maps because I think it's easier to explain when you're taking a look at maps.

So, NCRMPP sampling occurred in the most recent years. So, 2016 to 2021. This is where you're getting island-wide sampling to the best of our ability. Obviously, dependent on Covid or weather, you know, there are factors that come up, but island-wide sampling is the target for each of these years and we use the RVC. So, the cylinder method that I just talked about.

We originally, just of note, we're not sampling Puerto Rico and the U.S. Virgin Islands during the same year. So, in 2017 we have the U.S. Virgin Island, and in 2016 it's Puerto Rico. But now moving forward, they will be sampled during the same year every other year.

NCRMP sampling began in 2012, so this is when island-wide sampling began, and we didn't implement it everywhere initially. So, in 2012, when it first started, it was in Saint Croix. In 2013, it was in Saint Thomas/Saint John, 2014 in Puerto Rico, 2015 in all of the U.S. Virgin Islands. So, island-wide sampling began, and at that time we were using the belt-transect method.

So, belt-transect method was used up until 2015, and then all of these prior to 2011 are the same. So, I'll flip through these fairly quickly. But essentially, this is pre-NCRMP sampling, and this is what we're calling regional sampling, using the belt-transect method. So, you can see in Puerto Rico, Saint John was sampled really well, but Saint Thomas was not sampled. And then Eastern end of Saint Croix. This will be the same for all of these figures moving back in time, back to 2001.

So, these are the data that we have. And we were first presented these as a data stream, as part of the Caribbean, U.S. Caribbean, Queen Triggerfish indices, the working group. And when we presented to the working group, we provided four different options, which was one, just use the most recent data, RVC data. Two, use the RVC and belt-transect data, but maybe you have to look at the data set separately. Three, RVC and belt-transect data, use them together, but you need to take into account-- we need to perform a gear calibration. And for four, which is using the RVC and belt-transect data using a gear calibration as well as a spatial calibration. So, taking into account using that whole data set.

The working group suggested that we pursue option four, which was to try and obtain the entire time series by doing both the gear

and spatial calibration. Again, this would create a long-term data set from 2001 to 2019, with a belt-transect being used to collect data, from 2001 to 2015, and the RBC stationary point count used from 2016 to 2019. Um, island-wide sampling was done from 2012 to 2019, and regional sampling from 2001 to 2011. And, as I already mentioned, the caveats are, calibration would need to be done in order to merge these differences in these survey changes over time.

So, the gear calibration that was done with the stationary point count and the belt-transect. How we handled this is, we got funding through Grants, through a [inaudible], as well as the Coral Reef Conservation Program to go out and survey reef simultaneously, beginning in 2017, in both the U.S. Virgin Islands and Puerto Rico. And so, divers would get in the water together and we'd have one diver doing one belt-transect survey and two divers doing stationary point count. And that way, we were able to look at what each survey was observing at the same reef at the same time, and hoping that we could combine, you know, the data together for one large data set. And so, the outcome of this is, we produce a species-specific calibration factor that converts the develop transect data to RVC data, and we are able to apply that calibration factor from the 2001 to 2015 data to our most recent RVC survey data.

I'm not going to get into the specifics, but this is the two-stage regression framework for the gear inter-calibration that we used. And the Queen triggerfish calibration factor is listed at the bottom.

For spatial calibration. Our first question was really can you even use the regional data and apply, you know, the total strata weighting factors to produce domain wide estimates? So basically, can we use regional data and move it into our current design to be able to get large scale estimates from what was regional sampling. And so, our way to handle that was we looked at island-wide sampling and regional sampling side by side. So, I know some of the texts might be smaller here, but on the left-hand side this is density by some of the different strata. The take home message is that you can see that the island-wide or the orange color and the regional are very similar to one another. So even though we were only serving in this smaller regional area the densities that we're getting within each of the different strata were quite similar.

And so, we took this information, we then looked at the strata weighing, the weighting within-- this example is for Saint Thomas/Saint John, but the regional sampling to the whole domain was quite similar as well. And essentially it passed our gut check. We presented it at the working group. Everybody, the working group

passed their gut check. So, we decided that we would then take the regional sampling and we would push it through, basically scale it up, put it into our weighting, so that it could be used to produce domain-wide estimates.

So then when you're looking at our full-time series, we have this ability to scale this regional sampling up and we are able to produce this 20-year fisher-independent time series where you are comparing apples to apples. So, while there were these survey changes, gear changes and spatial changes they are all accounted for in our final 20-year time series.

And showing the same figure on the left here. But you know, this can be used again for density, abundance, or on the right-hand side here, this is the relative frequency. So, these are length frequencies for each of the different domains for Queen Triggerfish.

So, while RVC is newer to SSC here. Just wanted to, you know, again, maybe go back to that big, that global 10,000-foot perspective that I started with that, you know, RVC again is surveyed in the Pacific and in other areas in the Atlantic and Caribbean, and so in Florida RVC has been used in sock assessments for a long time now, almost 20 years. And so, it's been incorporated into sock assessments there. It's a reliable fishery-independent data set that they use and as well as in Hawaii. It was used, I believe for up 19 different species of shallow water reef fishes which included: Snappers, Surgeonfishes, Parrotfishes, Groupers, etcetera. And the survey design portion of it, so the stratified random survey design, was used for Deepwater Snappers and Groupers as well.

And so, I'm going to end here a little bit. I'm getting towards the end, but I just wanted to share that, you know, the stock assessment and survey sampling, they truly are analogs of one another. Um, you're both, everybody's trying to get at, whether you're doing a fishery-dependent survey, fishery-independent survey, everybody's trying to get at the stock abundance or biomass scaled up to these population levels. And, you know, it's just how you go about getting there. And so essentially, you know, stock assessment is model based, and it evaluates what's taken from the water, from the habitats and depths that the data streams come in from. Um, so fishery-independent data, you know, is wherever the fishers are fishing. While in contrast, RVC data, is a survey design, it's design based and it evaluates what's left in the water after fishing in the areas where the survey is collected and you know, where the fishery overlaps with our survey. But in those areas, the methods, no matter how you're getting at, they're both

looking at the same population.

So, in conclusion, RVC truly is a unique dataset, it's fishery-independent. We use this design-based sampling that provides data on a range of different species. And we do particularly well in the species that are upcoming in the Caribbean, you know, Queen Triggerfish, Yellowtail Snapper, Stoplight Parrotfish. We do exceptionally well on all of those species to provide measures of abundance, density for any of the fish that are again, remaining in the water for us to survey. The data are very, very high quality. I would argue the highest quality. The survey is very precise. So, for Queen Triggerfish, again, there's a CV of less than 15%. Um, and if for some reason that wasn't high enough quality there's always the opportunity to build upon our survey to add more samples using the Neyman Allocation as needed into certain strata to even get better variants for selected species. And again, we're high-quality data, we're sampling in known habitats, you know, using all the available benthic maps, we're sampling at known depths, we have a known survey area, and our sampling is dispersed around the islands or our domains.

Our limitation, you know, is that we are surveying this coral reef and hard bottom habitat, less than a hundred feet. I mean, every survey has its limitations. Nobody is going everywhere and that's being documented as far as a fishery-independent survey. But, wanted to say that this survey can be extended to deeper water. So, in the case of Saint Thomas/Saint John, let's say, the shelf extends out to what, 55, 60 meters? We have a pilot study going on right now that has extended, we call it DCRMP, that has extended RVC out to the shelf edge. So, we're wrapping up our third year of sampling there. So those data will be available moving forward. But it could also be different gears. So, you can build off of using this design-based survey. You can build off of it to use maybe cameras or, you know, asking commercial fishers to go fish in certain areas. It can all be built off of to get this profile from zero to as deep as you would like to go.

So with that, just wanted to just impress upon everyone that this is not just a NOAA effort and that it's collected in part by locals the academics, DNER, DPNER, you know, like everybody that we work with, you know, agencies are trying to participate the park service to collect these data and it's a partnership. We all work together to go out there to collect these fishery-independent survey data. More than 400 divers. Again, this is CRCP funded, and with that I think we have some time. I think the plan was to have some time for questions. I have our contacts back up here, so happy, like this is when we're happy to get weedy. We're happy to answer anything, clear up anything that may be misunderstood about our

survey. And Jerry and Jeremiah are here to be able to jump in. We each have our areas of expertise and so they may be the correct people to be answering your question, but that's why we're all here to be available to answer anything. Thank you.

Questions

RICHARD APPELDOORN: Thank you, Jay. Are there questions from anybody in the committee? Vance.

VANCE VICENTE: Vance Vicente, SSC Member. Thank you very much for your presentation. One question, what specific criteria do you use to distinguish and differentiate between the epibenthic habitats?

LAURA JAY GROVE: So, you're talking about as far as the maps go and how we allocate, or are you talking about how the divers select it when they're under water?

VANCE VICENTE: No, if you use the NOAA epibenthic biography maps, they're very general and within the sampling areas that you have studied, I suspect that you have a lot of intraspatial variability. In other words, I like to know how well do you distinguish the different habitats that you use in your stratification samples?

JEREMIAH BLONDEAU: I can help there, Jay. This is Jeremiah. So, when Jay was shown one of those earlier images, there was, we gritted out the entire domain. I think she had a photo of Saint Thomas/Saint John grided. We did use that, the NOAA habitat map and we had to make a lot of decisions on how we're going to specify what that 50 by 50-meter grid cell was. So that had some decisions. If it's, you know, a certain percentage of this hard bottom and we called it that and all that was really doing was just trying to get us this, knowing that there was, it's not, wasn't homogenous in that 50 by 50. There are definitely different areas in there, but ultimately, it doesn't really matter in the survey design. All, we're really trying to do is break out. We're trying to group strata of the most homogenous variants for certain species. That's all that really matter. That's all we're really wanting to do. That's why kind of have those, they're kind of broad, they're kind of crude strata. There are only six or seven strata in a couple depths. And that's why they're intentionally crude that way because we did some analysis and it says, "Hey, these types of strata are breaking apart the variance of these fish. That is now going to be our strata that we're going to sample on."

And you know, the better-- if we do some reana-- we'll do some reanalysis, like we did in Florida a couple years ago. We reanalyzed and we came up with some new strata based on some new

information. So, we were able to restratify. And again, the whole purpose was it didn't really matter. We weren't specifically going for like a hard bottom with 10% coral. We just wanted a habitat that broke out fish variants so we can then use our or apply the Neyman Allocation to sample the most efficient. That's all we are trying to do. So, we are fairly crude with those habitat types, but it's--

JERALD S. AULT: Jeremiah, could I jump in there? For a second.

JEREMIAH BLONDEAU: Yep. Jump in.

JERALD S. AULT: I have a very different opinion about crude [analogate?] because one of the cornerstones of what we've done here is to-- and it, you know, the work that we did really worked closely with coral reef biologist to look at reefs the way they did, right, to kind of understand what that structure is. So, what's on them, of course, I think is what you're talking about, the epibenthic side. But we utilized, if you will, so I'll just, you know, I'll simplify it just to say, that factors that relate to the diversity of fishes that are on a habitat, and then for a species, the abundance and biomass by life stage really kind of has three central principles associated with it. It's depth that you're at, the operating depth. The substrate, you know, really hard/soft bottom because it makes a big difference. [inaudible] coral reefs says, by and large coral reef fishes live on hard bottoms, on the reef. And then complexity.

And so, you know, that's defined in a variety of ways. We're utilizing new algorithms to define it. But mostly it's a rugosity measure and those three factors-- and we've iterated over time, but we utilize a high-end, generalized linear models at all to try to build a relationship between species, life stages, community components, etcetera, and what that relationship is. And so, if you will, we've really pinned down the variant structure and it turns out that, again, what helps the stratification side is that the density and the variance are correlated, meaning low density means low variance, high density means high variance. So, the stratification is trying to partition spatial variance in a way that captures essentially an overall minimum variance estimate in the design.

And, we published a lot on this, so I'm just giving the Readers Digest version of it. And it kind of works out globally because we've marched this idea certainly around the Atlantic, but also out in the Pacific Island, Pacific Trust territories. And it's kind of a universal process of the way coral reef fishes live on reefs. And that's what we're trying to capture in the survey design

for allocation that Jay's talking about, the Neyman Allocation. We end up focusing on primary species, for example, that the Councils at all say, and or NMFS says these are our priority species. So, we'll factor our design to make sure we get really good estimates of those target species. But by and large when we do that, we capture essentially low variance estimates for the community. So, it's, I've probably said enough, probably more than you can handle, but, if there are other questions, we'll be happy to answer.

VANCE VICENTE: Yeah, thank you very much.

RICHARD APPELDOORN: Other questions? Yeah, Shannon.

SHANNON CASS-CALAY: So just to kind of clarify why the Science Center felt it was valuable to see this presentation. At the moment, the NCRMP index is in both of the U.S.V.I. SEDAR 80 stock assessments that will be presented tomorrow. And so, if we follow the guidance from Puerto Rico, it would be removed and its length composition data. But if there's any chance that you guys would like to ask any questions of this survey program and use that index in the SEDAR 80 U.S.V.I. assessments. You know, we wanted to make sure you had the expertise here to address any questions that you might have. Because tomorrow when we present SEDAR 80, those model runs still contain the NCRMP index.

RICHARD APPELDOORN: And if I recall correctly, the reason we took them out of the Puerto Rico analysis was one, a question of depth and secondly a question of appropriate habitat, especially going back to where most of the sampling was limited to La Parguera and a couple other places around Puerto Rico and which are a much smaller fraction of the habitat than what you are looking at in the Virgin Islands. So at least that criticism may not be valid for the Virgin Islands. So, it is, as you say, worth for us to look at that and revisit it and not just accept what we did for Puerto Rico. So, thank you for making that comment. Sorry Todd.

TODD GEDAMKE: Thank you very much for the presentation. Jerry. Jeremiah, it's good to see your faces, even though Jerry has got a picture up there. The other thing that was, for Puerto Rico, was the error bars. And that was, I think there was a few people on the committee that pointed out the error bars, and one of the others was I think Erik also said that it wasn't informative.

I have been a critic of using coral reef surveys for fisheries since the beginning. So, I just want to pose a couple questions, Jerry has heard me ask these before, but I think it's good for the committee to recognize this. So, the two questions are one, is there any corrections being made for different species and

detection probability? And this would be analogous to gear efficiency in certain places. And just for the group, the question that I'm asking is, if you have a brand-new diver, that is here, that is on a second survey dive, and an experienced diver here swimming along, you're going to see two different sorts of data from them. But more important, especially in, I'll use Saint Croix as an example, if you have those same two divers swimming upon a Hogfish, that Hogfish is going to turn and face them. And it's just super obvious to detect it. A Black Grouper or a Tiger Grouper has to avoid Nicki every single day out there and doesn't let you get within a hundred feet. Sorry, he's telling me to be quiet. But anyone that watches groupers in places where they're fished hard, they know they have behaviors of hiding. So, there's clearly a difference between species detection probability in a Hogfish and in a Black Grouper. So that's been one of my concerns.

And then the other one, are there any of these species that are only found in less than a hundred feet? I just sent out the image again of Queen Trigger in Saint Croix. It's mostly found along the edges that are deeper than a hundred feet. So those are my two concerns.

And then just to re recap, Jerry, Jeremiah, is there a gear efficiency or detection probability based on diver and or species? And are there species in this that are only found in a hundred feet? Or how are you somehow trying to figure out where is undetectable deeper than the survey? Thank you.

JEREMIAH BLONDEAU: This is Jeremiah. For the detection. So, part of our-- so we have a lot of training that goes into all this. So, because we're a paired a diver survey there's training that goes-- So, some of it's just trying to get it through training.

So, we have a robust training that goes on. We have in-person lately we've had to do them remotely, but we have the individual groups are diving, are also doing in water training. And they are, for lack of a better word, not letting their divers go live until they feel that they're ready. And we've done this over years and years in years and years, and it's really worked. Um, of course somebody could see something and somebody else doesn’t. It happens. But we've attacked it kind of that way.

And the other one you talked about do we see fish only less a hundred feet? I would say absolutely not. That just happens to be where our NCRMP survey stops for like, it's efficiency. There are all types of reasons why we have to stop at a hundred. It's diving regulations with NOAA. It's just where we kind of had to stop. But we're not making any, like we're-- when we make our estimates,

we're making them saying, "This is our domain. We're doing it in these habitats at a less than a hundred feet."

Um, like Jay said, we are a not attempting, we are finishing up a deep version of NCRMP in Saint Thomas and Saint John. This is the most kind of obvious one. There is a massive amount of area between 30 and 60 meters, and I've done hundreds and hundreds and hundreds, probably a thousand dives out there and there's a lot of fish. And so now we're going to actually make a comparison between the two. And if we want to expand in NCRMP further we have the ability to do, we have the ability to do it and it's, you know, fairly efficient. It's just kind of a more expensive thing because now we're getting a little bit of technical diving. But that's not to say that there's some fish that stop a hundred feet. There's no way. I mean, they're everywhere. We know that. But just our survey, NCRMP survey, goes from zero to 30 meters. And that's just one of the limitations of the survey. And we can—

JERALD S. AULT: Well, yeah. Jeremiah, I see it a little differently is, you know, so Todd-- you're asking good questions and it's not like we haven't thought about these. But this issue of detection probability, I think Jeremiah made a really good point that we don't send novices out there to survey. Folks are highly trained, and they know the species of fishes. Most of the stuff we look at, they can certainly, you know, if it's there, they're going to see it. So, one. Two, the transition in methodology was very significant for the Caribbean because the historical methodology was a belt-transect where the divers moving. And of course, you know, there's the hunkers and the skedaddles and those method tends to frighten the fish.

The RVC method is stationary, and so, if you will, the divers settle in the fish accommodate to that, and you'll have Black Grouper looking at you. So yeah, if it looks like you're coming at them with a spear, you may freak out the fish. But the fact that you're there, you know, the fish take a breath.

The survey area, that's a function of basically nitrox. It's 112 feet as compared to, you know, a hundred. That's kind of the limit. But, you know, of course then lights become an issue. But the work that we've done in Hawaii, I mean, there's no reason, and I think Jeremiah made a very good point, that we're trying to accommodate whatever that additional domain area is, where the resource is at.

And so first of all, the survey is totally random. It's synoptic, it's covering all coral reef habitats, certainly that are mapped within these island environments and it's an extensive mapping process. The areas down the other side, you know, the perceived,

"oh, there's fishes down the hill," well, you know, you have to ask yourself the same question about the fishery-dependent data. How random is it across the entire range of the habitats that represents the resource? And I'm not going to answer that question. I'm just going to put it out there to say that we've really tried to accommodate the variability that exists in collecting samples by divers over the broad range of area. And so, we work hard on trying to figure out what this relationship is between animals, habitats, spatial distribution, etcetera.

The survey design is completely amenable to working down the depths and I think that's, you know, essentially the team is working to build that in as deep as we need to go. In Hawaii, for example, we use, of course, divers in shallow water, but then a combination of commercial fishermen and cameras, drop cameras, down in environments that you can't dive in, right? And so, in those cases, we're going, you know, for example, the bottom fish survey is 75 to 450 meters deep. So, it's not like that's insurmountable and that's just kind of an evolutionary part of the design. And then finally this detection probability issue. We've thought about it for a long time, worked on it, and we're now working with Park Service partners to look at our historical data because we have, presently within our primary unit, which has been reduced to 50 by 50-meters, which means we have about 14 probable sample locations within each primary unit, I'm looking at the data and building essentially sets of generalized linear models to help us understand what that is for species. But for the most part, you know, we think upfront if they're there, we see them.

The stuff where we probably aren't doing the greatest job is what our good colleague, Jim Bosak, used to call Dickie Fishes. That's the gobies and blennies and stuff that get up under the crevices, etcetera. But for the most part, in the 15-millimeter cylinder diameter, we're seeing most of their-- But we're going to come up with a number for correction if it exists for this detection probability.

LAURA JAY GROVE: I just wanted to build off that and say one thing, which is, you know, keeping this in mind, you know, you mentioned a Black Grouper versus a Hogfish, of course they're going to be different. Um, but it should be the same, right? Their behavior shouldn't change. So, it should be the same over time and it should be the same each time, different divers encounter them. So, I mean, it's not like some Hog-- you know what I mean? Like, so it's the same for you within each different species when you're taking a look at them.

So sure, some species are, we're going to do a better job at seeing

because they're going to be less skittish than other species, and that's okay. But that factors in, it's consistent over time, and that factors into our estimates over time.

JERALD S. AULT: I want to respond. I see Jason wrote something there and this issue about dome-shaped selectivity. Jason, I would say what we're talking about is more knife edge, and that is, the selectivity within the survey they made is more related to life history because many of these species, you know, if I come up with percentage, a large percentage live in different environments than the reef, much of them are [inaudible] environments, seagrass beds, etcetera. And one of the triggers for moving into the, if you will, into reef environment, typically, and I'm not saying exclusively, sexual reproduction is a point where you get movement of animals within the reef system, and those are, if you will, recruiting out to the fished area.

But the point being, if that was thought to be a significant area for recruitment, I guess the other point that I would make here, thinking about that, is this is one of the advantages of the fishery-independent survey because we're able to do integrations of size structure, literally, to as small as they are there and they're within, you know, sizable. Which means, we are clearly getting free recruit, meaning free, you know, pre-survival to the non-exploited phase. And then, we see them come into the exploited phase. So, in essence, we're also getting a recruit estimate and not recruit to the exploited phase, but recruit to the population estimate within the survey data. So that's a really rich piece of information.

And go back to selection, I think by and large, for the animals that are in the reef, the selection is, you know, pretty much knife edge as the diver goes. But there's a life history selection is that there's a spatial preference for location habitat by, if you will, immature to premature animals.

RICHARD APPELDOORN: So, Jason follows up and then Todd.

JASON COPE: Yeah, yeah. Thank you. Yeah, Jerry, thank you for that. I was thinking if this dome-shaped might address some of the depth, anything deeper than a hundred feet issue, that you might not see all of them. And if you did put in, not a full dome, unless there's some real strong, get bigger/go deeper, sort of thing, where you're never going to see some of the bigger ones, but just instead of having a full selectivity after that knife edge, having some sort of descending right-handed dome-shapeness that is not fully selected, maybe 80% or something like that. I just didn't know if that was something worth looking into.

JERALD S. AULT: No, it's a good point. Jeremiah has done some work on, well, of course we're doing this DCRMP stuff, which is basically, mixed gas deep diving under the same domain. And we've compared, if you will, the size structures that we're getting within those ra-- we don't see big anomalies between the two. Right? Meaning that whatever is out there in the deeper water, more or less has the same structure. But you are exactly right. If we thought it was a problem, we could truncate it. One of the limitations of that, of course, is the[inaudible] is, that's a grand indicator of exploitation rate, right? With that truncation of older, larger sizes. And so, we'd like to be seeing that.

So, here's a pitch for Shannon and Kevin to, you know, for thinking about making sure that we've got the survey domain covered across the, if you will, the life history range of the species.

RICHARD APPELDOORN: Alright, Todd and then Shannon.

TODD GEDAMKE: Sure. I think a couple good points were made. The recruitment, using this as a recruitment index, given the life history and the likely development in shallow water is an extremely interesting idea. I think Jay also sort of disagreed with one component and that the Hogfish and the Black, as long as it's relative over time, so if there's a detection probability that is somewhat different between the two, you could still generate an index from that. And that I agree with, but that also acknowledges there may be some detection probabilities.

And I think that it's very, very important for this SSC in looking at this to recognize two things. The statement was made numerous times. If they are there, we are going to see it. So, first of all, does everyone on the-- we don't need to discuss this, but think about this in your mind, for those of you that are spear fishermen, for those of you that are divers, think about if that is the case.

And then again, Jeremiah has worked on and produced the image that I just sent you guys about Queen Trigger. He's the one that generated that basic data and shows that Queen trigger abundance is at the edge in the deeper waters of Saint Croix. So, this is the study we did in 2010, which is completely random fishery-independent, done through a multi-stage sampling process, which shows a pattern of distribution of Queen Trigger at that time. So given a full-scale mapping of Queen Trigger down to 250 feet, we have information to show that the main part of the abundance of them is at the edges in the deeper water.

LAURA JAY GROVE: Todd, can you share that figure? If I stop sharing, I can't see what you've shared. Let me see if I can stop sharing what I'm doing.

JERALD S. AULT: Yeah, Todd, I guess I would disagree a little bit about the main part of the abundance is down below the diving range because you have to look domain wide and ask the question, how much habitat is in that area that the animals can occupy? And, you know, Florida's a good, the shelf is dropping off rapidly, so that area is relatively small compared to the domain. So that's an issue. But that should be, you know, of course we're thinking about that.

The other, though, that I want to impress here, and Jay I thought made a great presentation of rec-- but you know, we're not talking about an index per se, that you're restricted in this design. The fact is that we sample system wide. It's a probability proportional to area variance that we can calculate totals, right? So technically within the domain, you know, you've estimate a queue within the fishery model, the independent is scaling this thing since it's a fixed area search that in the, and it's prob-- within the strata, we're sampling randomly within those, that you can build a total estimate of those statistics.

The density converts to bio or to abundance, and the, if you will, the biomass CPUE can be computed directly up to total. And so, I've been looking between our survey, the calibration with the SS model estimates of stock biomass, against what we're estimating directly from a survey. And I think that's the advantage if, you know, one can kind of help the other, because technically we're looking at what's in the water after fishing, and that's if you will, when you look at things on the dock, you're trying to figure out what it came from, right. Where, if you will, catch ability is a proportional statistic to that. So, there's a, I think it's a really rich opportunity for assessment generally.

RICHARD APPELDOORN: Alright, Todd, your follow up directly to that?

TODD GEDAMKE: Yeah. No, I asked the question about which species are found only in less than a hundred feet to see if anyone would bite on the fact that, "well, yeah, we can come up with a [BLUE?] estimates based on a domain that is less than a hundred feet." I don't know how you extrapolate out to a full species population based on samples that are in a hundred feet or less.

So, for any one of these species, you go for a hundred foot, you have an index, you can multiply that out by area, that's a swept

area calculation. Super, super simple. But which of these species and where is the population center? So, if you have one of these, I mean, none of them are just below a hundred feet. So, if your population center is at 200-foot for Queen Trigger, you're only picking up one little edge of it. It's impossible to calculate total abundance unless you are surveying, the domain is equal to the depth distribution of the fish.

JERALD S. AULT: Yeah. You're missing my point entirely. Is that, if you think that proportion of populations down deep water, no big deal, use a gear that's amenable to that depth, integrate the entire domain. What we're talking about is computing estimates within the survey domain, very clearly. And you say X percent sits outside. Fair enough. I don't know where you're getting that number from, but the point being is that that's the nature of the design statistics is that you're basically declaring what your survey domain is and sampling it randomly.

Uh, you know, as we all know, there's issues on both sides of the ledger about data. How representative are the fishery's data to the fishery? Well, that, you know, it's certainly not a random sample. We treat it as one. And so, I'm not saying anything is bulletproof, but there are ways to think about it. One.

And then two, if you just think about it strictly as an index. It's a really precise index of population that clearly is random. So, there are some strong advantages to it.

RICHARD APPELDOORN: Shannon.

SHANNON CASS-CALAY: Yes, thank you. This is Shannon for the record. So, I just wanted to point out that whether or not it can be expanded to a total population abundance estimate is not entirely relevant to the SEDAR 80 assessment, at least.

What is relevant at this moment, for SEDAR 80, is whether it can be used as an index of relative abundance. Just meaning that increases from year to year are some indicatives of changes in the population. I want to point out also that we use the length composition data from the NCRMP survey to estimate the selectivity of that index. And it's both the availability and any gear selectivity that exists.

So right now, those assumptions can all be explored, and we can show you essentially what we have done with SEDAR 80. You could look at whether you think the selectivity functions are in need of reevaluation. You could make decisions, for example, about what fraction of the time series to use, the entire time series, or

just the most recent years with expanded geographic coverage.

But I do think that this is an extremely valuable data set. It is our only fishery-independent information. You know, I don't think it's necessary to be able to extrapolate it to a total population size for it to be useful in the stock assessment context.

RICHARD APPELDOORN: Go ahead, Todd.

TODD GEDAMKE: I think I started before that. The other one that wasn't mentioned was the error bars on the index. Could we see the error bars on the index?

SHANNON CASS-CALAY: Yes. We can show you the error bars and the index tomorrow.

TODD GEDAMKE: Okay, cool. So, we—

SHANNON CASS-CALAY: One second, let me point something out. We have the input CVs, right, that are actually from the survey. We also have a plot which has been widely misunderstood, which is actually what the model has done after the weighting procedure.

And so, the model there is a conflict in information in SEDAR 80 between the trend you see in the NCRMP index and the trend you see in the length composition data. And so, what the model does is, it wants to fit the length comp and it wants to inflate the error bars on the NCRMP index. So, there's a fundamental data conflict and it is something we will talk about tomorrow and it needs to be resolved in some way. And we have some suggestions.

So those air bars, what do you want to see? Do you want to see the ones we put into the stock assessment model? or do you want to see what the model wants to do with it after it weights the various data components?

TODD GEDAMKE: Once you tell me there's two conflicting signals, the error bars then don't even matter.

SHANNON CASS-CALAY: Well.

TODD GEDAMKE: Because you now have an index that's showing a completely opposite thing from your length comps. We have evidence showing that the center of the population is below a hundred feet. You could wipe out every single fish in a hundred foot to zero, and if the fish lives from a hundred to a thousand feet, you haven't affected the stock at all.

Your index in a survey on a coral reef can go to zero and not reflect the population. Because you're not surveying the entire depth strata of the population. I understand we can do these deep things and dump a lot-- you know. But I'm saying, right now, we have a survey that is actually, you want to put it in because it's-- but it's conflicting in it. You've got error bars that are being driven by your model. And the fact, a completely precise index, I'll give it is completely precise at a hundred foot or less. And we have the evidence that I-- I mean, we've done this, you paid for it, again, to show that the base of this Queen Trigger population is deeper than a hundred feet.

So, I'm just wondering, how do you resolve that? You actually are putting data into the model that doesn't agree with your existing data. And it's not representative of the fishery, it's only representative of the coral reef at a hundred feet or less.

RICHARD APPELDOORN: Alright. So, this is something that's going to be shown and discussed tomorrow. I will point out that in our review of the Puerto Rico data, when we took the census data out, it didn't really impact the results. So that's when we have kind of looking at it. So last person with a question was J.J. and then it's getting after five.

JUAN J. CRUZ MOTTA: Thank you. Great presentation, thank you very much for that. Simple questions. Jay, can you go back to that figures that you use as an evidence that regional and island base surveys are the same? I just want to make sure I understand that.

LAURA JAY GROVE: Sure. Let me re-share my screen.

JUAN J. CRUZ MOTTA: Yeah, yeah. I'm sorry because I don't have that presentation here on the--

LAURA JAY GROVE: No problem. It says the host has disabled attendee screen sharing, so I need permission to share my screen again. My internet kicked me off for a second. So, I'm just going to wait. Somebody will let me know and I'm approved. Okay. I can see it now. I'm approved. Okay, so let me pull this back up. Let me-- slideshow, get my whole screen. I believe this is the slide that you're talking about. Is that correct?

JUAN J. CRUZ MOTTA: Yeah, that's correct.

LAURA JAY GROVE: And so, you wanted to take a look at it? Or you had a specific question.

JUAN J. CRUZ MOTTA: Yeah. The question is, what you have on the

X-axis are the different habitats, right? Or the different-- Yeah. And then to work out the average, that's average across all years that you did the surveys.

LAURA JAY GROVE: On the next slide, are you talking about for the--

JUAN J. CRUZ MOTTA: No, no, that one. The density, that average density per habitat. Is that-- sorry, go ahead. Sorry.

LAURA JAY GROVE: The sample numbers on top of each of those error bars, I know it's tough to see, but that is the mean density with the error.

JUAN J. CRUZ MOTTA: Yeah, but you took all the years to calculate that average.

LAURA JAY GROVE: I don't believe—

JEREMIAH BLONDEAU: I can jump on there, Jay.

LAURA JAY GROVE: Yeah.

JEREMIAH BLONDEAU: So, this is Jeremiah again. So, for this, we took the, so this is not terribly weird, I think we can follow it. I took the boundary of that regional area, let's say here. Where are we here? I think we're in Saint Thomas/Saint John. I took that boundary of, it's like the two national parks in Saint Thomas and Saint John. And then I grabbed the last two years of NCRMP, because when we did, this was '19 and '17. 2017 and 2019. And I used all the samples within those boundaries of 2017 and 2019. So, it came up to like, I think it's on the next slide, a hundred and something samples, 200. So, the regional, you look at the regional thing there, it says 200 N.

So, I kind of combined two years there. So that's how I got those, that's how I got those regional. I just overlay the boundaries of what was sampled through history by the other NOAA group. It was always in those parks. And that's how I made those estimates.

JUAN J. CRUZ MOTTA: Okay. Thank, thank you very much.

JEREMIAH BLONDEAU: Does that make sense.

JUAN J. CRUZ MOTTA: Yeah, yeah, yeah. Thanks.

JEREMIAH BLONDEAU: And this was appeared to be-- Yeah, you're welcome. And I guess to be clear, when we first presented, I guess this was a while ago at these topical working groups. We presented,

not presented, we just said, “there is data all the way back to 2001 and we can attempt to try to make it work.”

And that's when Jay presented earlier all those options to the tropical working group and now it was just part of this process. They were like, “Yeah, let's, let's give it a good shot.” And this is part of that analysis process of seeing if can we get those data back to 2001 and come up with some kind of estimate, of course, within a hundred feet. I mean, we're still in those boundaries. And this is some of the analysis that's showing how we came to the conclusion that maybe we can go back to 2001. And then when we presented this the working group did say, “yeah, let's try to put it in there.”

JUAN J. CRUZ MOTTA: Thank you. And actually, I have a second question for you, Jeremiah. It's related to the first question that Todd asked. Have you actually, I know the divers you are using, at least on the West of Puerto Rico, they're very good, divers, very well trained. But the question goes back, even though they're very well trained, have you estimate the variation or differences among the different observers even, you know, with very well-trained people looking at intertidal rocky shores that, those things don't move and they're standing on top of the quadrat. There are differences among observers. It will be nice or ideal to have some estimation of that variation. So, I'm going back to that original question. Thank you.

JEREMIAH BLONDEAU: Now that is, so this is also a part of our QA/QC procedure when we finish all this. So, the data is just not entered and then we use it. It goes through a really, really strict, I got so much code that crunches all the data, and I can, I might be able to see any anomalies from the divers. And sometimes, like you just said, sometimes I have pulled a diver all their data out because when I put it through my QA/QC they were always off of the rest of the people. I was just, I'm just using this kind of, these metrics of trying to figure out, are they in the range of everybody else.

So, I do, it does go through a rigorous QA/QC process. I also say, the numbers that you were seeing are actually an average of two, the two divers. So, it's not just one diver that is sampled, so at a PSU, it is the average of two divers. So, there's a little bit of, you know, because both of them are diving at the same time, it's basically one 15 millis-- 15 meters cylinder with like four eyes. Like one diver with four eyes going on. So we're trying to attack it from multiple ways. But I do agree there's difference between divers. And I do send out, I'm trying to think. I send this out to everybody, but I do make these histograms of what the

divers saw. So basically, what they're writing down, what they saw and how do they compare to everybody else. And that's my very first thing that says I need to go check this diver's data. And I look at every single species and the number that I write down and the sizes they write down and I look through it.

Um, so it does go through these kind of strict quality controls. Of course, stuff's going to get through, of course. However, we make our best effort to try to catch this stuff.

JUAN J. CRUZ MOTTA: Thank you.

LAURA JAY GROVE: We also try to recalibrate every year, right. Going out there, making sure that, you know, divers are sizing things correctly. You know, training and making sure they are working together. And so, what Jeremiah is doing by these histograms, is he'll tell us a diver, like maybe a diver is really prone instead of writing down, you know, 14 centimeters or 16, they're a diver that's really prone to going to the fives. You know, like they just, it's kind of their go-to. And so, like we do go through this training even with our really experienced divers to make sure that, you know, are they, if they're both in the same area, like when we go out at the beginning of the season, are they seeing, you know, like what you're saying, the same things and also are they sizing things the same?

Um, and how we do that, is we have an APT so that underwater, it's a meter stick with a 30-centimeter ruler on top and we go over and measure a coral head or something that doesn't move. So that you know, that coral head is 30 centimeters and then from there as fish swim over it, you know, you can get really good, you know, practicing like fine tuning and tuning in. That's 15 centimeters, that's 12 centimeters, you know, that's 18 centimeters.

And we really work with the divers at the beginning of the season. And then afterwards with Jeremiah saying, with all these histograms, we show them, you know, what their potential tendencies are so that they can keep evolving and keep learning. And our divers we're all coming from different agencies and as well so, you know, you're comparing all these data, you know, you're getting maybe some tendencies of groups worked in silos, you know, by themselves all the time. But when you're continuously swapping dive partners that's really helpful to just keep brushing up on, what did you see? What am I seeing? You know, talking things through. That's a big thing for us too, when we get up on the boat, you know, if you see something strange talking it through, like what are you seeing?

So, with anything, any survey, you have a protocol. And everybody's trained with that protocol and everybody's following that protocol. And then our job is at the end, QA/QC and make sure that everybody doesn't have any tendencies that they don't even know that they have. So, we do the best that we can from a training perspective. And I would say we have a really high bar for training and keeping everybody using the same protocol.

RICHARD APPELDOORN: Alright, thank you. We're running a little late, so I want to try to wrap this up. Julian and then Reni.

JULIAN MAGRAS: Julian Magras for the record. So, a question for Jeremiah. I saw that you said the studies were done inside of the parks. Has there been any plan to do, like a comparison of what's going on outside of the parks to compare to what's going into the parks? Because from recent history and studies that were done, we are told that a lot of the coral reef and a lot of the fish are more healthy and the outside of the monuments or closed areas, protected areas. So, it would be nice to know what's actually going on, on the outside of these areas, which doesn't have the interaction, like they do with the fishers. Thank you.

JEREMIAH BLONDEAU: This is Jeremiah. Thanks, Julian. Yeah, we can most definitely do that. This is something that's usually done, and if you want, I can try to reach out to some of the National Park folks. This is usually done by the national park. So, this is something that I help-- they usually help their interns and some of their analysts. We'll analyze, you know, the Virgin Islands Park versus the outsider Buck Island in Saint Croix versus the outside. So that stuff is out there, and we can try to try to dig that up.

It's not something that I've done, and we've presented or produced as NOAA, but the National Park Service, because they're a huge partner, they have most certainly done that.

JORGE R. GARCÍA-SAIS: Uh, thanks Jeremiah. This is Reni here. Jeremiah, I've been an NCRMP Diver for last two surveys. And I know that this method is also a time sensitive method. So how do you deal with the different times periods where you make the analysis? Does this have any implications in terms of the densities of the fishes?

JEREMIAH BLONDEAU: Yes. So, if you remember, so Reni's asking about our actual in water, what's going on while we're taking a sample. We sample in these five-minute increments. So, there's a first five minutes of the dive time and you're taking all your data, and there's a second time period where you're taking more

data. And then there's that third time period that could be one minute. That third time period could be 18 minutes. That one's variable. We do not use time period three in any density estimates. So, we only use that strict 10-minute first time period. And I'm imagining you've done a couple years of this now. Once we hit that 10-minute mark, unless it's like one of those sites that's just, 50, 60 different species, you know, we are pretty much done with that sample around 10, 12 minutes. So.

JORGE R. GARCÍA-SAIS: Okay. Thanks.

JEREMIAH BLONDEAU: Mm-hmm.

RICHARD APPELDOORN: Alright. I'd like to thank Jay, Jerry and Jeremiah. I think there's a little bias in your grouping name there, but for a good presentation, a stimulating discussion.

And with that we will call-- we will have an announcement from Graciela.

GRACIELA GARCÍA-MOLINER: Some housekeeping items. Pick up your parking sticker from Iris and also sign the papers because the financial officer sent them via email. So, we need you to sign those papers. All the documents that you've discussed are in your Google Drive for the SSC members so you can access them at your leisure.

RICHARD APPELDOORN: Alright, and with that, we're adjourned 'till tomorrow. Thank you very much.

(Whereupon, the meeting recessed on November 29, 2021.)

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NOVEMBER 30, 2021

WEDNESDAY MORNING SESSION

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RICHARD APPELDOORN: Okay, we'd like to get started, please, so if everyone can take their seats who are here in the conference room. Okay. It's 10:03, it's November 30th, 2022. This is day two of the SSC meeting. I remind everybody that the guidelines that I read yesterday on how the meetings are to be run and expected behaviors still apply. So please keep those in mind.

GRACIELA GARCÍA-MOLINER: State your name for the record.

RICHARD APPELDOORN: Those people who are speaking, remember a, have your microphone on, and b, please state your name for the record so that the transcripts can be accurately describe to your comments. And with that we'll start with a roll call of the SSC. Walter?

Okay. While we're working on that let me get voice roll call for the members that are online. So, Doug, you there?

DOUGLAS GREGORY: Yes, I'm present today.

RICHARD APPELDOORN: Erik? Erik Williams?

ERIK H. WILLIAMS: Yes. This is Erik Williams.

RICHARD APPELDOORN: Okay. Jason Cope.

JASON COPE: Yeah. Good morning. Jason Cope, SSC.

RICHARD APPELDOORN: Michelle.

MICHELLE SCHÄRER-UMPIERRE: Michelle Schärer. Good morning.

RICHARD APPELDOORN: All right. Rich Appeldoorn, SSC Chair.

TARSILA SEARA: Tarsila Seara, SSC.

JUAN J. CRUZ MOTTA: J.J. Cruz, SSC. Good morning.

TODD GEDAMKE: Todd Gedamke, SSC.

RICHARD APPELDOORN: So, they function. Okay, those are the SSC members. oh, sorry. Reni.

JORGE R. GARCÍA-SAIS: Good morning. Reni Garcia, SSC Member.

WALTER KEITHLY: Walter Keithly, SSC Member.

VANCE VICENTE: Vance Vicente, SSC member.

RICHARD APPELDOORN: My apologies. Shannon, would you continue?

SHANNON CASS-CALAY: Shannon Calay, Southeast Fisheries Science Center.

KEVIN MCCARTHY: Kevin McCarthy, Southeast Fisheries Science Center.

ADYAN RIOS: Adyan Rios, Southeast Fisheries Science Center.

GRACIELA GARCÍA-MOLINER: Graciela García-Moliner, Council Staff. Buenos días.

KATHERINE M. ZAMBONI: Kate Zamboni, NOAA Office of General Council.

SARAH STEPHENSON: Sarah Stephenson, Southeast Regional Office.

LIAJAY RIVERA GARCÍA: Liajay Rivera, Council Staff. Buenos días.

CRISTINA OLÁN MARTÍNEZ: Cristina Olán, Council Staff. Good morning.

NELSON CRESPO: Buenos días. Nelson Crespo, DAP Chair, Puerto Rico.

JULIAN MAGRAS: Good morning. Julia Magras, DAP Chair, Saint Thomas/Saint John.

GERSON MARTÍNEZ: Good morning. Gerson Martínez. Stepping in for the Chair, Mr. Schuster

IRIS N. OLIVERAS: Iris Oliveras, Council Staff.

LIAJAY RIVERA GARCÍA: Alida Ortiz, also joined us through zoom.

RICHARD APPELDOORN: Yeah. Also online is Alida Ortiz, Jay Grove, Jerry Ault, Jeremiah Blondeau, Jesus Rivera Hernandez, Julie Neer Marcos Hanke, María López, Martha Prada, Nancie Cummings, Nathan Vaughan, Nicole Greaux, Rachel Eckley, Rafi--

REFIK ORHUN: Rafik Orhun.

RICHARD APPELDOORN: Yeah, it's my computer's jumping around so I can't focus on your name. Sennai Habtes and Tania, we don't have the last name for Tania.

Alright, I think we left yesterday. Finishing Spiny Lobster in SEDAR 57, 6, whatever it was. And so, we're going to turn our attention first thing with, back to Queen Triggerfish and trying to finish up the situation in Puerto Rico before turning to the situation in Saint Thomas and Saint Croix. So, Shannon, you have, or Kevin?

KEVIN MCCARTHY: Did the SSC receive a copy of the presentation for the Puerto Rico Queen Trigger? We can send it if you haven't

received it.

GRACIELA GARCÍA-MOLINER: Who sent it? You sent it?

SHANNON CASS-CALAY: It would have come from Nancie Cummings most likely.

LIAJAY RIVERA GARCÍA: We have Nancie Cummings waiting for a turn to speak.

RICHARD APPELDOORN: Yeah, go ahead Nancie.

NANCIE CUMMINGS: Oops. Thank you. Good morning, thank you. Nancie Cummings, NOAA Fisheries here. Kevin, I think you were going to send that yesterday after we went through the final.

KEVIN MCCARTHY: Okay. We'll send it now.

NANCIE CUMMINGS: Thank you. My emails are closed because of the presentation. I'm ready, Rich. Again, I'll lower my hand, thank you. I'm doing a permission to share my screen.

RICHARD APPELDOORN: Yeah, I just want to make sure this gets delivered, especially for the people online in case something happens, I can follow.

NANCIE CUMMINGS: Thank you. There is a document that was forwarded to you. It's in the email chain from Liajay and that was a Word document, but it was a PDF of the word and that's the same as the presentation. A couple extra slides from the document.

RICHARD APPELDOORN: Nancie, you can share your screen. You are now cohost.

NANCIE CUMMINGS: Thank you very much, entire screen. Let's see if this works. Tell me when you see my screen. Are you seeing a PowerPoint?

GRACIELA GARCÍA-MOLINER: Yes.

LIAJAY RIVERA GARCÍA: Yes, we are.

Finalize SEDAR 80 Queen Triggerfish for Puerto Rico—SEFSC

NANCIE CUMMINGS: Thank you. I'm going to go back. So, I'd like to just, again, Nancie Cummings from NOAA Fisheries. And, before I begin this presentation, I'll just remind you that also in your package, that I think Graciela sent or Liajay, there was a

document, it was a PDF also and it was a summary of the [inaudible] that were presented at the October meeting.

We will not be delivering a presentation on that because you had the presentation at the October meeting. So, what you'll have today, what I'd like to do today is, we're going to deliver a presentation that basically followed up on the guidance that you provided the Center after the October SSC meeting. Um, and Nathan Vaughn was principally involved in this as well.

So, it is just further developing the catch advice for the Queen Triggerfish stock in Puerto Rico. And the objectives of this documents, very short document, just to document the work that was conducted since the October meeting and to provide follow-up stock assessment candidate model results that incorporated those decisions that the SSC agreed on at the October meeting. And then to have a discussion, if necessary, to seek additional guidance to further refine the Puerto Rico based model and to develop catch advice.

So quickly summarizing, in the PDF that you have of this presentation, you'll have one or two extra slides that we decided that were sort of redundant, and so those were removed. But you'll also get the PDF of this presentation as well.

So, summarizing the decisions from the October meeting. The decision was made, remember we had the discussion regarding what that initial equilibrium catch, what it should be. In the candidate model that was presented in July, it was a simple geometric mean of the 83, 4 and 5. But it was decided to use um-- because we knew fishing was going on before 1983, it was decided to use a grid search to search across the grid of likely values, a range of values rather, with a model, a stock synthesis model, that estimates steepness. And the choice or the decision, the way to choose the best model then was to basically what we referred to as the MLE, the maximum likelihood estimation, model to identify the best value. So basically, we're looking for, across that grid, the range of initial catches. We would then choose the model that has the lowest MLE. We would fix the initial catch at the MLE estimate. And we would not, in terms of the parameterization of the growth inputs for the SS model, it was agreed that would not use the South Carolina/North Carolina fish. It would only use the observations from the Caribbean. The maximum age from the South Carolina/North Carolina data that was observed had not been validated. In addition, sensitivities were done on the trap selectivity as a dome-shape and was decided to retain the logistic function.

Finally, for this, across this grid and for this, the model that

estimated the lowest MLE, we would look at a profile of steepness and identify if the value that was estimated from the model was indeed estimable, and was it reasonable? If it was reasonable, then we would fix steepness at that MLE, and we use FMSY in the model. And we'll go into this a little bit more as well. Otherwise, we would use SPR30 and a mean recruitment value. And finally, regarding informing the basic catch series, the commercial catch series, we would use the Puerto Rico reported data, we refer to it as a historic data, to inform the model, the landings. And recall that the landings for Puerto Rico, the reported landings, are from 83 to 2019. When it comes to doing the projections, because we know that the terminal year is 2019 and we want to begin projections in 2023, we would use the gap years then we would use, the correction factors would come from the 2014 to 2019, and we'll go into this a little bit more. We have 2021. We would use 21 to inform 2022.

Okay. So, the procedures, in terms of estimating the best model in terms of that initial catch, then it's a little com-- It's not complicated, but there's a few steps to it. We would run the search from 20 metric tons to 150 metric tons. We found the lowest MLE was initially identified between 39 and 40. We ran the grid at one metric ton increments. At this range of 39 to 40 metric tons then we ran a finer grid, and that is at 0.1 metric tons. It was identified between here, that 39.4, 39.5, and 39.6 metric tons were all, they all had the same likelihood, and so they were equally likely to be the best candidate model. So, then we took the centroid of that, the 39.5.

A second step was to, what we talked about previously, was to look at profiles for steepness. Those were constructed and characterized, not just the profile of steepness, but also other metrics across these initial catch crimes. So, we do have some feeling for how this procedure behaved. For the initial equilibrium catch, with the best initial catch, that is the lowest MLE, we did that steepness profile, which I mentioned. And then, what we also provide in this document, for you, that you have, some key metrics, such that are relevant to the to the Magnuson-Stevens status determination criteria. For example, FMSY SSB at MSY equilibrium catch at MSY and so forth.

Okay, so now we'll turn to the results. What I'd like to do here for you right now, is to sort of set up what we're going to show in some of the following plots, and that is the X-axis. A number of these plots, they will have the initial catches on the X-axis, this one just happens to have the behavior of the search across the grid on the Y-axis. And this is the likelihood. So, what you see is, you see this, you see a trough, a U function, a U curved

basically, here and it's showing you that the lowest value was around 87,000 tons or pounds, or 39.5 metric tons as we showed. And it was, it corresponded to the likelihood about 149.7. And here, this is the median value across this. So, this is the best estimate.

So, in the next few plots, again, I will say that the X-axis, and most of them will be running across this range of initial catches. So, this is our profile of the likelihood. This is how the, across that grid, well, how we searched for the best initial catch or the, for the candidate model. That's how that looks. Then we wanted to evaluate whether the steepness, remember across this range, across this range of initial catches, we estimated steepness. An SS model was estimated for each of these values. So, we wanted to see the behavior in terms of the profile of steepness for all of those, for this initial catch. And what it suggests here, is that, so the vertical line, it denotes the steepness at the lowest catch, lowest MLE rather, that's at 0.95. There's, in general, there's weak support that's steepness is estimable at 0.9-- is 0.95. But there is some support, weak support, that also its grater than 0.9. Just wanted I say that. And the other take home here is that the behavior of each of the data components, this is the total across all of the data components. The recruitment is in blue, the equilibrium catch yellow, the index data is, you know, it starts at around, or the change in likelihood rather, is about one, and then it goes down.

In general, the components all perform differently, are similarly. They start at these high levels, 10 to six units. The change in likelihood does, and they do decline. But we just want to say that there's some evidence, weak support at least, that steepness is greater than 0.9. It does bound out at 1.99, reaches a high band.

Okay? As I mentioned earlier, these plots and the next few plots, you're going to see on the X-axis, again, this is how in terms of estimating candi-- or identifying the candidate, the best candidate model, how it performed in terms of that initial catch. So, the X-axis, again, is running across the range of initial catches that were searched over 60 to 160. And then on the Y-axis, what you're going to have in this plot, you have two different panels. One is showing the estimate of steepness, and the other is showing the estimate of SPR at MSY. Okay? So, what happens here is, across this range for steepness it's flat from 0.95 up down to about 80,000 of pounds. So, we are showing this in thousands of pounds for you. And then it declines as you go to higher initial catches. And again, the red line, the vertical red line, again here, is the estimate for the 0.95 at the best model. Similarly, the red line here, the vertical line on the right panel is the

best estimate, the best MLE was at, I think it was 87,000 pounds. What this is showing suggests, indicating, not showing, indicating, is that the estimate of SPR at MSY is very, is low. It's about 16% from initial catches from 60 to about, here this is, again, using a point 0.95. And then it increases as the initial catch also increases up to this largest range, the large part of the range 160,000.

And this panel is showing you the equilibrium catch, MSY. It shows you that it also varies across the range of initial catches that was searched over, and it varies with your choice of proxy. Whether you are assuming MSY is your proxy or your FMSY or you are assuming SPR30 as your proxy.

And again, the vertical line is indicating the best MLE, the best candidate model, with the lowest MLE which was 87,000 pounds. And so, this panel is again, showing you two metrics that are key metrics from their output from the SS model. And that's your equilibrium SSB and your equilibrium F. And it's showing you, again, it's looking at whether it's using the F at MSY or SPR30. And again, this shows you that across the range of initial catches, from 60 to 160 for each, that SSB also varies given the proxy from a very low level at MSY, which could be that's something maybe to discuss, and also at SPR30, starting a very at a high, higher level. Much higher level. But this is again, noting that if we were to review earlier what that SPR was given that proxy. This proxy, this was a very, a low level.

And again, now looking at F, this is your F at MSY given the proxy. So here we see across the range of initial catches. And again, the vertical line on both panels is illustrating what the MLE, the candidate model was, it was 87,000.

So, what we were asked to do was let's look for the initial catch, identify the initial catch that satisfies the MLE, the best, you know, the lowest MLE. Then also we were asked to look at the profile steepness for that model and we did. And then it was suggested that we, if it appeared reasonable, then we would go forward with projections and we would use these decisions or your guidance that you gave us. We would begin them in 2023 and recall that in order to go forward you need to have some guidance regarding what your patterns of F are and the selectivity. We would use the average of 2017 to 2019 for these, in terms of informing relative the relative F and the relative selectivity. And then we would use recruitment that was derived from the Beverton-Holt stock recruitment relationship for the SPR30 and steepness at 0.95 and also using the FMSY at FMSY. So that would be a separate set of projections.

Now remember, the model starts, the terminal year is 2019. We have data from 83 to 2019. We would use 2021 to whole, to fill 2022. And then this is where I sort of stopped early on because I wanted to get to the slide. In terms of, we have the reported data from DNER, Puerto Rico, DNER. We would use those data, but we would also still apply the correction factors that were agreed at the meeting in October. And those correction factors would be the 2014 to 2019 average. And they would be used to correct the 2020, 2021 and 2022 data. And then we would start the projection at 2023. And then, we also did an alternative projection that's assumed steepness was fixed at one. So, the model estimated steepness at 0.95, and we did that. And then we also have another using an SPR30, but we assume steepness was 1.0. And again, recruitment, was from the stock recruitment curve estimated. You know, these are the preliminary results, and that would be the projected OFL for assuming the metric for MSY-- FMSY, excuse me and then SPR30. And that's using, informing the initial catch, that equilibrium catch, and it would be taking that best run, best SS run, according to that lowest MLE and that was at 39.5 metric tons. And we would, the first set would assume steepness at 0.95, and then an alternative SPR30 at 1.0. But also, we did the projection at FMSY.

Okay. And these are those results. So, what we have here, the red line, just denotes the, this is the 2023 this where the projections start, and these are the report, these are the adjusted, the gap year catches 2020, 2021, and 2022. So, you have on the X-axis, you have your years and then on the Y-axis you've got your overfishing limit catch in thousands of pounds. And then the blue line is the FMSY projection. This is a sort of a black line, it's the SPR30 projection, assuming steepness is 0.95. And then this is the red or kind of a magenta line or dots rather, are the SPR projections assuming steepness in one. And you would expect that these would be similar because this was 0.95. They're not very, it's not a very different level of steep-- rate, value for steepness.

Okay. So now so what we've done here, we've carried out the, moved the candidate model forward assuming, taking at your guidance regarding all those decisions that were made. And those decisions, I just want to remind you, they're in the document. but we didn't need to rehash those. Those were the, you know, the growth information in terms of the parameterizing it using the Shervette and Rivera-Hernández Curve, not using the North Carolinas or South Carolina fish, assuming the logistic selectivity and there were a few others that we looked at. And so, we've run that, we've looked at, we've identified through a quantitative procedure what the best candidate model might be, assuming the selection was made through identifying the model with the lowest likelihood across

the range of initial catches that ran from 60 to 160. And we evaluated whether steepness looked estimable. If it's close to one and any value above 0.9 we want to look at whether it was supported by the likelihood profile. We have some weak support that it's greater than 0.9. just want to, these are the points where we would like to further request your guidance. If MSY is selected for your reference points, as you recall, it produced a very low spawning biomass and that is relative to the unfished condition at equilibrium. If the true steepness is lower than 0.95, there is some risk of overfishing based on FMSY. The SSC should consider retaining the proxy until further research can better validate the spawner recruitment relationship for the stock and also the productivity. Recent catches are about 64,000 pounds. Increased catches of up to 30 to 50% appear sustainable under this candidate model and using the SPR30 proxy.

And then this is just a very simple table where we have your reference point, your target reference point, in the left must column followed by the level of steepness that was assumed in the model. And then we have a series of overfishing limits, catches calculations, that run from 2023 to 2027 and what the OFL and equilibrium is.

Um, and this is, we'd like to, I'd like to thank you an open conversation, the floor for conversation, but I also just want to, I'd like to leave this slide here unless someone would like to maybe just see something else. Thank you very much, and I can take questions.

Questions

RICHARD APPELDOORN: Thank you, Nancie. Questions?

LIAJAY RIVERA GARCÍA: Erik Williams.

RICHARD APPELDOORN: Yeah, go ahead, Erik.

ERIK H. WILLIAMS: Yeah. Thank you, Rich. Erik Williams. So, Nancie, if I understand correctly, when you did the likelihood profiling, you were freely estimating steepness?

NANCIE CUMMINGS: Yes.

ERIK H. WILLIAMS: While scanning across fixed values for the initial catch level. That's not really a proper way to do a likelihood profile.

If you want to determine whether steepness is estimable, you should

fix it across various values and then look at the likelihood response for various elements. You know, the total likelihood as well as individual components of the likelihood to see what their response is to fixed values of steepness, not estimated values of steepness. Um, so this makes this tricky to interpret.

NANCIE CUMMINGS: Right.

ERIK H. WILLIAMS: So, I caution you about how you're interpreting this plot because steepness is being freely estimated.

NANCIE CUMMINGS: Right. Steepness was being fixed here, but this was at the best likely, this was at the candidate model with the lowest MLE at 39.5 metric tons. So, yeah. Yeah, yeah. This was actually fixed. These levels were fixed. So, this profile here, but it was, it was, Erik, it was estimating excuse me. It was using the 39.5 metric tons. So, I'm also going to open the floor to Nathan where he might want to add some comments here as well.

ERIK H. WILLIAMS: Well, well hold on. So, I'm just, I'm unclear then. The way you described it was for steepness was being freely estimated. Is that not the case? Was steepness fixed for that likelihood profile or not? [crosstalk]

NANCIE CUMMINGS: Steepness was fixed where this likelihood profile on this slide, however it was the initial catch was fixed.

ERIK H. WILLIAMS: Right. That's fine.

NANCIE CUMMINGS: Yes. Yes.

ERIK H. WILLIAMS: Then it's, then it's fine. Okay, then.

NANCIE CUMMINGS: Thank you. Thank you. And, thank you very much for pointing that out. Yeah. So, everybody, so everyone knows what, what we did here, or I did was I ran a profile on steepness from 0.7 to actually 0.99. But I assumed the lowest, the initial catch rather, was at the lowest likelihood, and that was at the 39.5 metric tons.

RICHARD APPELDOORN: Alright, Shannon and then Jason.

SHANNON CASS-CALAY: Thanks. Yeah, I just, that was a bit of a confusing interlude and I just want to make absolutely sure the SSC understands what was done because the procedure that Erik described is in fact what was done. And so, if you require additional information about the procedure, Nathan Vaughn is available and can describe it in detail.

But essentially it is exactly the description that Erik described. So, if you're satisfied, we can move on, but if you have additional questions, we can take the time for it.

NANCIE CUMMINGS: Right. And I, yeah, I just want to point out to the SSC also that the vertical line here is just representing when I went out and estimated steepness just freely in the model, you know, it was at point 0.95 and it was also estimating R zero. Just want to point that out. But I want to point out that also that SigmaR was fixed at 0.6 up there. Was fixed at 0.6.

RICHARD APPELDOORN: Jason.

JASON COPE: Yeah. Jason Cope. Nancie, thank you. Thank you to you, Nathan, others who contributed to these follow ups. This is really nice to look at. And I think it makes it extremely clear-- you showed a lot of things changing over profiling and different model setups, but for me, I guess it really just boils down to, and this is really not so much a question, I guess just a statement for discussion, that steepness is unknown. This model really doesn't know what steepness is. This is a classic profile of a model that doesn't really know. And, in particular, if we look at the likelihood components, and you mentioned this, that there isn't a whole lot of evidence here. And yes, strictly speaking, likelihood is flat, but a lot of that information is coming from equilibrium catch component recruitment, not much from the index. There's probably not a lot of contrast going on here.

So, this is not an unexpected result. And again, you've presented a lot of results that make this very clear, that the big part of the decision here is, what is steepness going to be? Because whatever steepness is, you then fix basically what the difference between the MSY and the SPR is. Because as you lower steepness, right, you get closer to what the steepness that equals an SPR of 30. And so, you've shown that clearly in your other things. And as you have a high-- As you get closer and closer to a 150, 160, right, you're getting closer to MSY matching an assumption of SPR30 because an SPR30 is reflective of the estimated models, MSY.

And so, all of the-- I guess I just want to say to everyone that I don't see any aberrant behavior in this model. It all makes complete sense and it all hinges on that decision of what this is, which the model can't tell you anything about. And we need to fall back on expert opinion, some consideration of biology even though that's going to really not reveal a whole lot maybe to us. So, I'd like to maybe discuss that a little bit more.

And knowing that it's around 0.95 and, Nancie, as you showed clearly, even assuming one, which means no stock recruit relationship, you're not getting a big difference in behavior. So, 0.95 is a very, very productive fish. And so, the assumption is we're moving forward and I'm not saying this is wrong, I'm just stating the assumptions of productive species and then everything else just scales appropriately. Thanks.

NANCIE CUMMINGS: Thank you, Jason.

RICHARD APPELDOORN: Hey, this is Rich. I have a number of points I don't understand and hopefully it's just a point of clarification. I'll start with your initial thing, where you said equilibrium catch and you're looking at initial equilibrium catch. And what if this isn't equilibrium?

NANCIE CUMMINGS: It's the-- you said I started with my first thing. I just want to get to that slide if I can or may. And I'll just say that it's the long-term average excuse me, long-term sustainable catch, and that's over the a hundred year projection.

RICHARD APPELDOORN: You're talking about the initial, I'm talking about initial catch.

NANCIE CUMMINGS: Oh, I'm sorry. Initial catch. Okay. So let me just remind you, remind everybody that the goal here, let me, I'll just go back here. Remember the model starts in a period of time, 1983 is the first informed catch, reported catch, that we have. But we know that there was fishing ongoing. And so, let's go back to July, just for a moment, and remember that we set out to estimate, we have an initial F, this is Puerto Rico, so we have a trap fishery and a dive fishery, and we know that the dive fishery was at a pretty low level at that point. So, we assumed that the dive fishery was at, I want to say zero. The fishing, I think, was about zero at that point. But the trap fishery, they had, there was fishing mortality going on. And so, we knew that we needed to estimate a value for the, because it was not in an unfished state. So, we are assuming that there's some level of exploitation going on, and in a lot of cases in the Gulf and-- Now, this is our first, second SS, set of SS runs in the Caribbean. Lobster being the first. We estimated, initial F, excuse me, an equilibrium catch using the geometric mean of the first 83, 4 and 5. But we learned, and you saw that in the model in our sensitivity runs from October, that there was sensitivity to that. So, there was impact on the estimates of spawning stock biomass and on harvest rate and so forth, given what you chose for that initial catch. So, it was decided and agreed that we would run a search across a plausible range of initial catches. And we, rather than, I think Nathan can

remind me, that my initial catch was, I don't know, like 40 something metric tons, maybe 48 metric tons. We did that here. We ran the initial, we ran an SS run for each of these from 20 tons, 21 tons, 22 tons, all the way up to 160 metric tons. This has a 150. And then we decided, we agreed that the best way to identify the best model would be to take the one with the lowest likelihood. And that settled out at 39.5 metric tons. [crosstalk]

RICHARD APPELDOORN: Yeah. Nancie, I'm not questioning any of that procedure. I want to know whether this is assumed to be an equilibrium catch and whether that assumption of equilibrium affects things. And Shannon has her hand up.

NANCIE CUMMINGS: Yes, yes. Yes. Shannon.

SHANNON CASS-CALAY: Thanks. So, yeah, the model, it is an equilibrium catch in the sense that the model assumes that that level of catch has occurred for a long enough period of time, historically, that the stock is an equilibrium with regard to its age structure.

NANCIE CUMMINGS: Yes.

SHANNON CASS-CALAY: Right? So basically, in the sensitivity runs we did with this model and showed at the previous meeting. You know, it's similar to having a historical ramp up to that level of catch in the first year of the assessment. It's similar to that, not identical. But yes, it's an equilibrium catch in the sense that it's, the catches weren't zero prior to that. They were at similar levels of catch for a long enough period of time to produce an equilibrium age structure.

NANCIE CUMMINGS: And you know, Rich, you did some work in terms of reconstruction of catches from Puerto Rico and we looked at that, Nathan and I did. And we know that there was quite a bit of exploitation going on before then. And you know, I'd peg it back to probably, you know, this model starts in 83 and 82 is that equilibrium catch. And so, you know, we could peg the fishing back to at least the fifties probably. So, you know, in this age structure, you know, we're assuming an age of 23 for the maximum age. So how long it's taking to stabilize is another question. I guess, maybe. [crosstalk]

RICHARD APPELDOORN: Todd.

TODD GEDAMKE: I can follow up directly on the equilibrium catch, just clarify that.

But Shannon, could I get a copy of the config files and the data files for this one so I can run it? and the equilibrium catch, I think the answer's pretty easy on this one. It looks like they ramped up from 1950 till current or built it up at that point. But Richard, your question is at the beginning, in year one on this, is there an equilibrium catch? And the modelers are saying they have modeled an equilibrium, which would mean you're at a stable level. And as you know, that first year is really high and you've discussed some of the traps in there. So, it's unlikely that that assumption is being met, but the sensitivities that they've done to it might not show, I don't remember what it was, but they might not show that there's problems.

RICHARD APPELDOORN: Yeah. And that was kind of really my question. Erik, do you have your hand up?

ERIK H. WILLIAMS: Yeah. Rich, this is to a different point, but I didn't know if you wanted to finish this conversation, or I can jump in with another point.

RICHARD APPELDOORN: Just go ahead.

ERIK H. WILLIAMS: Okay. So, Erik Williams this may be a first I think Jason and I might disagree here. Jason was indicating that he thinks everything's sort of consistent in this model and I would say not. And the concern I see is that that likelihood profile steepness does suggest that steepness is estimable at least it's pointing it to a very high level. It's not pointing it right to the bound, it is pointing it to a level, there's a slight upturn in some of that likelihood as you get closer to the bound, which would suggest there is a minimum there. And it is pointing us to a high steepness value. And so, the concern then that is a big inconsistency in terms of the difference between going with that value and the F and the MSY based on that versus an F30%. Those are radically. Which does raise some concern that that SPR percentage at that steepness is so low. That's, I mean, I know it gets really low as you get high steepness, but that gets really low. I've never seen SPR down around 16, 18%. That's outrageously low. But anyway, so that's my concern is that there is, you know, do we believe that this model is telling us about steepness? I can agree. You know, that's debatable, certainly. But if you trust the model and you're going to, and you're going to use the data and the model for making decisions to be objective, really the steepness should be at a high value and if we can get steepness within a reasonable range, we should be using that for MSY directly rather than a proxy, that's just sort of the hierarchy of how we, we go about determining MSY. So that's my comment.

RICHARD APPELDOORN: Jason.

JASON COPE: Yeah. In reaching harmony I don't think Erik and I disagree all that much. I guess to say that I don't think it has much information. I'm looking if you have a change in the negative log likelihood, which is shown here if its less than around two units, so we have two here, and so if you take the actual data from the model, which is an index, and you [inaudible] that's that red line, everything from 0.7 to one, there's nothing that the data can tell you that that can distinguish steepness here. And so that likelihood component, the data likelihood component, has no information on steepness, is my interpretation.

What you then do is start adding the likelihood components, equilibrium catch, and then recruitment, which has the most sort of information. But that's also kind of circular, in the sense that that's a recruitment penalty on a presumption that the stock recruit relationship has a certain steepness of whatever it is. So, I kind of don't really look at the recruitment penalty so much in that regard. And so, when it comes to the-- and then the equilibrium catch too is also kind of this, it's a number that you don't know that you're trying to figure out.

And so, with that, I go back to the data and I just don't see a lot of evidence for steepness here at all. And as was just noted, going from a 0.7 to a steepness of one, gives you very, very different estimates of what your SPR is at MSY, and it will range from probably somewhere around 0.4 something all the way to these really wild numbers that are like below 0.2 or near 0.2, which is what you're getting at when you hit around one. Because the SPR at, given the selectivity and etcetera, etcetera, the SPR is really connected to your steepness. And so, it's basically defined by it. And so, we get this strong relationship.

And so, it's just my-- I guess, I don't know if it's concern, it's just a warning that I just don't think this model has any real information on steepness. And so going with the MLE here, you're saying I trust the equilibrium catch and recruitment to tell me what, and basically throw out the index data to tell me what steepness is. And steepness is very difficult to estimate, even in models that have a lots of data over decades. You have to have very specific data conditions to be able to tease out what steepness is. And even though this is a highly constrained model, there's only a few things being estimated, which makes it more possible maybe to pull that signal out.

I'm just dubious that there's anything in true data here that inform that and therefore you have to pick it and wherever you

pick is going to map back to the SPR. And so, if you pick something around one or 0.95, you're saying the true SPR is around 0.2. It just is, it just maps to that. And then I would go back and say to the experts, does that seem to make sense? Is Queen Triggerfish such a highly productive animal that it's really decoupled from how much spawning biomass is out there? And if you believe that, then great, we can move forward. If you don't believe that then you are taking the assumption that it's very, very highly productive and then everything else comes from that. And you will see, as Erik's point pointing out, a huge difference between SPR and the actual MSY that the model would prefer to use to match it to the biology. I hope that was not just a ramble on. I hope something out of that was useful and clarifies things.

RICHARD APPELDOORN: Yeah. Thank you, Jason. Todd?

TODD GEDAMKE: Just a direct follow up on that. Jason, thank you. Your, your comments on these, and Erik too, is very helpful for my brain. You made the comment about steepness and what you pick, and that this model is only estimating a couple things. I'm a little lost as to how some of the sensitivities were done. So could the analysts or someone at the Center describe what was just a summary of what was fixed and what was estimated. So, is M fixed? Is all the life history fixed? Were there priors on those? Was there-- just the basics on what was picked, what was chosen, by the analysts in the first part of this?

SHANNON CASS-CALAY: Yeah. Rich, I can address that. So, this is a data limited implementation with a number of very strong assumptions. And so yes, essentially what we are estimating are the spun recruit parameters. The life history information is fixed, the growth is fixed. The natural mortality was calculated from a Lorenzen M function based on the assumed growth and fixed in the model.

What else did you ask? The selectivity is estimated.

TODD GEDAMKE: So that was, I've just got my list here. So, life history M. You're saying SPR, Selectivity-- yes.

SHANNON CASS-CALAY: Selectivity is estimated. Yep.

TODD GEDAMKE: Yep. Okay.

SHANNON CASS-CALAY: What else did you ask?

TODD GEDAMKE: If SPR, selectivity, steepness, those are estimated, then you're getting your other management parameters out of there.

But the input parameters, and I'll be getting back to the starting conditions on this, but the starting conditions in this are all driven by the life history parameters and M. So I just want to make sure that those are fixed.

SHANNON CASS-CALAY: Yes.

TODD GEDAMKE: So, M is fixed by using a Lorenzen. Okay. And well, I got a note here. Could you, so that, thank you very much. That explains that.

I didn't understand and I'm very interested, obviously in the sensitivity's done to the initial catch amount on there, those metric tons represent the first year 82, whatever that is, is that correct?

SHANNON CASS-CALAY: They are applied in the model in 1982. But fishing was occurring prior to that, and we don't know exactly the magnitude of that historical fishing. And so, essentially the model assumes that that level of catch has occurred through history in such a way to produce an equilibrium age structure in 1982 at that essentially equilibrium catch value. And it was estimated in the model, in the base model and also, through this procedure that we have shown you.

Well, that's not entirely true.

TODD GEDAMKE: No.

SHANNON CASS-CALAY: So, it was, what is estimated in the model is the initial F, but it's highly constrained by the fact that we are assuming an equilibrium catch, which is why it is so important to try to do this profiling procedure.

TODD GEDAMKE: So, the initial F, I don't want to get diverted here, but that's really where I want to get to this whole thing. And everyone, note that initial F that's estimated the initial, or is that calculated?

SHANNON CASS-CALAY: It's estimated, but it's probably not freely estimated because it is highly informed by the level of equilibrium catch that we have put into the model, which is why it's more appropriate to look at the estimated initial catch through this profiling procedure that we're showing you today.

TODD GEDAMKE: Okay. So, this catch profiling procedure is running on the expanded values that we're currently using in the assessment. I think that every, this committee has raised extreme

concerns about the expansion value numerous, numerous times. And the request was to do some sensitivities based on different values of that.

So, Nancie touched on that in the last slide. If that catch is based on the expanded values, the other runs that we requested would be 50% of that. So, starting at 30 to 80 on that. So, if you change your initial catches based on dropping the landings amount by 50% or raising it by a hundred percent, is this come out the same or is this different?

SHANNON CASS-CALAY: We ran those sensitivity runs for the last meeting, and we could pull up those presentations again. I don't recall. I don't have it memorized. My apologies. Perhaps Nancie recalls, but it'd be better to just give us a moment to pull up those presentations. Most likely. So do you have a more—

TODD GEDAMKE: Yeah, yeah. No, no. My question was that-- because the conclusion from the last time is, and Nancie please correct me or Nathan, whoever was doing this, the presentation last time, the conclusion was, by putting in different values and Kevin, I think you, it doesn't change anything in the model. It just scales the spawning stock biomass, it scales the total biomass, the virgin, it scales everything when you change that expansion value. Is that true?

SHANNON CASS-CALAY: So, if you—

LIAJAY RIVERA GARCÍA: Sorry please for the record, state your name before speaking. Thank you.

SHANNON CASS-CALAY: So, this is Shannon Calay. So, if you scale the entire time series, right, then it doesn't change the stock status that is produced. If you scale the entire time series by a constant. These analyses are just showing the effect of a different assumption about the magnitude of historical catch.

TODD GEDAMKE: Okay, so stock status is not going to change, but it's going to scale the recommendations apples and oranges or however, wherever you want to do in terms of how you measure it. Yes? This is a critical point.

SHANNON CASS-CALAY: So, are you asking me if we scale the entire time series by some scaler, will it change the stock status that's produced by the assessment? Is that the question?

TODD GEDAMKE: Yes.

SHANNON CASS-CALAY: It will not. If you change the entire time series by a scaler.

TODD GEDAMKE: Okay. So, I have a lot of technical pieces in here, which Jason's already touched on a couple and I think this is a perfect opportunity for me to boil this, because I don't understand some of these, but I can now boil this model to the most fundamental essence of what this model is doing without all the estimations and out all the other pieces.

And I know there's a couple people nodding right now that get, that sometimes gets hammered by the quantitative. And this is very, this is a-- that question and that exchange we just had gives me the ability to basically explain this to you in the most simplest of terms.

Stock status. Our job on this SSC is to look at the data that's coming in and determine whether the science is going to support management advice. What can we use from this to support management advice? So how do we look at those parameters? We look at those parameters-- How much is being removed from the system that you have?

So, in these models, this closed system, let's assume Puerto Rico-- this is this room. This is what we're modeling. You can fit 500 people in this room right now. That is your virgin biomass. We're taking out 200 people out of this room, or let's say a hundred. You've removed 20%. You have an exploitation rate of 20%.

What this model is saying is that if you put the original expanded values of 3 million pounds over the time series, that's what the sum of Queen Trigger over the time series is, from 70, whatever the first date 'till now, it's about 3 million pounds. The model is run and you get a stock status and you get management guidance that comes out of it. Once again, Puerto Rico is this room, it is this size. Now, if we do the same exact thing and we say, "No, not 3 million pounds is coming out of the system, 1.5 million pounds is coming out of the system," the answer is the same. The stock status is the same over time. Management advice does not change over the time.

So again, visualize this room, 500 people, you take a hundred out, now you change that. You double that. You now take 200 out. This model is saying the exploitation rate is the same. It is fixed by the life history parameters, by natural mortality. So, the model is doing virtually nothing beyond everything getting driven by the initial life history parameters, and most importantly, M.

And if you look at M on this and how M is incorporated into this, you have some real problems with M being in the numerator, in the denominator. I don't know details, Jason, and please don't correct on the technical. But the details in that, how M is incorporated in there, the only way to get at fishing mortality or to get at FMSY is to make assumptions. And sometimes those assumptions can be really, really problematic.

I've got about 12 papers listing here that site, this exact thing. And I'm going to-- Jason Cope, for those that don't know, he's one of the first ones that pioneered this approach. We worked in a meeting together 2010. Him and Steve Ralston, we did a lot of extensive testing on using SS and in limited forms for data testing. And the overall conclusion about using this type of model, stock synthesis, catch and length, was the panel encourages further development, provide management advice. However, it's concerned with length data alone or sufficient to enable reliable estimates, quantities of management interest, depletion, OFL, stock status, in particular as noted past experience length data only can perform poorly when the assumptions are violated. And you can go on saying, with the panel is concerned, appear a few length samples can provide considerable amount a hundred units of likelihood on M and that apparent certainty was likely due to model misspecification, incorrect assumptions regarding selectivity.

So, some of the battle back and forth is, well that looks too perfect, or I understand this, or I don't. I want everyone to be absolutely clear. The minute you put a life history parameter, L infinity in there, the minute you start using, "I've chosen to use the Lorenzen method to estimate M. I've chosen to look at these other pe--" This where everything is coming from.

So once again, imagine you trying to explain this to-- in the most lay terms of all, that we can take 3 million pounds out of Puerto Rico, or we can take 1.5 million pounds out Puerto Rico and the answer and the management advice is identical.

RICHARD APPELDOORN: Um, we have all kinds of hands up here. I'm going to ask Shannon to respond initially, but we also have Doug and Jason.

SHANNON CASS-CALAY: Yeah, I can allow the SSC to respond first.

RICHARD APPELDOORN: Okay. Doug, and then Jason.

DOUGLAS GREGORY: Yeah, I have no intention of responding to Todd. What I was going to try to get at is-- and all the discussion points out, you know, what I consider a large amount of

uncertainty, that makes me uncomfortable, with trying to estimate MS by [director?]. The results of that also make me nervous about, you know, the possibility of a 16% SPR. This does not seem reasonable. This species, in my mind, from a life history standpoint, is not a prolific spotter. It's a nesting benthic spotter. And that, in my mind, puts me on the higher up on the susceptibility scale. So, I would only be comfortable working with the 30% SPR proxy. I don't think it would be worth the trouble to try to get the SPR estimate higher than 16 to make it more comfortable for us. That would just be a lot of work for a very little benefit.

So, I'm just too-- my [inaudible] is I will support just sticking with the 30% SPR proxy until we can get better data. I appreciate it. Thank you very much.

RICHARD APPELDOORN: Thank you, Doug. Jason.

JASON COPE: Yeah. Well, there's so much we could talk about here. I'll try to limit my comments before they expand forever, like the universe. What Doug just said is a very, very important thing. So let me just respond to that. The reason we have these SPR proxies is because we don't think we actually can estimate in the model.

The model's going to-- given your model set up, and as Todd has noted, and as Shannon has noted as well, in these types of models, we don't have the extensive data to estimate everything, so we start fixing things. And there's nothing wrong with that other than, as Todd pointed out, you just start to assume things, right? You assume that this is the right answer and that's why we do these sensitivity tests, right? We ask the what if. Well, what if national mortality isn't Lorenzen? What if it's constant and it's a different value, right? You can ask these questions and you can explore uncertainty that way. But unless you feel, by the end of that exercise, you feel really good about what you've discovered and characterize the uncertainty, going with proxies is a very common thing to do when you don't know how to estimate.

Now what we're seeing here, and I think what's making people uncomfortable is the fact that the proxy is decoupled quite a lot from the assumption that steepness is equal to 0.95. And that's a completely fair and very important observation to make. It's a precautionary one, right? Because you don't know if that highly productive assumption of steepness equals 0.95 is right. The model, again, can't tell anything above 0.85. It has no statistical way of saying whether 0.85 is different than one. But when you fix that value in the model, the model's going to give you very different results.

And this is the other thing, comment, I want to make and then I'll stop and not go on and on and on. Just to clarify, Shannon and Todd, had that discussion about scaling the whole catch time series up and down. If you scale the whole time series up and down, Shannon is a hundred percent right. You will not change stock status in the relative abundance measure. What you do change though is exploitation rates because if you have a higher population size that catches- well if you're scaling literally everything up, I guess those things won't change but your MSY values will scale up appropriately as well, right? So, it's not that nothing changes. The scale of the population will change. If you scale everything up by a scaler, translate that all the way through to MSY, MSY will go up that much more. And so, you would have a much higher catch level if you scaled everything up than you would have it lower, even though you have the exact same stock status.

So, I just wanted to clarify. There are things that change when you scale everything up and there's very important management quantities that change. It's just not the stock status. Thanks.

RICHARD APPELDOORN: Thank you, Jason. Todd?

TODD GEDAMKE: Yeah, Jason, thank you very much for clarifying the change in, in MSY too. Yeah, no, that is understood. And again it's a model con-- I think you said something that's really, really important, and that is once you do your exploring, if you're comfortable with your uncertainty and then that's also been touched on by Erik.

But the increase in the MSY is important for people to-- but that is apples and oranges units that you're using on it, everything scales up. Again, our job here is to look at these metrics in terms of management measures and are we able to get them and what is being, what is driving this is the setup on it. Thank you.

JORGE R. GARCÍA-SAIS: I'd like to make some-- Reni García for the record. I'd like to make some comments about the vulnerability of the issue for the species. And that is, as we have talked about this earlier, I believe yesterday, Queen Triggerfish a big part of the adult reproductive population is typically found below a hundred feet. In fact, we have been seeing it down as deep as 200 feet. So, the depth becomes some kind of a refugia for the species in terms of there is relatively little effort for fishermen to go that deep to fish specifically for Queen Triggerfish.

The other aspect that I'd like to comment is that by being a demersal spawner the larvae does not actually comes out of [pre-

flexion?] larvae where the highest mortality rates are typically found. It's a large, relatively large, larvae that has a much lower mortality than species that would have a lot of fecundity, but the eggs are hatched into a [pre-flexion?] larvae. So, that lower mortality by being a larger larvae gives it another aspect that has a lower vulnerability in terms of the mortality of the larvae.

So those are two aspects. I don't know how relatively important they are. But they are two aspects that I wanted to comment that actually work towards decreasing the vulnerability of the species to fishing mortality. Thank you.

RICHARD APPELDOORN: Thank you, Reni. And those are actually two points that I wanted to bring up. When we're looking at our inability to estimate steepness, would part of this be due to the fact that we're not capturing the data, the fact that the deep areas are where the spawning stock is, so when we're looking at the relationship for recruiter to spawning stock, we actually don't have spawning stock and therefore, that's why there's no relation.

When, as Reni pointed out, these things are nest builders that are doing post-flexion larvae, they should have one of the shortest larval durations and therefore, there should be a fairly close relationship between spawning stock and recruitment, which we're not seeing.

Um, I don't know whether just blowing that off and assuming an SPR30 solves that problem or not. But, you know, I think there's some biology here behind what we're not being able to estimate well. Doug, you have your hand up?

DOUGLAS GREGORY: Yes. I was just getting ready to lower it after your comment. I just wanted to emphasize that given the life history of this species, it's not likely to have a steepness of 0.95 or anything close to them. This is not a prolific spawner like you would have with King Mackerel or Mahi-Mahi or some other pelagic species.

I mean, it's just, life history is a very important influencer with Triggerfish, and I think that has been ignored in the Gulf of Mexico and Triggerfish remains an overfished and in trouble despite a large number of effort. I think that's part of it. I mean, it's a nesting species.

The Gray Triggerfish in the Gulf, the male actually protects the nest, so it's-- I highly question whether SPR, I mean whether steepness could be anywhere near 0.95 when with other species, let's say one we recently did with Scamp, I think steepness was

0.75, something like that. So that's what makes me more comfortable with the proxy. Thank you.

RICHARD APPELDOORN: So, Shannon or Nancie or whomever, does assuming an SPR30 solve that problem? Or is there something that, you know, stems through the model that we're not discussing yet?

SHANNON CASS-CALAY: So, I don't think it would ever be fair to say it solves the problem. It's very difficult in any of our Southeast stock assessments to estimate steepness and spawner recruit parameters because we typically lack any contrast.

You know, usually the fisheries have gone on for a long time before the data are available. And so, we typically have very flat series, for example. And furthermore, we lack recruitment series, recruitment indices, for example. So, what has typically been done is to fix steepness near one and use the proxy in those cases. And I'd say that the primary reason for doing so is that we're estimating then-- we're not making, let's put it this way, we're saying that whatever level of recruitment has occurred, according to the stock assessment model in the recent history, is what will continue to occur. That's the assumption that's made when you fix steepness near one. So, we're essentially using that mean recruitment that has occurred in the historical period as an estimate of what will occur in the next three to five years.

So, it's, you know, it doesn't solve the problem because any assumption can be incorrect. But the alternative is to use like a meta-analysis from literature to try to inform that proxy, to try to inform the steepness value and trust that the spawner recruit relationship, the shape, the functional shape, of that relationship is understood, right? That it is in fact Beverton-Holt and not Ricker, for example. So, there's a lot of assumptions, you know, this is data-limited and assumption rich and any of these assumptions can be evaluated, but at the end of the day, we lack data to make these estimates.

So, I mean, this is basically the state of where we are right now. There is a great deal of good discussion occurring in the chat window about better ways to evaluate model uncertainty in the future. And Erik and his team are working with us in the next SEDAR process to do those things, to do those very things in the next series of stock assessments. Right now, you know, we are essentially making strong assumptions that the SSC can certainly weigh in on. And using the control rule to expand the PDF that we get out of a stock assessment to basically replace it with a large uncertainty, which is two times Sigma_min. So that's what we're relying on right now to allow us to buffer against scientific

uncertainty.

RICHARD APPELDOORN: Okay. Thank you. That was very helpful. I'd like to get the graphs that look at spawning stock biomass and then F back up on the screen. And while we're doing that, Jason your hand is up, and I know you and Erik have been having conversation in the chat.

NANCIE CUMMINGS: So, quick question Rich, you want to see the plots from this presentation?

RICHARD APPELDOORN: That's correct, of the spawning stock biomass.

NANCIE CUMMINGS: Yes. Okay. Thank you. I'll share again.

RICHARD APPELDOORN: And then Jason, while that's going on go ahead and make your comments.

JASON COPE: Sure, thank you. First Shannon was saying was really great and I just wanted to build off of that by saying, we're lucky here that we have this, in my opinion, because we have the type of model that we have, and it's very explicit about, just what Shannon said, all of the assumptions it's making, right? Because you have to tell it all of these very detailed biological assumptions rather than rolling them all into one parameter, not really knowing exactly where the uncertainty in that composite parameter is. You can start to develop research. You can just start to develop different ways to get at either characterizing uncertainty or reducing uncertainty.

And so, just to summarize that, we have a very useful model to pinpoint the places where more work can be done because it's so parsed out biologically. And then it allows also the growth of more data in the future to be just to be put in there so you can remove an assumption and allow the data now to talk to that parameter rather than assuming it. But I think that one of the things that we have here is that these Sigma values that we apply are so large, they almost defeat the purpose of doing sensitivities and all these things to characterize uncertainty because there's so much bigger than anything that would probably be calculated through ensemble modeling or whatever. So, but the important point here is that we're trying to find a center. Basically, this reference model becomes where do you center that large amount of uncertainty? And so, choosing these fixed values then becomes really, really important because that's what centers you to the very large Sigma you will then produce. The sensitivity analyses are not symmetrical, they may show you non-symmetrical variation among around some of the parameters and I think we see that here

with, with steepness as an example though it's really, really, really wide. It's a bit asymmetric on one side if you believe at all the likelihood.

So, I just want to point to folks here that even though we're working with a really large Sigma, which reflects the large amount of uncertainty we have here, this reference model is very important to center that uncertainty. And so, understanding how we fix these things and then just reflecting back on those big assumptions, and then, as Shannon said, in the future, you're able to pick those things apart and attack them in the future and get better but we are where we're at now. And there's a whole bunch of stuff in the comment section that we've been throwing ideas out.

And the last thing I'll say is, one thing we do on the West coast that's not so good is that we have drifted away from our proxy FMSYs that we use and the actual steepness value that goes into the model. Our steepness values have crept up, but our proxy values reflect a steepness around 0.6, but we're putting in steepness values of 0.75 around that or so in our models. And that's a big discrepancy between the estimated MSY and productivity of the stock versus what the proxy is inducing the OFLs to be.

And so, one suggestion I put in here is that if you don't want that mismatch and you are fine with a proxy, you can actually tune your model steepness to match that proxy and then go forward. And at minimum, you at least have a model consistent with the assumption of your proxy rather than decoupling that and making more confusion. So that's just one thing that could be done.

But back to the assumptions, you're assuming that your FMSY proxy is quote unquote "more right" than the biology that you can assume through meta-analysis of a steepness value or whatever. So right, it's a trade off, but that is something that could be done. Thanks.

RICHARD APPELDOORN: Thank you, Jason. So, there is a chat going back and forth between Jason and Erik about appropriate values for an SPR proxy level. And for those who haven't seen it they're kind of pointing to the fact that 30 is looking to be a little bit low, especially in light of what we've said about reproduction and the species not being a prolific spawner, although it does release its larvae at a more advanced stage. That maybe this was something that should be 35, 40, even 45% SPR rather than 30. So, I think that's something we should consider. And I think, was it Doug that mentioned Queen Trigger, was actually set pretty high. So, we're looking at these and we'll have to make those kinds of adjustments.

So, Nancie thank you for putting those graphs on the screen. You

had gone through them really quickly before, which is why I wanted them back so I could look at them a little bit. And my concern was how rapidly things were changing as we changed our initial catch, which surprised me. But maybe that is because of the-- well, actually I'm having trouble reading the colors. So, Nancie which graph is based on MSY and which line is based on SPR30?

NANCIE CUMMINGS: Okay, thank you. I was muted. Thank you very much. Okay, so what we have here, Rich, and my apologies for, I know that we had, we're concerned about time, and we were trying to be parsimonious in terms of the number of slides get to just the most important ones.

So, what we have here on the left panel, again, going across a grid search from 60,000 pounds to about 160,000 pounds, we have SSB calculated SS, estimated SSB and thousands of pounds. And then on the right panel we have the estimated F. And that's given the two scenarios. And the blue line is the MSY scenario. And then the black line is, here I'll just point you, the top line is the SPR scenario. And then the vertical line on both panels, the red line, marks the candidate, I would say best candidate model and that was indicated through the lowest likelihood.

And then, so what you have is calculated SSB for the MSY scenario in blue and the SPR30 scenario in black. And then the same colors on the right panel, the calculated F values.

RICHARD APPELDOORN: Alright. Thank you. Thank you very much.

NANCIE CUMMINGS: You're welcome.

RICHARD APPELDOORN: So, just looking at the SPR30, because I think we already agreed that there's problems with the MSY scenario, on the SSB graph, we're not seeing any kind of suggestion that when you're near that equilibrium or that initial catch, that somehow things are stabilizing. In other words, it's just a straight line basically and to the degree that we are off on our estimation of what that initial catch would be. And, you know, there was some area of flattening on the MLE graphs that says there's some uncertainty, although you did have a bottom to it, that there'd be a fair amount of uncertainty in what the SSB would be in contrast obviously to the F which is a flat line. So that's going to be a constant regardless. I don't know if that's troubling or not, but I just sort of hit me as—

NANCIE CUMMINGS: Would you like to see the profile of the—

RICHARD APPELDOORN: Well, profile of what?

NANCIE CUMMINGS The profile of across the grid search. I just want to show you.

RICHARD APPELDOORN: No, I remember what that was.

NANCIE CUMMINGS: Okay. Just make sure the committee has recalls that it did have, it was flat around that area and, you know, between the air.

RICHARD APPELDOORN: Yeah. So, I assume that's why it's not really steep in the MSY scenario. But when you depart from that, it shoots up quite a bit and the other graph shoots down quite a bit. But I think we're kind of discounting using the MSY scenario. So, we're looking at the SP, and SPR scenario. And is this-- what I understand we are, this is really being driven by the life history parameters. And if you have a species that does this, it's basically telling you it has this kind of vulnerability and that's what's being reflected in what the output's going to say. So, our big thing is to try to center this as much as possible. And I'm just seeing that for the SSB value that centering it has some impact on what the SSB is going to be as opposed to F which it obviously is not.

I'm just trying to get my head around where the sensitivities are going to be. Even though, yeah, we're going to bracket this with a large, if we accept this, we are going to bracket it with a large uncertainty using the Sigma_min times two. So, thank you for showing that and explaining it.

NANCIE CUMMINGS: You're very welcome.

RICHARD APPELDOORN: Shannon, did I see your hand or—

SHANNON CASS-CALAY: Yeah, I'm not sure honestly, Rich, that this is relevant, so my apologies if I've misunderstood your question or what you were trying to convey. So, we're not attempting to find like a best estimate here of SSB equilibrium. These are just the model estimates that are produced when we project the stock at that initial catch and that steepness that is implied from the initial catch.

So, whether the results are surprising well, I think we at the Science Center agree that it would only be appropriate to use FMSY directly if you were confident about the steepness and the shape of the spawner recruit function. And we are not confident of either of those two things. And we agree that there's very little information in this model that would allow us to estimate

steepness.

So, I mean, we are supporting the use of a proxy in this case. And so, if you look at the line that is SPR30 here, and it shows essentially that the equilibrium SSB that is produced when you fish the stock out to equilibrium, it increases as your initial catches increase. That doesn't surprise me. It basically says that if you assume that the historical landings were very large, 160,000 pounds, the stock size needed to support those catches has to be bigger, right? So, the model scales up essentially the spawning stock biomass to support that level of removals. That's what happens. So, I don't, it doesn't surprise me.

RICHARD APPELDOORN: No. Excellent. Thank you for that explanation. Jason, do you have your hand up?

JASON COPE: Yeah. Shannon this is great. Exactly. And I just wanted to again, just add to her excellent explanation here.

That difference that we see, right between the blue and the black line, that's the difference between steepness and the assumed SPR that comes from that steepness. So, because what you can do is you can, you can map this. So, we see them converging, right? MSY and SPR, they're converging around, just around maybe 150 something, right? If you go back to that steepness profile that looks at the equilibrium catch or initial catch. Sorry, let's go to… yes. This one. Perfect.

Right? You're hitting that around 0.75. Yeah. Between 0.75 and 0.8. Right? But around there, that lower part, right? That's just about where they're converging and 0.75s exactly where I would expect an SPR of 30 to match the assumption that steepness equals 0.75. So, what you're saying here is that from that other really useful graph, you're just showing how, when you allow steepness to be estimated, it's going to converge to the MSY here, when your steepness matches the SPR assumption that you're making. And so, this makes a hundred percent sense.

Shannon said, exactly right. If you are less productive, in order to get to what you need to in the model, you have to have a higher initial stock size, which we call R0 in the model, if you're following the parameters. And that's why you see the spawning biomass go up. So, this makes, like I said before, this model, there's nothing weird going on in this model. It's behaving exactly as it should. And these additional runs here, were very, very illustrative of the fact that this all boils down to either, and this is all saying the same thing, which if you're going to

estimate steepness, then it boils down to what's your equilibrium catch going to be? Because that's going to define what your steepness is going to be and then it's going to go forward. Or what's your steepness going to be? That'll define what your kind of best fit initial equilibrium catch would be and then all of that's going to tie back to this SPR30.

And to my comment before, if you want them consistent, you would make the steepness consistent. In this case, steepness would be around 0.75 with an SPR of 30. That makes the model internally consistent, and you don't have any issues. If you decouple them, you start to ha start to produce an assessment that says, "well, your MSY should be higher, but we're going to apply a more precautionary SPR despite what the biology and the model says." And so, I think this is where we get to, if you want-- now this gets to what Erik was saying, maybe SPR of 30% is too high. Maybe it's 40%, maybe it's 35%. I don't have a strong opinion on that. I'm just saying whatever you pick, it's probably best to make the model internally consistent with it and then move forward. And now you know where you've centered your model, you've centered it around either steepness value or it's analog, an SPR value F SPR value. And then you move forward, and you know exactly where you are, where the model's centered. The Sigma will then incorporate all around it and you go forward with this very nice strategic model were it's tactical in the sense that we can set catch limits, but strategic in the sense that you know where to go now next to start to try to bolster up the information needed to inform parameters rather than fix parameters. Thanks.

RICHARD APPELDOORN: Thank you Jason and Erik, you have your hand up?

ERIK H. WILLIAMS: Yeah. Thank you, Rich. This is Erik Williams. So, a lot of the chat, and I know we probably shouldn't be doing too much chat, we should do more on the record. I think sort of discussion about the SPR is, what is the appropriate SPR? And not having worked with this region for very long, I'm just relying on, is there a precedent? is there a reason? how did SPR30 come about? Is there any analysis or any discussion or expert opinion that sort of arrived at SPR30? Or I think understanding how that value was derived will be important to determine whether we should go forward with it or not, for this species.

But along those lines, I will add this. Jason's right there is a one-to-one mapping of steepness to SPR values, but you don't have to have those in alignment. You know, SPR values imply a level of biomass or level of stock condition that you don't want to get below. A steepness, more or less, helps you to define what the

production function looks like as you get to low stock sizes, what happens to recruitment? Those don't necessarily have to be coupled, in an equilibrium condition you'd want those coupled, but there are two different assumptions going on there. I mean, by fixing steepness at lower and lower values, we are assuming that as this stock gets decline, if it declines, recruitment will decline with it at some point. And I don't know if that's true or not. From my experience with the South Atlantic, it doesn't, it rarely seems to be the case. We seem to see conditions where actually, in some cases recruitment goes up sometimes when we get to really low stock sizes.

So, I just want to throw that out there. Not meaning to muddy the waters. I think Jason's recommendation is still fine. I think that's fine to make steepness consistent with the SPR. My only concern at this point is making sure that we've established a sort of an administrative record of sorts on why SPR30. And maybe that's already been established and that's just me not knowing that background.

RICHARD APPELDOORN: Okay. Thank you, Erik. Doug, you had your hand up? Okay.

DOUGLAS GREGORY: Yes, I was going to try to respond to Erik. In the beginning of using SPR, the basis was, work done in the Northeast with Wendy Gabriel and others that indicated that around 20% SPR was appointed where the stock could collapse. And from that 30% SPR became a target and the 20% was the limit. In the Gulf, when we first started doing stock assessments, everything was overfished. So, in a way, 20% became a target unofficially until we could get there with Red Snapper. And I know later, as y'all discussed in the chat, William Clark and others in the Northwest, did a bunch of analyses and work concluded 35% SPR was probably more appropriate. And it pointed out, I think, by Nathan that he was working with Groundfish that have a longevity of a hundred years.

And there's been recent analysis, Nathan's done some analysis on different species that show different SPR that are appropriate for them. So as long as-- 30% is a starting point, if people want to be more conservative, we really have no basis. I don't think there's any metadata on Triggerfish types, you know, life history. So, it's just a shot in the dark as the 30%, 35, 40% depends on how conservative people want to be.

In the Gulf we have been comfortable with 30%, with some objection by a few people, but it's been a good goal for us as far as, when we can reach it, things seem to look pretty good. King Mackerel is

a good example of that. That was highly fished and overfished in the eighties and seventies and now going very well with that sort of goal. So that's what my history is with it.

Going back to [inaudible]and the initial, using it, getting away from yield per recruit and using SPR as a more reproductively related goal. So, thank you.

RICHARD APPELDOORN: Yeah, thanks Doug. Was Gray Triggerfish looked at and was there an SPR for that, that was other than 30?

DOUGLAS GREGORY: This is Doug. Yeah, but I don't recall the details, Shannon might. So what our goal was, whether it was 30% or not, but whatever our goal was, we're not reaching it with Gray Triggerfish. And that's the problem with management there. And again, it makes me suspicious of whether the management measures put in place had been effective or not. But I don't recall what the actual practical was.

RICHARD APPELDOORN: Thank you, Doug. Shannon?

SHANNON CASS-CALAY: Most of the Gulf species are set at F at SPR30, the proxy. And you know, we have a few different research efforts to try to inform SPR proxies, and one of them is a paper by Hartford et al., that I can pull. And essentially, he looked at reef fish species and those analysis largely supported SPR values larger than 0.3, so closer to 0.4. Some of our analyses in the Gulf where we have data rich stock assessments allow us to kind of establish a bottom line, a bottom limit, for what we think SPR ought to be. And in those data rich situations, the bottom limit is often close to 0.3 or even a little lower. So that's a paper, that work was done by Dan Goethel et al. So, I think, I don't, I'm pretty sure that the proxy for Gray Triggerfish is still 30%, sometimes I am incorrect. That species, we see now a long history of low recruitment and so there may be some environmental signal there that we have a lot of future research efforts going into Gray triggerfish to try to determine why that species has not responded to management as Doug was saying.

So, would it be helpful to pull those two papers? But I'd say largely that the Center's research for reef fish stocks often supports proxies closer to 0.4.

RICHARD APPELDOORN: Okay. Thank you very much, Shannon. Uh, any other questions or comments around this? Doug, is your hand up again or you didn't put your hand down?

DOUGLAS GREGORY: I just forgot to put it down. My apologies.

RICHARD APPELDOORN: No problem. Either for Nancie or the analysis in general for the Science Center. If not, then I think we have some decisions we have to make. I am assuming, so, correct me if I'm wrong, is that the first decision is we accepting this analysis as, and we can have some debate on the SPR level we'd like to put if we're accepting, but are we accepting this approach as being useful for management? So, the next step after that would be the calculations of the corresponding ABCs and OFLs. So, what does the committee think? Erik?

ERIK H. WILLIAMS: Yeah, thanks, rich. Yeah, I do think we're, we're, we're narrowing this down to, as you pointed out, you know, the important decisions we need to make, but I think this is the best modeling construct we have for this species, given the data. I don't think we're going to be able to do any better. It is the sort of standard in the stock assessment world. To be explicit with a lot of these things and that therefore, as Jason pointed out before, that you could use this model construct to advance as we get more data, as we want to explore uncertainty in different ways. This is the way to go. So, I say that this is good for management. It's just we're going to have to probably pin down some decisions, as you said.

RICHARD APPELDOORN: Yeah. I'm glad you put that last part because you know, there is, is this the best we can do? Question. But then there's the, is it good enough part? And so, your last part saying that you think it is sufficient for a management, answers that last question, Jason?

JASON COPE: Yeah. I second everything Erik said. And I think just to be specific, it's choosing either a steepness value or a proxy. Again, I think there's value in making them consistent, just if nothing else, to not produce MSYs that have such a big difference as we saw clearly in the stuff that Nancie was showing, that you can create these big, big, big differences between the proxy. So that's just a consideration. But the other consideration is also, are you going to make the initial biomass consistent with the choice of—

So there's, what's the proxy-- So maybe this is a way to say it. Are we estimating MSY or using a proxy? it sounds like to me, clearly a proxy is the way to go. With that, what is the proxy? So that's one question. Once you choose that, then the question becomes, are you going to make the steepness consistent with that

proxy, yes, or no? Once you decide that, you're then going to ask yourself, are you going to make the initial biomass? And the Science Center folks can correct me if I'm off on this one, are you going to make the initial biomass also consistent with what you would expect is kind of the best supported as those profiles on the initial biomass?

Those are pretty informative it seems. So, the model does, given your steepness, seem to push it towards a certain initial biomass, right? All these things are related. Just being very explicit that I think that's the order of operation here. Proxy or no proxy. If proxy, what is that proxy? Do we want to then, then we have to choose a steepness value. Do we want to match that, make it consistent with the proxy? And from that point, do we want to make the initial biomass consistent with the steepness that's chosen? Thanks.

RICHARD APPELDOORN: Thank you, Jason. That was very nice in laying out what we're looking at here. Yeah, Todd.

TODD GEDAMKE: I'll just give a statement here and I agree that this model construct is unequivocally the best that we have. It's great for modelers. This model construct is even much better for the Southeast Center Stock Assessment Group, who are entirely an overly worked beyond belief with anything under the sun. Uh, so there is zero argument that SS is a very valuable tool.

There is so little information that is being calmed directly from this fishery to pin this down. The question is, does it give the right answer? Are we in the right place with this? No one's arguing that SS is great, and we can do it. But we are talking about which proxy and which MSY but fixing all the life history parameters, not investigating them, we requested investigations on that.

If you gave this to me and ran it, I can make this say more or less, whatever, whatever you want. You've got a hook and line that was added to a trap at 20% just added to it without accounting for selectivity. You've got recreational data that is changing. I mean, there's decisions that are being made throughout this, that are dependent upon the analyst. So, it's one of those that you could go back and we could discuss the subtleties in the modeling, but the setup and how you decide to inclusive parameters is so critical to everything and is defining the final output of this. So.

RICHARD APPELDOORN: Shannon?

SHANNON CASS-CALAY: Yes, thanks, Rich. So, we did prepare a paper, which was submitted to Graciela, that describes all of the

sensitivity runs, which the Science Center presented at the previous SSC meeting. So, the presentation is available from the last SSC meetings materials, and the document was submitted for this one, and we did explore the sensitivity runs that were requested.

TODD GEDAMKE: I will say that's not true because we requested sensitivities to L infinity and sensitivities to M. And I have not seen a sensitivity to M which you know, all I have to do is change that and fix it at rates that are 0.05 different and you're going to get a different result.

SHANNON CASS-CALAY: So that's patently false. We did absolutely explore the L infinity and changing those assumptions required recalculating M and we described to you that in fact the growth parameters weren't greatly changed, but what we learned about the potential maximum age of the species did change. And that's what reduced the M because-- So what happened was, we got new information from North Carolina/South Carolina, which suggested a much higher maximum age potential for Queen Triggerfish. Because that maximum age was much higher, we recalculated the M vectors, which greatly reduced the magnitude of M. And so, there was a large sensitivity to the M. We demonstrated that. It's absolutely true. Changing M has huge sensitivity in all stock assessment models, everyone.

And there is not, you know, there are almost no stock assessments conducted in the Southeast region that can freely estimate M. There are some that have better explored uncertainty through procedures like the Montecarlo bootstrapping estimates, but in every Gulf stock assessment where the data are actually far more abundant, we fix M, and we explore it through sensitivity. And it's always extremely sensitive in every stock assessment model. So those assumptions are crucial.

But what we used for M, at this time, is essentially the growth curve information provided by Virginia Shervette from studies done inside the U.S. Caribbean, and we calculated the age specific M factor from that Lorenzen procedure and fixed it in the stock assessment model and demonstrated that that assumption is sensitive.

TODD GEDAMKE: So, I apologize if I missed that. Our Chair also missed that because we discussed this repeatedly. Those sensitivities were just missed. We did not hear that because we have discussed that. And I just don't want to enter a gloss over that, yes, all of that was done. But every time the word calculated is used, we calculated a Lorenzen and we cal-- these are decisions

made by the analyst. The decisions are-- so anyway, Shannon, I apologize for missing that, but I believe that everyone else here also missed it.

NANCIE CUMMINGS: Excuse me, Mr. Chair, Ms. Cummings is requesting to speak. I can't find the hand wave.

RICHARD APPELDOORN: Yeah, go ahead Nancie. Thank you.

NANCIE CUMMINGS: Thank you very much and apologies for missing the hand wave. I just want to share with the SSC that the sensitivity paper that was provided on page seven is that sensitivity to the L Infinity. Um, and that incorporated the new TMAX and that was provided, the paper, was provided to you also in your package. Thank you very much.

RICHARD APPELDOORN: Yeah, that's the one that was recently sent, right?

TODD GEDAMKE: When was that sent?

NANCIE CUMMINGS: Yes sir. But the sensitivity was presented-- Thank you, Todd-- was presented at the October four and five meeting, the PowerPoint. And so that PowerPoint was provided to you there prior to the October meeting and then a document, a very brief document, was also provided to you this past week.

TODD GEDAMKE: Well, I'll apologize for myself, the Chair and everyone else that missed that.

NANCIE CUMMINGS: No problem. There's a lot of-- we've gone through a lot of machinations with this assessment.

RICHARD APPELDOORN: So, we've had Erik and Jason both state that they believe that not only is this kind of the best way to go, but they feel that this can be used for management. Is anyone going to, from the committee, going to disagree with that?

TODD GEDAMKE: Yeah.

RICHARD APPELDOORN: Okay. Todd, can you just give a brief explanation?

TODD GEDAMKE: Yeah. I mean, I could take this model set up right now, I could change a few parameters, calculate M differently, make different assumptions and come up with something that's totally different. A totally different answer.

And I mean, Jason, I don't have this set. I can do it, but you know, this is a length based stock status determination. You're getting this from nothing but the length base of the beginning. We've spent years and years and years looking at that here. It is now wrapped up in a black box that virtually Jason and Erik get it. I kind of get it. A lot of people don't get it.

So, for me, this is just a black box that's been obfuscating what are assumptions that are built, that are into it, that a different analyst could do this differently and come up with a very different answer. And it's not repeatable unless you are working with the same people and the same as the same assumptions.

So, we use Virginia Shervette's, yeah, we looked at that growth curve. I pointed out the single value and said this L Infinity needs to get changed. You got different values. So that's-- all mine is that you could set this up, there are so many assumptions in this, that you could come up with a different answer by it being a different person.

RICHARD APPELDOORN: So, what the process, I think, was supposed to be is that as one works through this, one is trying to build consensus on what the parameters should be so that there's agreement on that. Whether that's been achieved or not, that's another story. Erik.

ERIK H. WILLIAMS: Yeah. Rich. Thank you. So, Todd, I will say this, I get where you're coming from. I think the idea, we do need to separate the difference between, you know, a flexible state-of-the-art model configuration or structure, and then how we parameterize it and what we can use that model to get information out of. And I think that's where, I think, Todd's having some angst and I get it because this model does require us to make decisions. But we do need to make decisions on that. I think that's the point. And the question is how do we make, I think, Jason was hitting at this, how do we make a sort of central base run decision on some of these things and then how do we characterize the uncertainty around them? That's where this still is a very useful tool and it still forces us to make those decisions. And we're going to have to make those decisions. Unless, what we're saying is, we can't make those decisions and that's a totally different situation than if we just think there is no way to make a decision on what is, say, an appropriate growth curve or what is an appropriate SPR proxy then we're completely lost at that point. I don't think we're there. I think where we're at is we have a nice model construct. We can make some central tendencies assumptions, but then we can also characterize the uncertainty around those things. And the question then is what comes out at the end? Do we have such a range

of uncertainty that the model is saying that the population could be anywhere from zero to a billion fish? I don't know, that's what we need to explore. And then if the uncertainty is that great, at what point, and I don't know the answer to this question either, at what point does it become a useless tool for managers? Because what we're saying is we know nothing.

I don't know that we're there yet. I think I made these comments at the last meeting, something similar to this. We need to explore that. We need to see sort of explicitly how our uncertainty about certain things feeds into this model and gives us an overall uncertainty of the final output. And then we can look at it and say, is this just too great for us to even use as a tool or not? But I don't think we're there yet to throw this whole thing out.

I think the tool is there. The decisions have to be made. And maybe this is, I mean, I hate to say, maybe that's what we need, to more carefully go through each of those, so that SSC members are comfortable with, you know, what are all the decisions that had to be made and are they comfortable with those or not? And maybe that's where we're stuck now. I don't know. But-- I don't know. I hope that helps us to maybe move forward. Maybe not.

RICHARD APPELDOORN: Thank you, Erik. Todd.

TODD GEDAMKE: Erik, thank you very much for those comments. I agree with everything that he said. And he didn't answer some of the end questions on it, but, you know, the model's clear. I obviously missed some of the pieces in there.

So, I want to be also clear that the tool itself is not at all in question. And in our case, I said--

DOUGLAS GREGORY: Excuse me, for some reason I can hardly hear Todd. You need to speak in the microphone or turn it on or something.

TODD GEDAMKE: Sorry, Doug. No, I was speaking to the side of it, Doug, and I can't believe you just asked to hear me. That was nice.

I was just-- so, Doug, what I was saying is that I agree with Erik entirely. I want to be absolutely clear that SS is the state-of-the-art tool. It is the way to go. And the comparisons that are being given, in a lot of cases, are in situations that have more data. You know, the-- so I just, once again, I missed the sensitivities. I don't see how we really have captured the uncertainty of the starting conditions. And I believe when we were arguing about the base case and the medley scenario, Erik, walked

back from doing medley across the whole thing to doing a medley around just the starting conditions and that was my minimum threshold for accepting this. Was just an explicit evaluation medley of the initial starting conditions, because that's what determines stock status. That's what determines the whole thing, the whole kit and caboodle.

So, your MSY, although it scales depending on your landings, but if our landings are so unknown and across the board, we're still saying that your stock status is coming right of the start of this. So, before they run the model and before the model's run, you can basically determine stock status by the input parameters.

So, my recommendation would be keep the model, there's needs to be-- or my stance on this is that Erik's statement from, I believe the October meeting, where at a minimum medleys around the starting conditions would be extremely helpful to have confidence in these results. So, thank you.

RICHARD APPELDOORN: So, comment on your comments. So, for the committee, medley was, I think Erik was using the term ensemble. So, you all know that's the same thing of what was going on there. And that we had learned that while the group in North Carolina has a model that's capable of doing it, that stock synthesis does not have that capability at the moment. It is something that they are trying to add, but it's, according to Shannon, it was not something that's going to happen instantaneously. So, this is where we are at the moment. Yes, Shannon?

SHANNON CASS-CALAY: Yes. Specifically, it's the MCBE procedure that's frequently, well always, done in the South Atlantic using BAM assessment, Beaufort assessment model, that has not yet been integrated into stock synthesis, although we certainly do recognize the value of that endeavor. There always is the possibility of creating a model ensembles, and that is something that we can do. But, you know, we did discuss that and move forward with the recommendations of the SSC.

If we want to open the floor to additional model runs, that could be considered an ensemble. You know, that is something that can be done given sufficient time.

RICHARD APPELDOORN: Walter?

WALTER KEITHLY: Yes, thank you, Mr. Chairman. This is Walter Keithly. We've been discussing the initial equilibrium conditions quite a bit on this fishery and the, I guess, electronic data sets begin in 1983. However, and I'm going to show my age here, I

remember the Department of Agriculture having data back prior to 1983 back, in fact, I checked with Graciela, and it was back to 1965. And as Graciela pointed out, because I could not remember, the species may be aggregated to some extent, but the data may still allow some information to be given regarding what the upper limit on what landings may be back prior to 1983. Has that been looked at all? Thank you.

SHANNON CASS-CALAY: So, I'm staring at Adyan. I think that's going to have to be a very important research recommendation. You know, I don't think it came into the SEDAR process for SEDAR 80, but if that data can be made available, I think that would be very important to consider in future assessments.

WALTER KEITHLY: Thank you.

SHANNON CASS-CALAY: Nancie has a chat. She just said to me that, she says that the early data, she's aware of it, it's not species specific and only for a few groups. So difficult perhaps to use, but it is still something that we would like to understand better and certainly document what can be done with it.

WALTER KEITHLY: Thank you. This is Walter again. Yeah, no, I know it's an aggregated group, but it would give you at least a maximum catch during that period. That's what I was thinking of. Thank you.

RICHARD APPELDOORN: Yeah. The data, you know, show by the time we're getting to 1983, catches across the board are declining rapidly, if not bottoming out near that time. And it's different for different species or as I said, species groups, when they hit that. But the late seventies are kind of when the total landings peaks is supposed to occurred and then things come down. So that's why, you know, I was going to say, asking about this equilibrium situation because clearly there was an equi-- we don't know exactly what was happening for a Queen Triggerfish, because we don't have the specific data for that. But basically, everything's coming down it's not surprising that, to assume that Queen Trigger would be facing that same problem. Reni.

JORGE R. GARCÍA-SAIS: Well, I don't have my report for mesophotic, [inaudible] of mesophotic habitats. But one thing that I do remember is that, we carried out the initial survey of mesophotic habitats within the U.S. EEZ, Puerto Rican EEZ in 2010. And then we repeated the survey in 2018 and '19, right after Hurricane María. Queen Triggerfish is one of the species that I recall that we saw a significant increment in population. Sample size, small, you know, I believe it's in the range of less than a hundred

individuals, but still it was it was a statistically significant increment from the previous survey on the same habitats that we had previously studied.

So, from my small sample, what I can say is that we did see an increment in density of these species across the habitats that we surveyed that included Bajo de Sico, Abrir la Sierra, Tourmaline. I believe those. Oh! And, and Desecheo. Those were the habitat that we checked. And most of the fish were in that range between 40 and 50 meters associated with the rhodolith beds.

RICHARD APPELDOORN: So, without having to do a motion and a vote, what I'm seeing from lack of response from the committee that they were basically agreeing with Erik and Jason, but then Todd gave a kind of his view on that, which the committee is now here. So, I'm going to ask the question again. For the rest of you who haven't expressed an opinion, do you feel that the model is acceptable for management purposes? Subject to looking at the questions of proxies and proxy levels and what adjustments would need to be made given that decision? J.J.

JUAN J. CRUZ MOTTA: Thank you. In terms of the model itself, I have no concerns at all. I think the work was really good.

Now, the second part can we use that as a tool for management? I think it could be used as a start, however-- as a start, as a benchmark or starting point from which, we can then develop some indicators. And the point that I want to raise here is, given the characteristics of the data we have and all the concerns that my colleagues have mentioned, my view is that if we keep insisting on only using stock assessments as the only management tool, we will have serious difficulty. So, it's okay. I mean, like, I would say yes, I would support accepting it or recommending its use. However, not as the only source of information because we are assuming too many things that we really don't know, and we definitely need to find other ways to inform the Council for management. Thank you.

RICHARD APPELDOORN: Thank you J.J. Reni, then Michelle.

JORGE R. GARCÍA-SAIS: Something else that I want to contribute here is the fact that I've heard that this model is very heavily dependent on the length data and the fact that perhaps the areas, the habitats, where most of the adult reproductive population is found, are not being exploited, are not being fished, suggest to me that a lot of the fish that we have data for, length data, are fishes that are not being caught in the areas where most of the adults are. So, it's probably, I don't have the data. You can look at my reports to see what the median or the sizes of the fish that

we see there but we probably looking at a data set that excludes most of that adult population, a large adult population, that are found deeper in deeper waters.

So, for that reason, I believe that we may be missing some very important information regarding these species, particularly important for these models. So, something to keep in mind.

RICHARD APPELDOORN: Michelle.

MICHELLE SCHÄRER-UMPIERRE: My main concern is along those lines. Even the growth parameters and other estimations are based on our limited knowledge of the range of the species. So, we know that these fish can live up to 400 feet and we're only getting data from, probably less than a quarter of that. So, my main concern is that we are not seeing the whole picture here. And we did see, when we decided to take out the North Carolina/South Carolina fish out of that, we did see that the model was very sensitive to L Infinity. I think that was one of the reasons that, not only because it wasn't validated, because we've done a lot of assessments before with unvalidated data, because that's what we have and that's what we have to work with. So, I'm more concerned about, you know, the parameters going into the model and how that may change drastically when we can actually sample the whole population.

RICHARD APPELDOORN: Sorry. I was writing. Shannon and then Nelson.

SHANNON CASS-CALAY: Yeah, thanks. So, I think those are very valid considerations. I did want to point out one technicality, my apologies, but it wasn't the L Infinity that actually was sensitive. The L infinity was not very much changed by the addition of the North Carolina/South Carolina data. What was changed was the maximum age and the implied natural mortality that comes from using the Lorenzen M with a TMAX, with a maximum age.

So yes, you are correct though that if we were to expand the sampling programs to make sure we capture the entire geographic range of the adult stock and that could change our perception of growth, if more larger fish were sampled. Yeah.

RICHARD APPELDOORN: Nelson.

NELSON CRESPO: Thank you, Mr. Chairman. Nelson Crespo for the record. What I'm concerned is that this fish is not a target that is preferred, you know, by the communities. And if we have an order, we go there and get it because most of the people prefer Snappers, Tuna, Wahoo’s. Because it depends on the landings it's

going to-- if we don't have the demand for the people that want it, maybe to make turnovers or whatever they want to make with them, how are you going to consider that when you're going to play measure with this model?

RICHARD APPELDOORN: Thank you, Nelson. Shannon.

SHANNON CASS-CALAY: I can respond to that. We actually have a very similar experience occurring right now with Red Snapper in the Gulf of Mexico. And what happened is that Congress funded a very large 10-million-dollar survey of Red Snapper, which allowed us to understand better how many of those animals are located in, what we're calling, unclassified bottom structure. Right? And so, it expanded our understanding of the size of that population.

So, then the next step was, given that information, we had to test hypotheses about how the fisheries would respond. Because a larger stock could support a larger annual catch limit, only if the fisheries then expand across that unclassified bottom habitat and catch those fish in the less desirable locations. Because constrain the fishing effort to its historical footprint and you increase the catch recommendation and they continue to take it out of the local area that they fish, although it doesn't cause an overfished condition across the whole stack, it can deplete your fishing area to a point where fishing becomes undesirable in your most important location.

So that is the type of analysis that could be done. And that basically requires a cooperation between the SSC and the Councils to understand what the fishermen prefer in that case. Do they want to increase the size of the catch recommendation at the risk of depleting a favored fishing habitat? Or is it more desirable to do something else? And so, it becomes, at that point, a management objective, a question of what is your management objective?

And so, what I'm getting at is we have exactly that type of information coming in the Gulf that has changed our perception of the stock size and its distribution across deep water habitats that are not frequently accessed by the fishermen. we have the capability to make those evaluations.

RICHARD APPELDOORN: Thank you. Julian are you-- okay.

JULIAN MAGRAS: Yes. Good morning, Julian Magras for the record. Well, listening to all of this, I know the fishermen have sat in many meetings and have talked about the market driven fishery in both, Puerto Rico and in the U.S. Virgin Islands. The Queen Triggerfish, I know we haven't gotten to the U.S. Virgin Islands,

is a top fish that is [inaudible] there, but it's also market driven by size. And here in Puerto Rico, it's not a targeted fish because they don't care for it like Mr. Nelson just said.

So, the length data that we have seen is pretty much what they can support while catching it. And I think that the information that's missing here is the information that needs to be requested from the fishermen to be collected. You know, we have done a lot of studies in the Saint Thomas/Saint John district when it comes to the Queen Triggers of all sizes. From the very small ones to the very large ones, when it was requested upon us. A lot of life history stuff has been done and a lot of size composition work has been done.

John Hoenig has done a lot of studies on the Queen Triggers. We had Dr. Olsen that did a lot at the Saint Thomas Fisherman's Association. Virginia Shervette has ongoing stuff going on with the life history and everything. So, I think, sometimes, when we look at what we are doing here, before, I know we have dumped a lot of money into stock assessments and I continue saying we have wasted a lot of money, because before we do these assessments, it would be great to request the information that is needed in order for the stock assessment to work. And here it is once again, we are at a point where we are struggling to get through this assessment because we don't have the information.

And what I've been looking at here is the fishers, once again, is going to be taking a reduction because of the uncertainty. But the uncertainty is not because of the fishers, it's because of the managers who have not done their job. And we need to fix this, so the fishers and the people, the socioeconomic part of it, is not impacted by the decisions that are going to be made. And, you know, I am tired of begging, we need to fix it. This is the greatest time in our history, I've been involved for 19 years and we at the point where we can get the information that is needed, slow down the process, it's not a rushing game, fishery's not going to be overfished because it is market driven and get the information that is needed to do these stock assessments. Thank you.

RICHARD APPELDOORN: Thank you, Julian. Vance.

VANCE VICENTE: Well, when one is not knowledgeable enough about an issue, you either respect and accept the experts and the integrity of those experts in their propositions. And I trust Shannon and all on the work they have done. I trust them as a-- I trust their integrity, their scientific knowledge, their dedication, and I respect much of their time that they have put into this. And I know that when one doesn't know enough about the

life history characteristics, or parameters of a given species, well, you do the best you have, the best you can with what you have.

And I've been looking, for example, of what affects the spawning ratio. Well, you have to know or have a good idea of fishing mortality, but we don't have a specific knowledge of the fishing mortality of the Queen Triggerfish. However, based on other models and the literature, the spawning ratio varies between 20 and 40, and in this model we use 30. Okay. So that's somewhere between 20 and 40% of the spawning ratio.

So, in short, because I can go very long, talk very much when I don't know much about something. So, but I respect, and I think that the model based on the information that we have is useful for management and it will be modified as we improve our knowledge and recompile the information that does exist from the fishers and from non-fishermen, and it will be continuously improving.

So, again, I thank Shannon and all for this effort, and I think that the model is useful for management decision at the present moment. Thanks. Vance Vicente, by the way.

RICHARD APPELDOORN: Jesus you have your-- is it specific to the question of whether this model is suitable for management or not?

JESUS RIVERA HERNÁNDEZ: Just want to say-- Jesus Rivera, for the record-- that I just lost a little bit connection after the third shatter talk. We have samples for deep water stuff. For Deepwater Triggerfish. It's not true that all are shallow water, we have deeper waters Triggerfish. They are not the bigger one, are not the older ones, are not the main one for Puerto Rico specifically. That's it. That's the only thing that I want to say. Any other concern about or research is on the paper. So, you can contact directly. But I think that we did a comprehensive study on what the fisherman catch, and we also go further on that. So, thank you.

RICHARD APPELDOORN: Alright, thank you. The question is not on whether the growth information carries that information, but whether the population information carries that information.

So, Shannon, getting back to a point that you had made in terms of, I like that analogy you gave in the situation in the Gulf. So, I guess two things. One is a slight departure. How does this differ from something like you have, closed areas, where you have a population there that's presumably contributing to the reproduction of the stock, so it's part of the spawning stock, but

it would not be part of the exploitable stock. Is that kind of an analysis situation?

SHANNON CASS-CALAY: Yeah, it's a complicated, right? Because across the unit stock, if you have a cryptic population, a cryptic segment of the population, that is not fished on because it's in a closure or because it's too far from shore for the fishermen to reach, then the stock-- When you create things like stock status determinations and you want to understand if the stock is overfished or experiencing overfishing, then you have to consider that there is this cryptic population out there that's not accessible by the fishery and so, you are less inclined than perhaps to declare the stock overfished or overfishing. But the reality is what the fishermen care about is what they can exploit, right? And it doesn't necessarily, if you have a part of the population that is far offshore but they can't reach it because of economic considerations, for example, then what you really want to provide your management advice in is, how to sustain the populations that the fishery can access to make sure your fishing communities continue to have sustainable extractions of that resource.

And so, it has been relatively nuanced in the Gulf of Mexico, whereas we found out that the population size is in fact much larger than we knew, and that there are many older fish distributed across, what we call uncharacterized bottom, but is likely to be very small scale structure, scattered across deep waters in the Gulf of Mexico, it actually didn't change the catch recommendations as much as people expected because unless the fishery could change its behavior and decide to exploit those deep water populations where the fish are in far less density than the exploitable stock in the areas that they exploit, the catch that you can take out of the areas that they historically exploit, didn't really change based on this new information that we received.

Now, it would've been different if the fishery had decided, okay, we're going to exploit this stock at these very low density places, and then we could have given them a higher catch recommendation. So, what I'm getting at, you know, I'm sorry if I am not making my points clearly. It's difficult if you-- if there is a population of Queen Triggerfish that is in deep waters, that the fishery is not currently encountering, and thus we have no length measurements from those area. If we were able to find out that that cryptic biomass existed through some new research, it would actually be most only likely to change our catch recommendations, if all else was not changed. Right. If it didn't change-- let's say that it doesn't-- it's going to change our perception of growth, potentially. It would allow us to better estimate selectivity,

potentially, in this model. To have access to that information.

But if nothing else changed besides there is cryptic fish out there that can't be accessed by the fishery, the catch recommendation, in the areas that are historically exploited, would be probably quite similar. It would only in-- we'd only be able to increase it if the fisheries wanted to expand and exploit those deep water habitats.

RICHARD APPELDOORN: So, for example, the estimation of spawning stock biomass, we'd only be looking at that exploitable area that's coming out of a model like that.

SHANNON CASS-CALAY: Well, I mean, I think we are in a state of information in the Caribbean that, as we get new information, it is quite likely to change our perception of growth rates and things like that, right? And so, it's less clear in this case because the model would very likely change, and the catch recommendations would change based on this new information. That's why I said "all else being equal," if nothing changed about our perception of growth, and nothing changed about our perception of selectivity, except that we found, through additional sampling, that there are a large number of older fish offshore, to keep the stock in the historical fisheries at the levels that are sustainable, the maximum sustainable level, inside those historic fishing zones, that catch recommendation wouldn't change as much as you might expect, given the new information about cryptic biomass. It would make the stock more resilient, less likely to be overfished because you could take out all of the fish in the exploited habitats, right? The fishermen could catch very little because there's nothing there, and there'd still be that cryptic biomass out there pumping out babies. The fisheries can't necessarily access them.

So that's why it requires-- if we found out about cryptic biomass, that was unexploited by the fisheries today, that's when you need a conversation with the fishermen and the managers to determine what are your objectives? Does this fishery now want to expand to these offshore habitats or not? In order for us to give rational advice.

But this is all very hypothetical because we don't have this information yet. So, everything I'm saying is completely hypothetical.

RICHARD APPELDOORN: Reni and then, Michelle you had--

JORGE R. GARCÍA-SAIS: Reni García, it's that, as some of the fishermen have commented, Queen Triggerfish is not a primary

target. That is the main issue here. Queen Triggerfish, the capture of Queen Triggerfish in traps is mostly, of course, when fishermen are targeting lobster. So, the Queen Triggerfish goes into the trap. For the catch that is in hook and line, typically people that are fishing for Red Hind. So, and or Lane Snappers and things like that, you know, and unfortunately those catches are in shallow areas where you get a lot of small juvenile Queen Triggerfish.

So, I mean, I appreciate the comment of the probability or the possibility of expanding the fishery towards offshore waters, but that's probably not likely to happen anytime soon because fishermen are not actually going fishing for Queen Triggerfish, you know? So, that is that.

From another angle, regarding the model. I don't know the intricacies of the model, but what I can see, this is a very over simplistic viewpoint, but for what I can see the two main sources of uncertainty kind of counteract each other. Because we have the issue about the vulnerability where we might have been too liberal and some of the main experts here, fishery biologist, believes that because of the high vulnerability of the fish we should have been more conservative about the SPR30. But, on the other hand, from the growth parameters perspective, we may be losing, in the data, the larger fish. So, in my perception, those two uncertainties kind of counteract each other. So, I'm, I'm willing to accept the results of this model. So that's my comment. Thank you.

RICHARD APPELDOORN: Todd.

TODD GEDAMKE: I just wanted to follow up on the cryptic biomass. Shannon makes great points. It's just a nightmare for stock assessment folks to deal with those deeper waters. Statement was made, fishery is not counting in them, we have no length measurements. This is one of those places where I say, again, there is decisions that were made in this process. The main assumption of this is length data are representative of the population. Cryptic information makes that extremely challenging, but decisions made by this team muddles this issue.

You have two fleets that are being modeled. You have a dive fleet, which is less than a hundred feet, 120 feet. You have a trap fishery, which is generally less than 150 feet, across the board. And then you have a hook and line fleet, that operates in the deeper water with the larger animals. Now, a decision made by this team was to take the hook and line fish and lump them into the trap fish. So, they ignored the gear that was captured, they captured six-- In the last three years, 14,000 pounds of queen

trigger have been captured, and that was added to 66,000 pounds for the trap. So, they added 20% of the landings to a different gear and that gear happens to occur in the deeper waters that we're referring to. Shannon, please correct me. Thank you.

SHANNON CASS-CALAY: No, Todd, you're not wrong. But we did examine the length composition data from both of those, and they were essentially identical. And the selectivity was essentially identical. And so, we have to account for total removals. The assumption was made that the selectivity of those two gears are identical and they were lumped. And that is true. You're correct.

So, if in fact-- I mean, we see no evidence that there were larger fish collected by the hook and line fishery in the length composition data we received.

TODD GEDAMKE: I'm just, once again, highlighting decisions and the length data being representative working with those individuals in the deeper water. Are you picking it up? I don't know. But we're talking about cryptic biomass. We're just talking about where we're setting up this domain and adding it in, having a selectivity. You said, "Yeah. No, we assume the selectivities are the same." Ask anyone from anywhere is a selectivity of-- what is the functional form of the selectivity of a trap? What is the functional form of selectivity for hook and line? Fisheries 101.

SHANNON CASS-CALAY: So, what is very clear to me, and I apologize, Rich, this is Shannon, but you know, one thing that is essential to the stock assessment process is that we get participation during the SEDAR process. And these decisions were all presented and reviewed during the SEDAR process during our technical working groups.

We have recognized that that was not a particularly effective process for the U.S. Caribbean, which is why we want to move towards benchmarks within in-person workshops. That seems to work a lot better for us. But these decisions were all presented. The data to inform those decisions was presented. The decisions were made by the panelists who participated. And I invite you all to participate in future assessments so that these decisions can be improved, if necessary.

It would also be extremely beneficial to have independent analyses of selectivity so that selectivity, rather than estimating it from the available length comp, we could fix it based on empirical information from research. So, all these things would improve the stock assessments in the future.

RICHARD APPELDOORN: Alright, I think we need to push a decision here so we can have some lunch. So, Jason, you have your hand up.

JASON COPE: Well, yeah, I don't know if I'm pushing a decision. I just, what Shannon said has been on my mind. In the evaluation of these models, I feel like we continue to re-litigate the data, which I don't personally feel in this forum I'm well equipped to do. I work under the presumption that the data have already been sort of vetted and gone through the process enough to say, "This is representative data. This is something that can be used in these integrated assessments. Therefore, go forward and do that." It's very difficult to do that here.

With that said, I realize once you run models, it's very, very common to go, "Oh, now that I see the model running and how they're conflicting data or not, or whatever, I have more questions about the data." That's very, very normal and I think, and I really appreciate what Shannon said, I think she says something very important about process here. Understanding how we proceed with an understanding, an agreed upon understanding, when you can kind of go back and forth, back and forth, back and forth on these things.

I think we're at the point where we agree that the model structure, the model framework, modeling framework, is an acceptable one. It's integrating all the information there. There are different levels of comfort as far as the centering of that model, the life history parameters being used, whether the data have signals and so forth, right? And so, I think that's where we're at now and I had thrown in in the comments, again, we always ultimately get to the best scientific information available question, is that what we're dealing with here? And for me to answer that, I need to have some trust that the data that have been put in or embedded enough to say, "at this point in time, it's the most, it's the best information that we have, given that the modeling framework is one that we find acceptable, then therefore, these things should lead to this being the best scientific information available for management. With the caveat that there are tons of things for future research that need to be done and then have been revealed through this modeling process."

So, I don't know if we can make something out of all of what I just said, but that's where I feel like we're at.

RICHARD APPELDOORN: Alright, thank you, Jason. I really haven't heard any dissension other than from Todd. I haven't expressed my own view, which is, I think I will accept this for management. There's a caveat that I'm really unhappy about doing that because I am really not sure this is the way to go, and I'd much rather go

to an indicator's approach which I think would be both easier and more satisfying. I think that's kind of what J.J. was alluding to there with his opinion as well. And so, unless someone is going to argue differently, I think we've heard from everybody on the committee, except for maybe Tarsila, but she's been quiet, which is-- Oh, she would like to make a point. Okay.

TARSILA SEARA: I won't say anything new, but I would like to reiterate some of the points that were made earlier. I have complete trust in the data analysts, and I think that this does provide a good baseline. But I would like to second what J.J. said and Vince and others, and I guess to your point too Rich, that I think it's really important that we do explore other avenues. What it is that we're missing? What are some data that we can use to help make these decisions? And also, to Julian's point and some of the other points that were made earlier, I think a lot of this information can come from the stakeholders, can come from the fishers. I think we're missing a really important piece of information there that can really help when we're interpreting the data and when we're trying to make recommendations. So, I just wanted to reiterate.

RICHARD APPELDOORN: I'm sorry, was that an advertisement for your presentation later on?

TARSILA SEARA: Absolutely. [laughter]

RICHARD APPELDOORN: Okay. So, I think we have a consensus that we're going to accept the assessment and say that it can be used for management purposes, but we do have questions on what the proxy level should be.

And then there's some ramifications that Jason laid out about whether steepest and initial biomass need to be redone in that light. That will be done after lunch. So, we'll meet again at 1:45. Thank you.

(Whereupon, the meeting recessed for lunch on November 30, 2022.)

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NOVEMBER 30, 2022

WEDNESDAY AFTERNOON SESSION

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National SSC (August 15-17, 2022) Update— Richard Appeldoorn

RICHARD APPELDOORN: Okay, we'd like to get started again, so if everybody in the room, can take their seat. Everybody else can put their earphones on.

Okay, that's fine. Alright, let's get started again. There's going to be a change to the agenda because of availability of speakers who are online. So, we're going to stop doing SEDAR 80 Queen Trigger for the Virgin Islands for the moment and actually get back to the original schedule, which is now going to start with review of the national SSC meeting briefly by myself. And then, we're going to have some additional information by J.J. and Tarsila partly on stuff that was presented there for the Caribbean, but also things that have come out of that meeting that are applicable for the Caribbean. So, if you can put the thing I sent this morning on the summary slides. I'll just let you operate them, it's not a big deal.

The SCS7 or National SSC meeting was held in August in Sitka, Alaska. And that meeting was supposed to be looking at basically ecosystem-based management or adapting fisheries management to a changing ecosystem. So, it was really starting to focus in on, you know, climate change rather than just the totality of EBFM. And it was broken into three sessions, how to incorporate ecosystem indicators into stock assessment processes, which is supposed to be more model oriented. Developing information to support management of interacting species in consideration of EBFM. So, what kind of information do we need and how can that be put into some kind of useful format and framework. And lastly, how to assess and develop fishing level recommendations for species exhibiting distributional change.

So that was the goal. And there was a lot of all of that, but for me, and this is my personal take, and J.J. can comment about this a little bit, it kind of quickly devolved into models that were interesting but are nowhere near being able to actually address a lot of these issues and presentations that there are changes going on, but how do we deal with that? I'll give you two examples. So, the next slide.

So, the first one was the collapse of the Eastern Bering Sea Snow Crab. For those who've been following the news, this was a big thing. In the news about a month ago, they finally announced that we got the sneak preview of this at the meeting and basically, what happened-- next slide-- on the left, you can see two distributions. One is from 2000, I think it's '18, the other one's from 2021 of the distributions of snow crab. And you can see in the top one, which is the earlier one, the red and orange is where abundance was particularly high. And then in the lower one, you

can see that there isn't anything particularly there except for way, way up in the North, there's two grid cells that are in orange.

And what it's basically mapped out to, you see on the right, is the reduction of the zone of cold water, which the snow crabs require. And so, there's been some oscillation in that. So, in 2018, they actually got a lot of high densities of crab. But as this thing retreated, it retreated way up to the North, so they don't have the most recent picture in that graph. And so, it was just a small core area, right at the top of the graph, that had cold enough water to support the snow crab population.

So, the argument being that this is indicative of the kinds of climate change that are going on in these Northern climates. And we saw a lot of presentations that showed similar things like this, be it here in Alaska or on the East coast of the US, wherever there's been a retreat of warm waters, cold waters, whatever it is, that have changed the distributions of species, in this case just disappearing and leading to the collapse. Whereas in other cases, those distributions are just shifting North, whatever.

Is this applicable to Puerto Rico? Next. So, on the left is the range over which they were seeing those changes. It's 670 miles, mostly in a North South direction. On the right is Puerto Rico, and we're looking, if you include Saint Croix, maybe about 55 miles of shelf area. So, we're not going to see those kinds of distributional changes that they were talking about in this meeting because those were over hundreds or thousands of miles. What we are more likely to see is depth distribution changes. Uh, so things going into deeper water to get away from heat.

And then there was a couple examples of the next one. Next slide. This was looking at poor recruitment of reef fishes on the Southeast and what's going on. So next slide. And they grouped fishes into two categories, and you can see the dichotomy right away. The group on the top, which seemed to be decreasing because of low recruitment, are all spawning primarily in February, March or April. And those species in green, at the bottom, seem to be doing okay and or even increasing, and they're spawning largely in June, July and August. What's going on there?

Their explanation. Next slide. This is a change in sea surface temperature from 2002 to 2020. So, the redder is the more things have warmed up in those months and that green box is highlighting January through March-- January through April rather. And you can see that the degree of heating during those months is much greater. And so, this is somehow, either directly or indirectly, having an

impact on the reproduction and recruitment of those species that are spawning in those months. So, it could be direct effective temperature on the reproductive process. It could be temperature shortening the larval period, shortening the period of which larvae can rely on their yolks sac before they find food. It could be due to current changes that are associated with increasing temperatures. So, the exact mechanism unknown, but there's a very clear indication there that climate change is having some role and that's so perhaps more indicative of some of the problems we might be facing in the Caribbean.

Uh, next slide. Then I mentioned this at our virtual meeting, our last meeting. There was a presentation by Sarah Gaichas and she was more looking at not trying to model this stuff, but how can we get information about the status of things going on in the fishery from an ecological point of view into management.

Next slide. And her point of view was data products without clear entry points into management are going to be difficult for managers to use. So, she's trying to set up a mechanism where we're getting information and pinpoint how and where these can be used in the management process. And as you pointed out, this is going to facilitate a more direct use of ecosystem information. And we're going to need more collaboration between the people doing the assessments, the ecosystem assessments, and the decision makers, as well as most of the stakeholders because they could be providing the data.

Uh, next slide. So, one of the key things they had implemented in the Mid-Atlantic was the state of ecosystem reporting and where they're getting information directly from the fishers and trying to develop methods for incorporating those into assessment process. And there's listed there a couple of keyways that that's done and some sub things underneath of those. I'm not really going to go into those. I think Tarsila is going to pick up on this idea and see how we could possibly bring that into the Caribbean.

Next slide. So, I've edited the conclusions that come out of this, but basically the observation of today is that climate change is going to have a big impact, and it's going to be even more so in the next 20 years. They've started considering models to include these things, but those models have a long way to go. And the Councils are going to encounter new challenges in trying to deal with basically shifting baselines. So, all the stuff we're dealing with now is kind of like, we're all considering the environment to be fairly constant. And that's going to shift and that's going to force us to be able to have to respond to those shifts in terms of what climate change might have on our populations. Next.

So, we can expect in the near term an increase in non-stationary spatial shifts and assessments. We're going to have to think about new monitoring or new technologies for how we measure things. Communication and dialogue are going to be very, very important because of the dynamics involved here. Things can get more complicated, so we need that involvement, but we are also going to need more information that can only come from the fishery. We have to look at and use MSEs and start running scenarios on those to see what's going to happen and how robust our management rules are going to be. And, well climate change is going to be a problem.

Next slide. So that's just in the near term. So, some of the recommendations were to ensure that the Councils have the capacity to adapt fisheries management to a changing environment. So, it's going beyond what we're struggling with here already. And there's a list of things that we need to be doing with, there's a more monitoring and trying to develop models or use MSEs to try to explore what might happen and how we should be framing those things. Looking at multiple ways of detecting change. So that's local knowledge, traditional knowledge, and I forget what the S is, science. And we're going to need an interdisciplinary research team to really do this, so capacity building is important. Next.

The SSC should prepare for transition from reliance on indicators derived from observations, to informed dynamic simulations of marine ecosystem change. That's down the road. I don't think, I certainly got the impression the models aren't even close to that yet, but people are working on them to try to develop things that can address these things. It will all depend on the available data, and J.J. will certainly be looking at that in his presentation.

And so, they're saying start the scenario planning now to be prepared for this. So, we're not going to be reactive. We're going to have an idea of what we would like to be able to do when we start seeing significant changes due to climate change. And maybe one more. That was it. Okay.

So, I would take any questions? I'm not sure I can answer any of them, but J.J. is going to give, more or less, the presentation he gave there. Hopefully, in an expanded form since we have more time. And I think he might be able to play that off kind of some of the other things that were being presented. So, our input into this EBFM meeting was, I think, very different than everybody else's because it wasn't so necessarily focused on climate change so much. And it also invoked looking at some of the social science aspects and it was also very, very well received. So, Vance, you have a question?

VANCE VICENTE: Yeah, Richard, thanks for the summary. I did read the article of the fisheries collapse of the snow crab. And what I found interesting was the mechanism by which the rises in temperature cost the local reduction and, you know, partial extension of the species. And it states in the paper that it was increase in the metabolic rate.

So, these small crabs, you know, they require more food more often and they overgraze their prey. So, they run out of food. That was one of the reasons. And that the recruitment that took place didn't grow enough to the legal size. So that's why they close the fishery because, I know that there were not that many, but they're just too small.

Then the other comment I wanted to make is that with this climatic scenario, you say how can it be applied to the Caribbean. Two different things. I mean, climatic change, historically, in the Pleistocene during the glaciation ages affect more, higher latitudes than at the Caribbean. If you look at the temperature data, sea surface temperature data, for the last million years even during the glaciation periods, the water never got too cold. And in the interglacial periods it never got too warm. It's pretty much stabled between, 23 was a minimum to a maximum of 28. So we do not expect maybe such a dramatic change in the fishery based on this temperature data, there may be other factors. So those are the two comments. Thank you. This was Vance Vicente.

RICHARD APPELDOORN: Yeah, so this is Rich. I'll follow that up with two things that I've either been involved with or followed. One is with Queen Conch, and in Florida they have two different populations, one in the back reef areas and then one out in the kind of four reef areas that are separated by the Hawk Channel, which is a muddy channel that the conch can't cross that.

So, they've been struggling for the fact that in the shallow waters, the conch hasn’t reproduced for years. And they originally thought it might be some kind of pollution effect or something like that coming in from Florida to bay, or whatever, and never really found anything. And now they think it's temperature that just, you know, in the summer, the temperature gets too warm for those conchs to breed and if you pick them up and move them into the deeper water two months later, three months later, they're reproducing fine. So, there's a case where shallow waters in the Caribbean may be taken out of the reproductive range of conch, and they'll have to go to deeper water, well, if they can go to deeper water to reproduce.

The other one is the, the work we've involved with the groupers who spawn in February and March or January and appears, from what we know about people viewing these things, that there needs to be kind of a minimum temperature for them to successfully reproduce. And that minimum temperature has been climbing steadily. And, you know, will we get to a point where in fact the temperature gets too warm for them to do that? Fortunately, maybe, they can just go deeper and know be able to still maintain those cooler temperatures. But those are the kinds of things that could play out here. Reni?

JORGE R. GARCÍA-SAIS: Well, unfortunately that's going to be very, very difficult because there is a very limited horizontally distributed space below 20 meters in some areas, down to even 30 meters. Below that it's an abrupt slope. We've been seeing this with the ROV survey of mesophotic habitats. You know, a very, very reduced horizontal space to actually survey.

What you find is that below 30 meters is a very steep slope that goes down to depths that are really different from shallow area. So, there are not gradual areas with horizontal seascapes for this fish to move to. And in the case of conch, it's, I mean, they just don't have a chance, you know?

But we have seen conch down to 40, 50, 60 meters during our surveys. So, the limited spaces that we find with horizontal distributions, actually, you see a lot of reef fish in those areas.

RICHARD APPELDOORN: Yeah. So right now, it's not that desperate. So, the population in Florida that are having problems, they're in like three meters of water, so they're very shallow, getting lots of sun and having that heat impact them right away. Whereas the other populations are in, you know, 60 feet or something like that. So, we're not talking about getting down into those mesophotic habitats yet, we're just talking about those shallow back reef habitats that are going to be taken out and you're going to go into these four reef habitats on the shelf. Hopefully, things don't go beyond that, because then, as you say, we would just run out a habitat.

JORGE R. GARCÍA-SAIS: Yeah. Well, also, you know, another limitation is that we have deep thermoclines, deep pycnocline. Our thermoclines go down to as much as 70 meters.

So, we have to go really deep to avoid the mixed surface layer, you know. So that's also, you know, you don't gain much by going a little deeper. You know, you have to go, if you want to escape the surface mixed layer, you have to go between 50 and 70, 75,

sometimes 80 meters to actually get out of that heat zone, you know? So that is another limitation, which we might have to be dealing with.

RICHARD APPELDOORN: Yeah, that's why I made the distinction between the kind of this, direct solar heating that you can get in very shallow water versus the full mixed layer, which your point is absolutely right.

JORGE R. GARCÍA-SAIS: Right. Yeah.

RICHARD APPELDOORN: Alright, Seeing no more questions, J.J., are you ready?

Case Study 8: Multivariate Approaches for Ecosystem Based Fishery Management (EBFM) Implementation in the U.S. Caribbean

JUAN J. CRUZ MOTTA: Thank you. J.J. Cruz here. The idea of this presentation, rather than going through the whole presentation and going into technical details. This is an introduction to bring to the table a few points that we would like to discuss with you and most importantly, to get your input. See what would be the best way to move forward.

We're using these presentations because when we got there, at the beginning, we felt like we didn't belong because this approach was very different to what was being discussed in that meeting. As Rich mentioned, most of the talks were about modeling, and this is, as you will see, an approach that is based on description of the fisheries, in this particular case, the Caribbean.

So, when we brought that to the table, we felt, "oh, well, we kind of don't believe belong here." Right? Tarsila kept joking that we felt like the little kids table at the weddings, that we were apart from everybody else. Then what was very interesting was the feedback we receive from the rest of the group there. And then we thought, "oh, perhaps it will be a good idea to use this, to share it with the SSC in our region and see what can be done." I mean, what other things we could do to help management in the region.

I took a few introductory slides just to address some of the points that were brought here, yesterday. One is to acknowledge what Todd was saying, that still EBFM means different things for different people. I just want to-- I'm going to be making a lot of reference to that reference there-- sorry for the reiteration --which is a book that was just published last year, and it compiles all the efforts that have been done in the U.S. for EBFM. And in there they identify at least different eight different meanings with at

least 10 different principles, right? However, all those meanings and all those principles-- and on top you see what's the official definition used by NOAA. But all of them agree on something that is, an EBFM is, we need to move beyond a single species approach. And what you will see here is an attempt to do that.

The other thing that I wanted to summarize is what then we understand by EBFM. And on the top, you see what is called the single stock approach in which we're trying to assess what's happening with a single species, a single group, in which the only source of non-natural mortality is fishing, right? Then I want to bring the second option here, which is something that we talked about yesterday, which is an ecosystem approach to fisheries management. Again, we're trying to assess a single species, but now we are recognizing that there might be other factors affecting that single species.

And finally, based on NOAA's definition, right, is a more complex situation in which we're trying to manage a group of species where we have, not only, the different drivers of factor effecting that assemblage, but also, we are bringing it to the table, a socioeconomic consideration.

So, if you consumerize that long description is that want to increase the benefits of this ecosystem. However, at the same time, reducing the footprint on it. So basically, this is what we are using as an operational concept for EBFM.

What you have in the orange boxes are historic critiques to this approach. But as we develop this, what I hope is going to be a short presentation, you will see that some of them are not.

Now, let's put this in context of the Caribbean. What you see in blue are comparisons to other regions in the U.S. right? Some of them, I won't go through them because we have talked about those a lot, right? And actually, under the context of the U.S. you say, "Why should we care to manage the fishery," apart from the fact that it's we have to do it by law, right? And the thing is, when we look at the characteristics of the Caribbean, we can turn those, potentially negative aspect, let's say the last one, fully artisanal fishery, that becomes actually a benefit or an advantage if we want to apply a EBFM approach. And then here in this slide, what you see is some characteristics that makes the fisheries in the Caribbean an ideal system where we can actually experiment or try to implement different strategies related to EBFM, no?

One of the important characteristics is a lot of the fisheries depend on the coral reefs, which compete with other objective

management. Also, is a coastal fishery and is subject to many other potential drivers of non-natural mortality. So, we have the situation where we have a multi-specific fisheries, with multi-drivers affecting that fishery using multiple gears, is opportunistic, as we mentioned today a few times. And sometimes it the objective of the fisheries management are in conflict with the management of other activities, such as tourism or costal development.

So, in this case we argued, during that meeting, that this makes the Caribbean an ideal system to start experimenting with this EBFM approach. And we will also argue that perhaps it is the only option. And then the aim of the work that we presented is to develop an EFP for the U.S. Caribbean, which will help the Council implement an EBFM. So, this is, within this scenario that I just described before, right.

We have seen this a few times before. This is the roadmap we're using to come up with that EFP and we're basically on the first step. The first step is only a description of where the fisheries are at this moment. And out of that, please note that the first task that we need to do, to actually describe that fishery, is to develop a conceptual model. And I'm making emphasis on this because other Councils in the U.S. are using this approach to start to describe the fisheries, for example, the Mid-Atlantic. And even though this is a long loop, now, we're in the first stage and the preliminary results that we have is about this first stage.

Very quickly, just to describe the fisheries, we use a qualitative approach that you can see here on your left and also a quantitative approach. I'm going to concentrate on the qualitative, not so much on the quantitative for two reasons. One, it has to do with what Tarsila will be talking next to this presentation. And second, I don't want to get into technical details on the quantitative part. However, very happy to discuss them with whoever is interested.

Our qualitative approach is based on conceptual models, which is no more than maps of the perception of the different stakeholders. I don't need to go into details because most people in this table participated in one of those. What I want to tell you is that in this process, we actually involve very heterogeneous group of people.

These are the, the goals of the conceptual models. Actually, we had a session like two or three SSCs ago where we talked about the benefits of these conceptual models, what they're useful for. And these are examples of those exercises. On the left is the one—oh no that’s with managers, but what we did in the with the DAP’s and

the SSC was very similar to the one on the left. On the right is typically what we did in the Villas Pesqueras with the fishers.

What I want to say about this is, even though this is qualitative information, what is behind all those matrices are actually-- sorry, are actually matrices with one and zeros that can actually be analyzed quantitatively. And I'm saying this because Alida, among many others, has always asked, "what do we do with this spaghetti salad?" No, with that thing that we got on the top right corner, right? And then what we going to do actually, is to take that information, those one and zeros, analyze them.

These few slides are going to go quickly because it's the technical details, how we did that quantitative analysis. Happy to go back if you want to know about those. But the important thing is perceptions, right? We can transform those perception into variables, right? Each connection between components in a conceptual models can be considered as a variable, right? And then converting this in a multi-variate problem, in a multi-dimensional problem, in which we have different stakeholders, actually different groups of different stakeholders in different islands, providing their perceptions that can be expressed as individual variables. And using traditional multi-variate techniques we can map those, in this case, those perceptions.

And I was rushing to bring the complete analysis, like everybody, DAPs, SSC, NGOs, business. However, we still have this preliminary analysis only where we have the perception of the managers in blue, in red, the fishers and the expert in green. And then the labels indicate the island, Puerto Rico, Saint Thomas and the numbers are the different groups, right?

And then, you could see here that the perception of the three groups are very different. Very interestingly, the perception of the fishers is very, very homogeneous. They all think the same regardless of the island where they are located. Managers differ from fishers, and they kind of a agree, however, note that the expert is very spread. The different groups of experts have different views and how the system is working, right?

But then out of this analy-- first of all, this analysis is very useful because then we can identify what makes those things different and what makes those things similar and then concentrate on those aspects. And here, of course, this is a graphical representation, but also there are statistical analysis behind this saying, there is significantly different or not. I won't go into details to that. But what comes out of this, and I'm jumping really fast now, is that we can produce very reduced models that

we can use to inform management where we should be focusing our attention based on the perceptions of the different stakeholders. And whether those perceptions are going in the same direction. For example, you can see the blue line indicates that some groups believe, the fish assemblages have a direct relationship to the fisheries. However, the red line says, it is a negative relationship, on the other side, right? So, these, we can use, and we can provide that information and other tools that we are going to discuss later on, to inform management about what the stakeholders believe should be the important aspect of the fisheries that we should we should attend. Of course, this is a reduced example only with per partial data.

What we took from this with this exercise is that this is an analysis of the entire sociological system, not only of one species at a time. If this type of analysis can be used routinely to inform the Council, it will be a single analysis for the fisheries as a whole, not an analysis like, for example, we're doing now for the Queen Triggerfish. The second aspect is that all the stakeholders are involved in whatever the outcome of that analysis. One way or another, we have the backup of all the people involved in the process. The third point is, even though we involve a lot of stakeholders, they were assessed or interviewed independently, which we believe is an advantage because people can give freely their opinion of what's going on. In the special case of fishers, we actually went to the Villa Pesquera to their environment to get this this information.

The other aspect is that even though this is what is considered qualitative information, there are quantitative and formal ways of analyzing it. And the preliminary analysis that we have done on this are showing that all components that traditionally we have not considered, for example, recreational fisheries, are very important.

Now, in only five minutes, I'm going to just show you what we did with the quantitative. Again, not focusing on the technical details, just to see how this ties up, all these two things tie up. I just hope to do it relatively quickly.

You say that for this quantitative approach, we're using data that's already existent fishery-independent, fishery-dependent, what we call potential environmental anthropogenic drivers, and also socioeconomic information. These are examples of-- here we have fishery-independent habitat data. On here you have all the different programs that we have used for this. Please note, we have NCRMP here, which we believe is actually a great program. And this, we got information on habitat and fish assemblages, for

example.

We also extracted from publicly available databases information on environmental and anthropogenic drivers. We have about 19 of those. Many have-- I won't go into details. And, of course, we have information on catch data. Right? And then, I just want to mention here that we don't have the complete data set because we haven't solved yet the NDA issues with the Science Center. However, eventually we will have it.

And just very quickly, we did the same standard multi-variate analysis on that data. In here you have then, this is only the specific case of Puerto Rico, where you have the four regions clearly different in the structure and composition of that catch, is different in the four regions. And also, you can see there is a temporal variation, and that temporal variation is bigger in the North, this group of points here than in the other three regions.

Of course, those differences are-- also I just added this this morning because not only we can describe if there are differences among regions, and again, this is the structure and composition of the catch, but we also can look at relationships within that data set. And please note here, whatever is in red are groups of species whose patterns of temporal and special variation are highly correlated. And please note here, very interestingly, for Puerto Rico, that the patterns in which the catch of Queen Triggerfish here-- letters are very small --are highly correlated with those of lobster and conch.

Also, we cannot not only look at what species are making this difference in time and space, but also, we can see how those species are captured by different gears and the different regions and how that use of gear changes through time. And so, focusing now or concentrating now more on the structural composition of what is being landed rather on a single individual.

And of course, we can see, I don't know what's the cause and what's the consequence, whether the fishers are responding to changes in the environment and then adapting their gears to changes in the environment. Or because we change the gears then we are observing changes in the assemblages. Right?

And of course, we can do this also with environmental data. I won't go into details here. But most importantly, we can correlate environmental and landings data in this case. Here on the left, we have the landings data and the right environmental data. And please note, that at least to explain those patterns of temporal and special variation there is a high correlation between the two. And

also, we can identify what are the specific variables in the environment that are driving those difference or are correlated with those difference. For example, here, distance to the margin the index of pollution, distance to the river, distance to what are considered nursery habitats.

Also, we can describe temporal patterns. We're now concentrating on the West, and then on the right we have the 2003, and then on the left we have 2019. And we also can see a gradual change on the structural composition of catch through time. And we can also identify what species were present in the catch to start with, and which one disappear. We can see clearly that, here with the white spot, all these species over here were caught at the beginning, but then are not reported any longer. Some other species are constant through time.

We can also relate that-- and now I'm going to go and finish this really quickly because --we can also relate that to independent service like the Puerto Rico Coral Reef Monitoring Program and then try to see if changes that we are seen by visual censuses are somehow correlated with what is been captured, right? And even though the correlation is not as high as with the environmental variables, only 47%, we can see that there are some drivers that-- I mean, conclusion about this is that some environmental drivers might be more important than the catch itself in generating these temporal changes, right?

We can also identify here, what are these environmental drivers. For example, please note that coral cover is an important one, right? And then if we wanted, for example, if somebody asks, "Okay, what would be an important variable that we should take into consideration to put into the model using an ecosystem approach to fishery management?" I would say, "Oh, there you go. We can use coral cover."

And again, the same results as before. We can identify exactly what are those valuables. But the final message and what I want to leave you with and then let Tarsila say the good stuff, is first of all, we can, we're able to describe patterns of temporal trends use a multi-specific approach. And why is that important? Because then we can develop indicators related to the structure and composition of the whole fisheries. Not only indicators to a single species. We can identify potential alternative drivers of change, and then we can use that as indicator and threats. And however, the challenge is that if this approach will involve that, management actions are outside the jurisdiction of the Council or NOAA, definitely to manage the system using this approach we will need to have multiple jurisdiction working on it.

But I think that's basically it. Yeah. You still recognize this work was funded by the Lenfest Ocean Program. Thank you. Happy to take any question.

Questions

RICHARD APPELDOORN: Thank you, J.J. Questions for J.J.? I see wheels turning, but no hands. Okay. Reni and then Vance.

JORGE R. GARCÍA-SAIS: Hey J.J. Reni Garcia here. I've always been interested in this approach. However, I am still wondering how we go from, perhaps correlations or ways to explain the variations in catch, in landings, of the different species in question, to setting management regulations, for example, on the catch limits and this kind of more quantitative decisions that have to with the nitty gritty of how many fish can be caught, you know? Do you use the-- would using the present condition as a benchmark and then go from there? or you just redescribe the will completely?

JUAN J. CRUZ MOTTA: Okay, thank you. This is a totally different approach in which it is a reactive approach or an adaptive approach. So, you make decisions as you go, basically. Let's say we are here in 2019, right? Using that as an example, and then we get the data from 2020 and then the data in 2020 tells you that the fisheries, as a whole, is in the same place, or more or less in the same place, there was no significant change. Basically, we keep with the same management strategies that we have in place. But then let's suppose then there is a big change in that map. Now the difference between 2019 and '20 is a big difference. We then identify the drivers of that difference. And the point here is if the driver was, for example, population or was inorganic pollution, there is nothing that you have to do with the catch because that's not the cause of the problem. The cause of the problem is another. So, what you have to do is to solve the cause of the problem.

The thing with the single species approach or the modeling that we are discussing, the only source of mortality that goes in non-natural mortality fishing, and we know, especially for coastal communities, coastal assemblages, is not the case. So here you, of course, it has not a predictive power and it has not predictive power because it starts with the recognition that will be impossible to model an assemblage, right? So that's the way it would go. You use this as an indicator and then as the indicator change, you take management actions depending on what was the driver. Here, N this little letter N over here, actually represent total catch. Of course, we have done more detailed analysis where we correlate the change on the structure of the fish assemblages

as reported by the independent fisheries data. And we correlate that with the catch and see what species, in particular the landings, are driving those differences.

So, then you can focus on those, exactly those three or four species that are actually changing and then those three or four are the ones that you say, "Okay, we need to reduce the catch." I don't know if that makes sense, Reni, or if I'm answering your question.

JORGE R. GARCÍA-SAIS: Sure, sure. No, I'm following you. The thing is that I believe that there is a long way to go from there, to actually going into what we are used to be thinking about the threshold for undergoing overfishing and going into what is an overfish condition. Do those turns fit into this model.

JUAN J. CRUZ MOTTA: No, they do not.

VANCE VICENTE: Yeah. Thanks. I admire your efforts on this really complex, interactive issues. I appreciate that very much. One question that I have in the correlations that you have observed and measured and evaluated, which variable do you think will be appropriate, for example, for Shannon to include in her modeling? Like yesterday, Shannon said, "Hey, at least we have one variable that we've been able to give a weight in the modeling, which is the occurrence of red tides. Right now, which variable you think is mature enough to be, somehow, included in the modeling.

JUAN J. CRUZ MOTTA: Knowing that we were going through a Queen Trigger stock assessment, I did a particular analysis for that. But then the results is that the change on the fisheries, as a whole, of what the fishers are catching, has nothing to do with the Queen Trigger. And one reason for that was given before, it's because it's thought that the capturing of Queen Trigger, here in Puerto Rico, it's totally opportunistic, right? So, under this approach, if those changes, in the whole Assemblage, that particular species is not showing any important change, it doesn't go into detecting what variables are driving those difference. But for the sake of the example, let's suppose that is driven by Queen Trigger, those temporal changes that we're seeing there, let's suppose, I would say, "Definitely, you should throw into the modeling the percentage of coral cover." One of the drivers there is a Yellowtail Snapper in that pattern for the West of Puerto Rico. So, then the percentage of coral cover, which is data that is available, can be easily modeled, should go into there.

So that's, and again, we are in the early stages of this process-- and coming back to you Reni just to put it into context. It does

not talk in the context of MSY, or overfishing, ABC because this by no means tries to substitute. It's trying to compliment and help people modeling what other things should be considered-- when this now nice results get into the Council is to give the context, in the Council that perhaps is missing, only looking at the modeling. That's the objective of this approach. And this uses the TIP because there is all the socioeconomic consideration that we are going to talk before the--

RICHARD APPELDOORN: Not sure which one of you was first. Shannon and then Todd.

SHANNON CASS-CALAY: I just, I wanted to commend you, J.J., for that. It's excellent work and we're all very excited about it. And I do think this is going to be essential to evaluate this sort of information with each one of our SEDARs, to take baby steps to incorporate environmental indicators into the single species stock assessments, and then ultimately to work towards more ecosystem-based approaches. So really good work. Thanks.

JUAN J. CRUZ MOTTA: Thank you.

TODD GEDAMKE: Yeah, I'll second that. I was one of the biggest critiques 12 years ago when we started throwing these things out here but the idea of making sure that you get the concepts going, the conceptual model set up and the people thinking about this is key. In line with that we worked on a multi-species model, which can, just for your own thinking, this was the process of how do we get more information out what we have. We were struggling with single species and the information, content of the length data not being informative. So, we actually decided to put multiple length information from multiple species in. And what that does, and I just sent you that paper, then what that does, it allows you to assume that the mortality is trending in the same direction.

So, for example, one of these will show in 2017 there's much more pollution pressures than 2018. You would actually expect to see that signal in three different species, in a complex that you're looking at. So, as I critiqued the modeling that has been done and some components here, you have a length-based structure, which this very much reduces too, and there's a very good possibility of assuming common parameters between the complexes within the species.

Now this is also difficult because there's only been a few works that have done this, but this is where I think this could go in the Caribbean, where you're actually looking at the length structure of a whole entire complex, looking at a change, and that

parameter would give you proportional mortality, which then could be fed back into the model.

JUAN J. CRUZ MOTTA: Thank you, Todd. I just want to take the opportunity of that comment because, actually here, this is a simple run in which we had only the total weight that was captured that municipality that year. Right. But then you can include size data because then each one of those columns, which is a species or a variable, a dimension, you split that into categories of size. And then you can run a more complex model that includes the size of the different species. And actually, that blows your mind because it's like a two multi-dimensional space. We cannot even imagine one, imagine-- anyhow. But yeah, it can be brought to the model.

TODD GEDAMKE: No, and the nice thing about it, is that you could do something as simple as up or down where you're running a hundred species or 150 species all at the same time, and you're looking at patterns in years where you have a total upper or total down or a prevalence of one or the other. I mean, the fishermen would be looking at that going, "Hey, we didn't increase our effort on every single fish, we target." So, you know, then there's something that's environmental that's behind it or driving it, or you know, an El Niño a something else. So, they're all teed up in there and it's doable, but it takes work.

But I think some of these early evaluations in the data workshop, whatever we did, 2011, we started looking at that. We started looking at the number of lengths you had over time and running that. So that would be a really interesting matrix for you guys to pull together or someone to pull together as a next step in this thought process. And that would just be a mean length over time. And then looking at relative changes from year to year to year. And you could actually see whether you're above or below trends understanding that some of that is going to be fishing pressure, but those signals that over arch targeting of are environmental.

JUAN J. CRUZ MOTTA: Thank you.

RICHARD APPELDOORN: So J.J., I have a comment and a question. I'll go to the question first. If you could put the slide back up that had the track to catch and the various environmental variables. Yeah, that one. So that's, you know, a really interesting graph. So the question is, you have a lot of environmental information there, the catches obviously by year. Are you getting enviro-- those sources that you are using, are they comprehensive both across time and space, or it's just what you could get?

JUAN J. CRUZ MOTTA: No, they're not. And they have different resolutions as well, like the environmental data. Let's say what we got there. For example, population, that's from the Puerto Rico census, and that's only every five years. Then you have coral cover. That comes out of, in the case of the Puerto Rico monitoring program, out of 44 sites, but then NCRMP are hundreds of sites, but the sites are not the same. And then you have nursery. Nurseries are fixed value because the distance of given reef to the mangrove is more or less always the same.

So, no, it's not constant. And also, the resolution is not the same. So, what we use is a nested approach in which we start analyzing the data that has the highest special resolution. Like, for example, temperature. Temperature that we got from satellites is at the pixel level. And then we create what is called a centroid, or what would be the equivalent of the average of that area for that reef. From that reef we have only one number for coral cover for that year.

And then, we go on the next scale. Like for example information on landings. Landings is per municipality. And so, we have different reef close to that municipality. So that creates a centroid that is correlated to the information at the municipality level.

The other reconsideration is that not all data series are the same length. I mean, sometimes have had gaps, some data series start in 2000 others in ’88. But again, we work on a nested approach in which we start analyzing the one that we got at the lowest resolution with more spread, more stations. And then we put on top of that the next layer in terms of resolution and completeness and so on and so forth.

That’s why everything is reported at the regional level because then we, at that level, we have information and everything for the longest period.

RICHARD APPELDOORN: Okay. So, my comment goes back to your comment, and you actually made this comment to me last time we met. We were talking about Queen Trigger and, you know, Queen Trigger was correlating with conch and lobster. And you have to think about that for a minute because, you know, intuitively that's not something that would pop into your head, but when you think about it, it's like, “Oh yeah, who's shooting? you know, it's an opportunity species. So, it's either being speared by conch fisherman, who always go out with spears, or it's being caught in traps, which are primarily targeting lobster.” So, an example of something that comes out that you would think was not intuitive

initially until you think about it and yeah, it makes sense. So, I think there's lots of other gems in there that this process is going to be useful in identifying.

Any other comments or questions for J.J.? If not, I'm going to ask Tarsila to follow up on her component.

Fishery Performance Report proposal—Tarsila Seara

TARSILA SEARA: Yes. So, this is Tarsila for the record. So, I don't have a presentation per se. I just wanted to share some thoughts with the committee. Mostly the idea is to ask for your input. As you can see, J.J. and I have spent some time thinking about EBFM and, you know, we've had multiple conversations and we're at a stage with the Lenfest project where we're really thinking about what does this mean, right? What do we do with this? What are the future paths that we see in this context for doing EBFM?

So, we've had multiple conversations, ideas. After Alaska, we had a lot of you know, different insights and, you know, input from people there. And so, we've been having these conversations and we thought this is a really great timing and a moment to come to this committee and ask for your input, for your thoughts, and to share what we've been talking about and what we've been thinking.

I would like to give a couple of suggestions for things that we've been talking about and focusing our attention back to the stakeholder piece, right? So, the stakeholder engagement, which is, for me, as a social scientist, what really excites me in terms of moving forward with EBFM the opportunity that we have for to increase co-production of knowledge and have more of that stakeholder input.

But so, the whole point would be to, you know, have a conversation, a discussion. How do we see things moving forward? If we're going to, you know, toward ecosystem-based management, what are the things that we envision and what are the questions that we have and what are the things that we want to see change, essentially, right?

Um, so I would like to talk a little bit about something that I've been thinking, a suggestion, that I would like to perhaps pose as a recommendation. And it's something that we could model after what J.J. has over there, on the screen, which is something that has, this one, these particular example, is from the Mid-Atlantic Council and it's fishery performance report and it's something that they've been using to bring stakeholder information,

stakeholder input, into the process, into the decision making process and the recommendations that the SSC makes to the Council.

So, I, you know, this is not news to anyone sitting in this committee. If you've been in these meetings before there are lots of questions that come up that have to do with the fishery or the human dimensions or things that the fishermen, you know, luckily, we have them in the room to answer. These are very important questions. Of course, they are crucial for giving adequate recommendations. And so, I think that they are too important for us to not formalize it into the process, is essentially what I'm thinking.

Could we recommend that a mechanism is put in place that we can formalize stakeholder input into the process? And this could be a starting point, something that we could model after. So, the way that the fishery performance reports work, in this particular example of the Mid-Atlantic Council, there are four trigger questions that you can see on the screen. These questions are posed to the DAPs, and this is done on a species-by-species basis and every year. They're very simple questions, but they do get at what are, essentially, the priorities. What are, the fishermen and the other stakeholders, what are they seeing out there? What are things that they consider to be important? Their views on how things could be improved. And so, you bring in that information into the process in a sort of a formal document that can be used for the SSC to help make recommendations and can be used by the Council.

And that is also a way to begin to collect some important data, right? Data that we don't have. All the questions that come up and talk about, well, this, these are important questions, socioeconomic questions. These are important questions that the stakeholders can help us. Part of the issue is that we don't have a systematic collection of data on the social sciences and the socioeconomic factors that are driving the fishery, and this could be a starting point.

What I would really like to see, of course, a more comprehensive data collection, that would really be helpful. That is another point that J.J. and I have been thinking about, exploring some of these potential ideas. We are writing a proposal, hoping to get some funding, so that we could perhaps test different methods to bring in local ecological knowledge into the process, a stakeholder driven data collection. All these things that would be really helpful in the future. But I'm thinking this could be a starting point or something that could help improve the process and initiate something formal, a mechanism, for bringing in stakeholder input and local ecological knowledge into the process.

Um, so that's pretty much it, I think it would be great to get some input from everybody. What are you thinking? If you agree, or if you have any other thoughts, because the whole point is to have a conversation. It's not so much a presentation. So, I will stop here and open for questions or comments or anything.

Questions

RICHARD APPELDOORN: Michelle.

MICHELLE SCHÄRER-UMPIERRE: Yeah, I really like this type of approach and especially within what we have to do here. I think considering the adaptive management loop we probably need to flesh that out and see what would be appropriate so that it actually gets back and gets used. What I've encountered at the SEDAR process is that we invite everybody to bring in data, but a lot of times that data doesn't make it to the table because it's not in the format that it can be integrated. Uh, sometimes it's called anecdotal or sometimes it's written down, but it doesn't make it through. And I think a lot of those things when it comes to this table, we miss that. So, I think we need boxes to be able to put that in so it doesn't get lost in the process. Thank you.

RICHARD APPELDOORN: Shannon.

SHANNON CASS-CALAY: Yeah, I really appreciate this effort as well. And establishing a consistent way to get the input of the fishing community is always valuable. I do think that in the SEDAR process, it behooves us to expand our minds and attempt to see what can be done with information that we have to be innovative. So, I really applaud these efforts and look forward to receiving this information in the future. So, thank you.

RICHARD APPELDOORN: Yeah, go ahead, Reni.

JORGE R. GARCÍA-SAIS: Reni García. Yeah, Tarsila, thank you for opening this window, you know, this window of possibilities. I mean, it's so much confusion and debate actually trying to come up with our gaps in knowledge, that we have seen so far, that are so crucial to fit into these models that we're trying to use for stock assessment.

Frankly, I was trying, you know-- my idea, initially, with this subject was to incorporate socioeconomic and environmental indices into the mathematical fishery models, you know. Things, for example, that are quite beyond my imagination right now but, for example, things as basic as trying to corroborate the thesis of

some of the fishermen here, which have been for more than a decade, saying that our fisheries is demand driven. Okay, why haven't we tested that? So, why, in all this time that we've been here sitting, why has anybody tried to test for that? Make sure that that is true and if so, then why haven't we started to begin considering the introduction of quantitative indices into this fishery models to determine or to adjust or to do the stock assessment.

So, I was beginning to think about it that way. For example, the critical that we have seen-- you know, it comes out of the data, you know, very clearly the, for example, the impact of hurricanes. In many aspects, just because of the impact on the habitat, because of the impact on the demand, on the function of society as it is, you know. So, I believe that I was wanting to get your reaction to see how far are we from getting to incorporate this quantitative indices into this fishery management models.

TARSILA SEARA: So maybe, J.J., if you want to talk a little bit more about what we're doing under Lenfest. I know that you haven't been able to actually analyze the socioeconomic indicators, but we do have some that we are going to test and see how it works within this context. But I think the most important factor here, is that, what you're saying, yes, that's ideal. That's exactly what I would love to see in the future. The problem is that we don't have data to do it, right? So, we're not systematically collecting this data to be able to model it, to be able to use these indicators. For socioeconomics, we have isolated data collection events and efforts but nothing that would be enough to provide a baseline.

What we have that we're using under Lenfest are some community social vulnerability indicators that we have calculated for the Caribbean. There are, you know, indicators that are used nationally and that we've been working to calculate them. We do have some, essentially, landings data, right? And we also have some NCRMP data that was collected. But for all of these, these are isolated efforts, we don't have a means of analyzing trends and we don't have data collection that is consistent enough to do that yet.

But I, and part of what J.J. and I are hoping to do with the proposal that we're working on right now, is to hopefully, establish some mechanisms that we could start to collect some data more consistently. So, I don't know if that answers your question.

JORGE R. GARCÍA-SAIS: Yeah. But there's some things, for example, that we have available. Like, for example, number of hotel rooms rented, number of cruise ships getting into the island, number of houses without power, restaurants without power. Things like that,

that are clear indicators of either an environmental (i.e., Hurricanes) impacts or just things that are associated with pandemics, for example and so forth.

You know, I mean, things that are clearly, I mean, we're looking at our data and we know that things that are associated exactly with the dates that these events are happening. You don't have to be very smart to think that "oh man, that really may have had an impact on demand." You know, I mean, we're not far from it, we're just there. We can see it, but we are not doing anything with that crucial information.

TARSILA SEARA: So, just to real quick, just to respond to that Reni. Tarsila, for the record. Sorry. So, I guess we were maybe talking about two different things.

So, I totally agree with you that data is super important, and we are including a lot of the things that you mentioned, the data that's available, are being included in the analysis that we're doing under Lenfest. But I think, what I was thinking, was more with local ecological knowledge and perceptions and data that's coming from the stakeholders and what they are seeing out there, the changes that they are seeing and their priorities and their views and perceptions on what is influencing landings and that's the stuff that I'm saying we don't really have. We have isolated efforts, but we don't have that data being collected systematically and that's one thing that would be really, really helpful.

But what you're talking about, yes, we are going to hopefully soon have some analysis that will be including that and that's what J.J. is working on that. But I totally agree with you.

RICHARD APPELDOORN: Vance and Shannon.

VANCE VICENTE: Yeah, just one comment I really agree with Reni but at the same time I want to tell him that it's not simple. I mean, you take hurricanes for example. We know when they occur, we know actually where they originate and their path and everything, but their effect is very patchy.

For example, not all hurricanes affect the U.S.V.I. and Puerto Rico at the same time. Some of them go by the Caribbean South coast and don't impact at all the North Coast, etcetera. So not only that, but the effect of these hurricanes, even within an area, the effect of the habitat, is very irregular and patchy.

So, I mean, there's so many sub variables within one major variable, such as hurricanes and Northern storms. You know,

Nor'easter, which have even more dramatic effect than a hurricane in the North coast, with waves as tall as 30, 40 feet, you know, wipe out the piers and the docks and the whole North coast infrastructure maybe-- maybe, not, it has been wiped out.

So, it has to be broken down by area and by intensity, by frequency. So, it's not going to be that simple, Reni. It's going to be very complex.

RICHARD APPELDOORN: Shannon.

SHANNON CASS-CALAY: Well, I think that the complexity depends on how complex a model you're envisioning, but I do think that there is data available right now that could probably be integrated into our stock assessment models. Uh, sometimes the fisherman testimony already informs decisions. I mean, for example, you know, when the fisherman tells us there's been a change in the location of fishing or the gear that they're able to use, we can incorporate that as a time block in the model and re-estimate certain parameters.

We are not very good at communicating, obviously, when we are using that information and what we've done, so we can work on improving that. I do think that there are-- At some point when this SSC, I think, believes that the field is mature enough and there's enough information for us to start to evaluate, it would probably be a good idea to ask for a SEDAR procedural workshop, which can take a very comprehensive look at the socioeconomic indicators or ecological indicators that might influence many species.

And so, we can make decisions on many species at once, instead of each individual SEDAR process focusing on one species. I think a limitation, to be honest, of the SEDAR process, as we have executed it to date, at least in the Caribbean, is that it largely depends on people to bring finished research projects to the SEDAR process. It's not a mechanism that conducts research very easily during the assessment process because our analytical team is pretty much wrapped up in basic data provision and analysis for the stock assessment.

So, I think one thing we really need to do is, and I really like how you both are driving towards this, but to establish kind of the first steps, the highest priorities for integrating these sorts of information into stock assessments and to start to establish those mechanisms and methodologies that we would use to do that. And so, I'm really optimistic that this research is pragmatic and that we can start acting on this knowledge relatively soon.

And I realize, as you all recognize, as we move towards

increasingly ecosystem-based models, then the assumptions, you know, then there are a lot more data needs suddenly, right? You have to understand a lot more things. But it's a process and we take steps towards the conclusion. So anyway, that's it. But anyway, I think, this is the most kind of actionable information I think I've heard in some time. And I am optimistic that we're going to start to be able to use some of this information to manage fisheries.

RICHARD APPELDOORN: So, I have a question. So, you're talking about introducing something like this Fishery Performance Report and are you familiar with how they do this in the Mid-Atlantic? Is this done on a per species basis? Because we have a lot of them, even if you cut down to the primary. And so therefore, you know, how often are you going to, either the DAPs formally or just groups of fishermen, to do this? And is this every year or it's multiple times a year for different species? Or, you know, what's the burden on the fishermen to help provide this information in terms of time?

TARSILA SEARA: Right. And that is a great question and that is something that I think we need to discuss. What will be helpful for making recommendations?

But just to answer your first question, the way they do it in the Mid-Atlantic, they do it yearly by species, but of course they're managing a lot less species. So, you know, that's why I'm saying this is something that we would have to have a discussion about. So, they do pose once a year per species during the DAP meetings.

RICHARD APPELDOORN: And they do that like all in one meeting. They go through all the species.

TARSILA SEARA: No, I believe they have meetings per, or specific to species if I am remembering this correctly. Yeah.

RICHARD APPELDOORN: Okay. Thank you, Julian.

JULIAN MAGRAS: Yes. Good afternoon. Thank you, Richard. Julian Magras for the record. I think this is a great idea. I think it's the move in the right direction. We've been talking about this for a long time. I think a good place to start would be with the DAPs to get the key questions answered. I think some of the key points of doing something like this is most importantly, trust.

GRACIELA GARCÍA-MOLINER: That’s not working.

JULIAN MAGRAS: It’s not working. Hello, this is a little better. So, I think the key is trust in doing something like this. And

building the trust with the fishermen and the scientists goes a long way. But know that once the trust is broken, we have issues. And I think that the fishermen, most of them, realize nowadays the importance of getting the information across because their livelihood depends on it. Their future and the future generations depend on it.

So, I know definitely my group will be more than willing to sit down and entertain the beginning of this process. I know we're supposed to be having a meeting in March. I don't know how tight the agenda is, if we can get it in, because I know this will take some time. But I can speak with Miguel on that and see if we can even extend it out an extra day if we think we're going to need more time. But I strongly support this idea and I ask the SSC if they could please support them and Tarsila and J.J. in moving forward with this project. And let's see what the outcome is going to be. I think it's an area where it can help everyone and benefit and save a lot of time and money. Thank you.

RICHARD APPELDOORN: Reni.

JORGE R. GARCÍA-SAIS: Yeah, maybe an avenue for looking at this might be kind of-- you know, one of the main limitations that I've always heard regarding applicability of models for stock assessment, has been the absence or the limitations that we have on the data, on catch per unit effort. But if you think about it, you know, effort has a lot to do with the demand. So, if we can somehow adjust a measurement of CPUE to the different levels of demand in the fisheries, maybe that would be a way of introducing quantitatively a substitute, or a proxy if you want, for capture per unit effort, depending on the different levels or the variations in demand on the fisheries.

Just food for thought, you know? I mean, I don't know how this can be done, but I see the relationship.

RICHARD APPELDOORN: J.J.

JUAN J. CRUZ MOTTA: J.J. here. Just a comment on that. I know this is very simple drawings. But what we're trying to express is that the economic considerations must be thrown into the model. And one of those is, what's the demand of a specific-- and also, it's a multidimensional problem because it's not, what's the price of these species, but, is this species, versus that one, versus that one. But anyhow, yeah, you're totally right, it's in the moment.

JORGE R. GARCÍA-SAIS: Yeah. I know, what I'm trying to see is

how-- I guess that we need to find ways of introducing these socioeconomic indices into the mathematical models. So, you know, given the direct relationship that might be between effort and demand, that might be an avenue, you know. That may be a way into these models, by having demand as a proxy of effort.

RICHARD APPELDOORN: So can we, as a committee, if we're-- it sounds like we're all pretty high on this. What can we do to move this along? So, the two avenues I can think of is, one is that we would make a recommendation to the Council that they support this initiative in a meaningful way. And the other one would of course be to put it on our list of research priorities, which sometimes will get a little diffused, but I'm hoping we'll get to some prioritization of that list tomorrow.

What is the sense of the committee? Would you like to see a recommendation specific to say, "We're enthusiastic about the idea of instituting these fishery performance reports and would like to see the Councils support that effort to the degree possible." It doesn't have to be a formal motion, but just so we have a sense of the committee in that.

JUAN J. CRUZ MOTTA: Can I suggest something? All these ideas are being flushed out in the TAP EBFM. And then I would suggest that we finish with the document we're working on, to then it can be sent to the SSC for our consideration on the Council. And then we can take an action.

RICHARD APPELDOORN: I just motion this because Marcos is on the chat and I haven't seen him write to Miguel to open up his checkbook yet. [laughter] But, you know, shortcut that's the process. But I, we'll take your advice maybe and wait till the TAP comes up with our recommendations. Any other last comments for Tarsila or J.J.?

Okay, so we're going to take a 15-minute break. So, at 3:45 we'll be back and we're going to talk about the, I don't remember the acronym, to ENOW the Economics National Ocean Watch Program. So, 15 minutes. Thank you.

(Whereupon, a brief recess was taken.)

RICHARD APPELDOORN: Can we get people back to the table please? Okay, welcome back from the break. We are now scheduled to have a presentation on the Expansion of NOAA's Economics National Ocean Watch, or ENOW database. And I'm not sure who's giving that. It's not, is it Kate or--

Marine Economy Measurements for the U.S. Caribbean—Expansion of NOAA's Economics National Ocean Watch (ENOW) Database—Kate Quigley

KATE QUIGLEY: Yeah. Hi there. Good to see you all. Hi Richard and hi Graciela and others. Thank you so much for having us. Can you hear me, okay?

RICHARD APPELDOORN: Yes, we can.

KATE QUIGLEY: Okay, great. I think Charles will be putting up the presentation. I'll be starting off and then I'll have him take over.

Just a little bit of introduction. Some of you know me, some of you don't. I'm Kate Quigley. I'm an economist at the Office for Coastal Management. I used to work for the Caribbean Fishery Management Council and enjoyed many years there, so it's nice to be here. Charles Goodhue is an economist with Eastern Research Group that NOAA has, Office for Coastal Management, has contracted with to do some of this work. And so, I'll go ahead and get started and then I'll hand it over to Charles to cover some material as well.

So, I'm going to talk about this project. First, I'm going to talk about Economics National Ocean Watch the database and the project, just a little bit of an introduction. And then we'll go into some of the U.S.V.I. and Puerto Rico draft data sets that we have gathered for this project. We'll specifically focus on the living resources sector data, which includes commercial fishing. And then hopefully we can have a discussion and get some feedback from all of you.

So first we've got this data set called Economics National Ocean Watch, or E-N-O-W, which is referred to it as ENOW. And it is basically four indicators of the ocean economy. So, we've got number of businesses or establishments, number of jobs, not full-time jobs, but number of jobs, wages, and gross domestic product or GDP. And we have those numbers for the 30 shoreline states and 400 shoreline counties on the mainland in the sectors of living resources, which includes commercial fishing, processing, seafood retail, aquaculture, and some other industries. We also have it for, we have numbers for marine construction, offshore mineral extraction, which includes gravel and sand, marine transportation, which includes several different industries including whale warehousing, ship and boat building, which includes ship repairs and boat repairs, and then tourism and recreation. And there's lots of industries in there as well. I am happy to share those

with people who are interested. And we are working to expand this database for the U.S. territories, so for Puerto Rico and for U.S.V.I. as well as for the Pacific Territories. And we're looking to add in, for the first time ever, a few new sectors, so government, research and education, and power generation or energy. So that's why we've got that in parenthesis there coming soon.

And just for an idea about how people use this data set, which we have on our digital coast website, I can put that link in the chat in just a moment. And we'll be actually going over some of the data through a tool that we'd like to show. But some of the uses of ENOW, in past, have been by floodplain managers to use for mapping out vulnerable businesses and jobs where people might not be able to access their jobs. GDP at risk, wages at risk. Strategic plans, lots of times people want to know what marine economy industries are there in their community so that they can have a conversation about economic development. Help identify vulnerabilities to climate change and other hazards.

So not just from hurricanes, but from, flooding in general but also, tsunamis, that's more relevant to the West coast, and other vulnerabilities as including sea level rise. Some people use this information for grant applications because you can talk about how valuable your marine economy is for your working waterfront, or your particular area, perhaps for your territory, for your state, or for your county. And then advocacy. There are particular industries that will want to promote themselves and say how important they are to the U.S. economy, and they can use these numbers in this database to do that. For example, the tourism industry or the hotel industry or the restaurant industry could use these numbers to talk about their shoreline areas, their geographies, and talk about the importance in terms of jobs, GDP, etcetera.

So, we've got this project, we received some funds for it. It is a three yearlong project. The project objectives are to develop ENOW, which we have for all of the states right now, to develop it for U.S.V.I., Puerto Rico, as well as the Pacific Territories. So, what we're looking to do is develop relationships with territorial agencies, so in particular the statistical agencies, to continue this collection into the future beyond the length of this project, and potentially improve the underlying data that we have right now for Puerto Rico and for U.S.V.I., which we'll be talking about today.

And like I said just a few minutes ago, we're also exploring whether we can expand ENOW to include new sectors, government,

research and education, and energy or power generation, electricity. NOAA does not have the objective of doing any primary data collections. We're not collecting the data ourselves, but we'll be using secondary resources. We want to use whatever best available data exists. We want to go ahead and use that in the ENOW database using our existing infrastructure and the staff that we have within our office.

So, like I said, it is a three year long project. Started in May 2021. We'll be going until April 2024. The first year we spent relationship building, reaching out, getting feedback from folks and looking for more people to talk to and searching for data. We are now in year two. What we're doing is saying, "okay, here's the data that we found" and trying to get feedback on the data that we've collected and fill in any gaps that we still have.

Next year, we will be developing an operational plan for producing the data on an annual basis or if we can't do an annual basis, perhaps a biannual basis. So, we're going to do what we are able to do and it's still uncertain at this time whether we have funding from Congress to do that yet or not. And we're conducting a continued engagement, as many of you have seen from invites that we have sent through bimonthly meetings. So, every two months we hold a meeting for the U.S. Caribbean. We've had virtual workshops, but we will be hopefully having in-person workshops next year in each of the territories. And we're continuing to conduct one-on-one conversations to dig up additional data.

So, at this time I'm going to hand it over to Charles and he's going to do a little bit of walkthrough of ENOW Explorer before we go into some of the data that we have for Puerto Rico and U.S.V.I. with a particular focus on living resources.

CHARLES GOODHUE: Thank you, Kate. And thank you everybody for having both Kate and I. Again, my name's Charles Goodhue. I'm an economist with ERG, a contractor to NOAA for this project.

So, one thing I wanted to do before we dive into the underlying data is show what ENOW, or we have ENOW Explorer currently is for the U.S. coastal states and Great Lake states because ultimately this is what we are trying to develop for the U.S. Virgin Islands and Puerto Rico.

So, the explorer allows you to currently select any of the states. It can be done at the county level or county equivalent level, or just total statewide data. And as Kate said, we have indicators of employment, number of establishments, total wages, and GDP. So those are the four indicators that are part of the ocean economy

in ENOW. And as Kate also showed earlier in a slide, we can have these indicators across the total ocean economy. We can see those data for living resources, we get this description. So, for example, living resources includes commercial fishing, fish hatcheries, aquaculture, seafood processing, and seafood markets. It also notes that recreational fishing is excluded, isn't included in tourism and recreation. So, there's a description of the sector and the metrics for that. There's marine construction, ship and boat building, marine transportation, offshore mineral extraction, so both sand and gravel mining and oil and gas exploration. And then often the big one for many of the states tourism and recreation.

These indicators are provided on a time series. So many of the states, coastal and Great Lake states, go back to 2005. We will be doing our best to provide as much of a time series as possible based on data availability as we work with the territories in Commonwealth on this project.

And then, as I said for many of the states, we can zoom into certain county levels. So, if we wanted to look at Miami Dade, for example, we would be able to see these same metrics at the county level. Often, we run into issues of suppression for smaller counties because the underlying data sets, which I'll talk about very shortly, have to suppress data to protect confidential business information.

So going back to the slides, challenges in developing ENOW in the territories. So fortunately for the U.S. Virgin Islands and Puerto Rico, and this is a much bigger challenge for some of the Pacific territories and Commonwealths we're working with, we do have the base data set available, as that base employment wage and establishment data that you saw in the ENOW Explorer comes from the quarterly census of employment and wage data, compiled by the Bureau of Labor Statistics. So again, we do have that for both the U.S. Virgin Islands and Puerto Rico.

This QCEW data as they do it, I'm not going to continue to say Quarterly Census of Employment and Wage data, but QCEW data, includes a tabulation of data on the number of establishments, employee wages for workers covered by state unemployment insurance laws, and federal workers covered by the unemployment compensation for Federal employees' program. This captures about 95% of employment by businesses. These data are aggregated to many different levels starting at the six-digit NAICS code, the North American Industry Classification System, and to higher industry levels. So, they do get aggregated up. They're available, the QCEW data, is available at the county or county equivalent level, and

similarly aggregate up to higher levels such as the state and national, or in the case of Puerto Rico and U.S. Virgin Islands, either the territory or commonwealth level.

The issue is, as we'll see shortly in this aggregated data is that for U.S.V.I. and Puerto Rico, that disclosure restrictions are not always met, which can create some gaps. And again, I'll show you that data in a couple of slides. Another gap is on the self-employment side. While QCEW captures about 95% of employment by businesses, it does not include self-employment. So that's a major economic contributor, as folks know, to sectors such as living resources, which include fishers. For the U.S. Coastal and Great Lake States, NOAA uses the census's non employer data to fill that gap, but that data is not available for the U.S. territories in Commonwealths. Fortunately, in the U.S. Virgin Islands, we've been working with the Department of Licensing and Consumer Affairs, and I'll show this in the upcoming slides, to estimate self-employment for sole proprietorships because we have business license data which they've been able to map to our ENOW sectors, for sole proprietorships. We're still trying to work with Puerto Rico to see if there's anything similar in terms of business license database or self-employment data, but we have failed to find anything that can map to our email sectors sort of in an annual sense.

Our final challenge is, the Bureau of Economic Analysis produces GDP data. So, the Gross Domestic Product, which I shown, that was the fourth indicator that I showed, the bottom one, in the ENOW explorer. And for the states, we have more industry level granularity than in the territories and commonwealths. So, we're able to, in the states, come up with some probably more specific, more accurate ratios of wage to GDP by industry. For Puerto Rico and U.S. Virgin Islands, we're going to need to make much broader assumptions about the ratio of wages to GDP for the territory. So, it won't be industry specific. We'll probably just have a single ratio across everything. So that'll impact the accuracy slightly based on that.

So, I'm going to show the draft data in the upcoming slides for the U.S. Virgin Islands and then Puerto Rico. In a couple slides, we're going to hone more in into the living resources sector. So here are the data for the U.S. Virgin Islands. Unfortunately, when we aggregate our base data set, so this is the QCEW date from the Bureau of Labor Statistics, we have data suppression for living resources, the top row, marine construction, offshore mineral extraction, and ship and boat building. So, the only data we have across all indicators include marine transportation and tourism and recreation for the U.S. Virgin Islands. We do get number of

establishments, which is that second column from the left, from the Bureau of Labor Statistics, even when there's suppression for employment wage and ultimately, we are not able to calculate GDP without the wage data.

What we do have for the U.S. Virgin Islands, as I said, is the Department of Licensing and Consumer Affairs. That's that middle column where it says self-employment. So, we use the number of annual businesses licenses in 2022 for specifically sole proprietorships to estimate self-employment. So, we have 310 in the living resources sector, a couple in marine transportation, and then 477 more self-employed above and beyond the 2,183 in the Tourism Recreation Sector that are part of businesses.

So again, the only other thing I'll say here is I'm not going to spend too much time on it today, as we're mostly focused on fisheries, but we are working with contacts to fill our gaps for the marine economy related to the government research and education and energy as there are various challenges and data gaps associated with using the QCEW data here. Those being, these sectors would either not be included in QCEW data because they're not associated with businesses. Or in the case of energy, it's often quite impossible or challenging to split out the marine and non-marine component of the utility data accurately. A lot of the NAICS codes for which data is collected are not naturally broken up into sort of an ocean and non-ocean portion.

The data we have for Puerto Rico, we do have one additional industry that's not suppressed. So, we have marine construction available here, but we have suppressions for living resources, offshore mineral extraction, and ship and boat building. Often these suppressions happen because there's either not enough businesses or one or two businesses are sort of the predominant contributors to the economy, but there are some statistical tests and thresholds that BLS does before releasing the QCEW data.

As I said before, we have not found any similar business licensing or self-employment data that could easily map to these six ENOW sectors in Puerto Rico. So, certainly, if folks are aware of people that we should be talking to, that'd be something as we open up discussion in a few slides, I'd be very interested in hearing about.

So, before we dive into the living resources data and what we've looked at so far, these are some of the industries we are trying to capture. As I said before, these are the North American Industry Classification System codes and a lot of economic data, including QCEW, from the Bureau of Labor Statistics, is collected and

reported by NAICS code. In ENOW, NOAA then rolls up these industries into the living resources sector. So ultimately, we have nine different NAICS codes or industries that will be aggregated together to include living resources. So, this includes finfish farming and harvesting, shellfish farming, other aquaculture. Those three are in our fish hatcheries and aquaculture industry. The NAICS of finfish fishing, shellfish fishing, and other marine fishing, make up the fishing industry. The NAICS of seafood product preparation and packaging, are part of the seafood processing industry. And seafood markets industry is made up of the NAICS first fish and seafood markets and fish and seafood merchant wholesalers. And again, combined, that makes up the data that will present for living resources.

Even across the coastal and Great Lake states, there's a struggle to collect some of these data because of the challenges with missing self-employment and subsistence fishing. I'll note that self-employment would theoretically be captured in the census non-employment data for the states. We, as I said before, we don't have self-employment data sets, that self-employment data set, for the U.S. Virgin Islands or Puerto Rico, but subsistence fishing would not be captured because there's no earnings or associated data reporting associated with that. That doesn't mean it's not important. That just means that based on how ENOW is reported, it's very much a wage, number of employees, number of establishments. It's not creating that market impact, which ENOW captures. There's certainly other really important work that's done in the ocean economy that might capture non-market benefits associated with subsistence fishing. That's just not the piece of the pie that ENOW is capturing.

What we want and haven't really found yet are the incomes earned by harvesters. There are a few surveys that I'll go through that get us close to there, but not quite. As well as value added by the harvesting sector so that we can inform more accurate GDP estimates. The other note I wanted to make, just because of conversations with previous stakeholders on this topic, are on fishing co-ops. So, government funding fish co-ops are not necessarily included or wouldn't necessarily be captured in the QCEW data, if it wasn't suppressed.

So, separate from the suppression because the government pays for maintenance and infrastructure, we might see some of that come up in government spending, when we collect that data. However, the private entities that operate within these structures, within these co-ops, could be captured in QCEW and might be included in the ENOW data. Again, if it was reported instead of suppressed, it could be there depending on what NAICS they report into. So, if

any of those private entities are reporting into those nine different NAICS, they would theoretically get captured in QCEW. But again, the government payment for maintenance and infrastructure would not be captured by QCEW. We would have to capture that from government spending.

Just zooming into the fisheries data for U.S. Virgin Islands and then Puerto Rico. Just a reminder, as Kate said, we're not doing any primary data collection for this project. We're collecting the best available existing data and hoping that it's a recurring data set to inform time series. We've certainly had conversations with a lot of folks, both in the U.S. Virgin Islands and NOAA. Scott Cross and Juan Agar have been very helpful in providing studies.

But in terms of the data in the living resources for the U.S. Virgin Islands, the BLS data shows us, there's one establishment that reports. The Department of Licensing and Consumer Affairs had six and it might be because some of these are actually self-employment, but they could be under an LLC or something that's not necessarily self-employment. So, some of these six may very much be in the self-employment realm. Again, the self-employment data for U.S. Virgin Islands, there was 310 business licenses associated with living resources sector, in 2022. And the other supporting indicator we have is the 4 million in commercial landings from NOAA. And that's 2020 data.

So just to provide some context of other data out there that we've seen, and stakeholders have provided. We have this 2017 study from NOAA. Notably here, the universe of fishers was 260, which I think, and as we've talked with some of the NOAA folks, Scott and Juan and others, is reasonably in line with the 310 self-employed with business licenses in 2022 from the Department of Labor and Consumer Affairs. Kind of as part of that in related studies, we do have some data on costs for some of the commercial fisheries. So, this study, this table in particular, is specific to Saint Croix, but the study provided here also includes cost and profit information for Saint Thomas and Saint John. This data is from a 2014 survey, and these data do provide some insight into the value added and wages. Although one of the major challenges in trying to translate this into our needed metrics in ENOW is because the crew shares, that are part of that fourth column from the right in the data, are not necessarily normalized by number of crew. We're really trying to get average wages per person, per employee, and it seems like we might have some challenges given sort of how this data was collected. But again, this is sort of our best available data for providing some insight for some of the metrics we're looking for.

Moving order over to Puerto Rico. Again, this is just the line out

of the broader table, but I wanted again to focus in on fisheries here. The QCEW data shows there's 13 establishments in Puerto Rico that are businesses that again, report. We do not have self-employment, so any sole proprietors, self-employment folks, subsistence fishers would not be captured here. The other supporting indicator we have in Puerto Rico currently is the 8.2 million in commercial landings for 2019. But this still remains a major gap and a really important gap for us to fill going forward in the next year and a half of this project.

Something we have for Puerto Rico. This is a study that again, that Juan provided a census of active commercial fishermen in Puerto Rico in 2008. This was a nice survey of 868 fishers. At the time of this survey, there was 1,129 active licenses in the DNER database. And, and we'll work with DNER to see if we can pull active licenses now, because that might be our best bet at trying to get it some idea of what's available if they're willing to provide that to us.

And just to provide a little more context of related information that's been provided to us, that, again, has helped but not necessarily has provide us that year to year or even Kate said, it might be biannual data set for the metrics that we're specifically looking for. Some stakeholders have provided us the comprehensive fishery management plan for the Puerto Rico exclusive economic zone. The NOAA Fisheries Covid 19 impact snapshot, again, great context there, just not quite for that annual data set that we're looking for. Didn't quite fit the needs, but it was very informative. Economic impact evaluations for hurricanes, Irma and Maria disasters had some useful economic data in there.

For the U.S. Virgin Islands, we had some charter companies by islands, comprehensive fishery management plans for Saint Croix, Saint Thomas, Saint John. Also had the NOAA Fisheries Covid 19 impact snapshot in the economic impact evaluations for hurricanes Irma and Maria disasters.

So, this is where I'm going to stop talking. Given what we are looking for and sort of keeping in mind that ENOW's measuring jobs from businesses, we're trying to measure self-employment, we're trying to measure number of establishments. So that could be businesses. And then, also, if it's self-employment, that could be sort of part of that in a sense. In the harvesting sector, are there indicators, surveys, research that are available, maybe above and beyond anything I've already shown today, or maybe that might be expected to be gathered in the coming years? Or maybe, are there opportunities to collaborate with those data collection efforts? So that, again, as Kate said in the objective slide, that

we can try to gather this information annually or perhaps biannually or so, in the future.

So, I'm going to pause there. Kate is there anything you want to say before we open it up for any feedback or discussion?

KATE QUIGLEY: Nope. I'm good. Just want to hear if there's-- so, just a reminder, we're here today, first of all, to just let you know what we're doing and to see if you have anything that can maybe fill some of our gaps.

Questions

RICHARD APPELDOORN: So, thank you Kate and Charles. Comments, questions from the committee? Particularly Walter since this is somewhat your field.

WALTER KEITHLY: Thank you, Mr. Chairman. This Walter Keithly. Thank you for the presentation. The only information I would have that's not reported here is more recent census done for Puerto Rico. Just came out by [Manoj?]. I think it's 2021 or 2022, so you may use that in replacement of the one that you have here, the 2008 study by Agar et al. But that's the only information that I'm familiar with. Your right, there's not a lot of information on cost and returns income derived from fishing, and most of that is specific to gear. I know Agar's done some on trap fishery and I think on scuba fishing and all. But no census of income derived from commercial fishing and, as you are well aware, recreational fishing information has a large paucity of information on recreational fishing. You have, the latest one for Puerto Rico is 2016 on the MRIP studies. As far as I know, there's nothing more recent than that. Thank you.

CHARLES GOODHUE: Thank you.

KATE QUIGLEY: Thanks, Walter. Yeah, I don't think that we are aware that [Manoj?] had that census out, so we'll definitely get in touch with him and get a copy of that.

RICHARD APPELDOORN: Any other questions, comments from the committee? Michelle.

MICHELLE SCHÄRER-UMPIERRE: Michelle Schärer here. Hi Kate. Good to see you again. I just had some ideas as you guys were asking. I think for part of the information that you're looking for, I would contact the Department of Agriculture. They have several programs where they incentivize self-employed commercial fishers.

For registered corporations, I would check the State Department. I don't know if they used the NAICS codes or not, but any corporation that is doing business in Puerto Rico supposed to register there. And then finally, I try to get in touch with somebody with a treasury department, because even if you're self-employed there is a requirement to submit data through their new system. And it's called SURI, and some fishers are actually in that database. Good luck.

CHARLES GOODHUE: Thank you.

KATE QUIGLEY: Super. Thank you.

RICHARD APPELDOORN: Jason, you have a question? Comment?

JASON COPE: Yeah. Thank you. Jason Cope. This is very appealing to look at and to play around with. It's been neat to kind of move around through it and I'm not an economist and I don't know this type of information well, so it's nice for me to kind of get familiar with it.

One question, and now I'm going to expose my more assessment side of things and the fact that we usually don't know a lot about what we're using, and therefore we focus a lot about what we don't know. I was curious, just in general, the presentation [inaudible] of the application that you can look [inaudible] issue numbers basically as, not known, but they don't show error bars, right? They don't express uncertainty in any way. And we've had a lot of discussions about whether it be missing information or there might be some varying quality of the information that goes into building all of the components of this tool. And while I'm not saying that that should be the most front facing aspect of this, I was curious to know your feeling on representing uncertainty in all of these different dimensions in some way, whether it's qualitative or actually providing CVs or something like that. For a couple reasons. One, kind of gives folks an understanding of how much uncertainty there is, but two, for future research, maybe it really can highlight patterns and what is missing. And some of the people most intimate with each dataset would already kind of know that, but synoptically, someone looking at this tool, would be able to get a good quick look like, "oh wow, this in general has a lot of uncertainty around it. We need to put more information or get people more involved to provide more information."

That seems to be one way that we identify ways to move forward to better our modeling and then our reporting of estimated quantity. So just with all of that that I've just said, any thoughts or concerns or ideas about expressing either quantitatively or

qualitatively the uncertainty in each of these components? Thank you.

KATE QUIGLEY: Thank you, Jason. I will say, and with regards to self-employment data, which we get from the census, which is incorporated into the ENOW Explorer tool, but not for 2019, because during Covid they didn't have enough employees to actually get the data together. So, we're still waiting for that data. But if you look at previous years in ENOW Explorer, you'll see there's self-employment data.

Well, we also have a landing page on Digital Coast for the self-employment data so that you can download it. And in that, there are some uncertainty indicators. So, we know that there's uncertainty indicators with regards to the self-employment data from census. I'm trying to remember if there's anything from QCEW. Charles, I'm not sure if you remember or not, but before you reply to that, I will just say that a lot of this data we use in trainings, we use in economic analysis trainings, we'll do technical assistance. And it's very important that when we are providing them with this data, acquainting them to this data, and then we're explaining how you could potentially use this data, what you can and cannot say about this data, we always advise people to use a good bit of caution and try to explain where this data came from, what some of the problems are with the data. For example, in one of our trainings, we use the zip code business patterns data and that is actually a range, and a midpoint is chosen, right? So, we're using an estimate of the data that we receive.

So, we try to make that very explicit. That's doesn't always show up in the ENOW Explorer tool, but we do try to have that on each of the landing pages for each of the data landing pages that we have, we try to give a link so that they know, they're aware, of what the risks are associated with this data. I'll stop right there. I don't know, Charles, if you add anything?

CHARLES GOODHUE: Yeah, no, Jason, that's a really great question and important point for sort of building off this research. I would just add to Kate's point, a lot of times the underlying data is going to have different error based on the methods for which the data's collected. I think some of them are samples. So, there's error bars, I think the census non-employer being an example there. The QCEW data though, is essentially, in theory, everybody's supposed to report that has a business. So, the only people that are not captured in that would be businesses that are not reporting tax data into the system.

So that one is covered in a more qualitative sense saying that, "well, this is the entire universe of businesses that report, but sometimes businesses don't." So, I think in that sense, Jason, your point on sometimes capturing the potential error or under reporting in a qualitative sense would be more applicable on the QCEW side, which is the base data for this.

JASON COPE: Exactly. Like it doesn't have to be like very specific numerically presented uncertainty. But I love the idea that you do provide text descriptions of some of the caveats that go along with using the data. I was just curious, like if you, maybe stamped that page with a color that just was like a warning color, just like a real broad sense. Like, "Oh, hey, this, you should probably pay attention to all these caveats here, or whatever. This has an orange or a yellow or a red or something." Because in general, this data can be complex. We do approximations, whether it's zip codes, whatever it is, right? Just so like a stamp to let people know, "oh, okay, I should be aware before I just take this number and use it as true."

But I appreciate, I don't want to keep taking time. I appreciate the back and forth with this and this is a great tool. Thank you.

KATE QUIGLEY: Yeah, thanks Jason. I think that's a good suggestion. We do that sometimes. We also have reports that talk about this data, U.S. marine economy, and then we've got regional and state profiles and we try to provide some of those caveats.

One thing that I always try to make clear about this database is, when we replicate it for Puerto Rico and U.S.V.I. is, a lot of people will say, "well, this shows the value of the marine economy," one thing I'll say is, "It doesn't show all of the value. It shows four indicators of the potential value of the marine economy." And we know that we're missing things. And one thing that we always talk about is, of course this does not include cultural values, it does not include social values. There's a lot of values. It doesn't include the ecosystem service values. It is basically just common economic indicators. And so, yes, very often people will just grab these numbers and say, "well, this is the value of the marine economy" and we just have to remind them to, you know, "please don't say that, please just say that these are indicators of the value of the marine economy for the Economic indicators only, but it's missing a whole bunch of other things and that's very important." So, thanks for that discussion.

RICHARD APPELDOORN: Anyone else? Alright, I'm not seeing any other indicators of questions. So, thank you both to Kate and Charles for that presentation.

CHARLES GOODHUE: Thank you all.

KATE QUIGLEY: Thank you.

RICHARD APPELDOORN: So, the committee has a half an hour left on its scheduled time. We have some unfinished business regarding Queen Triggerfish and Puerto Rico. And then of course there's the whole issue in the Virgin Islands. And so the remaining issue in Puerto Rico was to deal with what our MSY proxy would be. And then if we want to see that being more fully incorporated, in other words, have the analysis run again, such that the proxy and steepness values are in line and also with the initial biomass. So, let's just start off with the MSY proxy issue. What was run by the Center was 30% and we heard a lot of discussion on pros and cons starting with, that's basically the baseline that the Center uses for most of the stocks, unless there's some compelling reason otherwise. We also heard that, because of the life history of this particular species, particularly their reproduction mode, that maybe they would have a much stronger relationship with stock and recruitment and that value should be higher.

So reproductive wise, they're producing by far fewer eggs, but they are letting them go at a much higher, developmental stage. So, and they would be in the plankton a shorter period of time, so there's a tradeoff there about numbers of eggs versus the survival of those eggs and larvae. So, and I think that's something we don't particularly know, but I want to hear from the committee whether they're happy with an SPR30 MSY proxy or would they like to change it.

And I'm not seeing any indicators that anybody really wants to say anything. So, I don't whether that's a, leave it like it is, or a fully, I don't know. Erik?

ERIK H. WILLIAMS: Yeah. Thank you, Rich. This is Erik Williams. You know, a proxy is meant to be, represent MSY. So, we don't have any direct estimates of that probably for any stocks in this region. So, we turn to sort of other stocks that might be related. As you stated, I think in the Gulf of Mexico, they tend to go with a 30% but I'm not sure what the basis of that is. If that is a number that is supported by sort of meta-analysis or species where MSY could be measured directly and then looking at what the corresponding SPR is.

Um, you know, my concern when I was discussing it in the chat with Jason is, you know, the literature does tend to point to higher values, but that is also for longer lived species and for ground

fishes in general. May not apply to trigger fish. But I think the issue here is, we probably need to establish sort of a scientific record of sorts for why 30% and maybe be open to the idea that it might change. You know, if as we start to get more data, start to do more assessments for these species, maybe we will recognize that there is maybe a better proxy for this region or for this sort of group of reef fishes that we're responsible for managing.

So, I just say all that, I don't, I'm not proposing, I mean, 30 is probably a good starting point. I would just say let's recognize that it is just that, a starting point that we might want to be open to reconsidering and not necessarily applying to other species because we've set this is a default for this particular species. And I think that's it.

RICHARD APPELDOORN: Thank you, Erik. We have Jason and then Doug.

JASON COPE: Yeah. Thank you. Jason Cope. The other way to think through this, if a proxy FMSY of SPR30 is hard to kind of try to figure out whether that's good, right? The flip side is to think about steepness, and we've already established that there isn't anything in the assessment to say whether steepness is really well determined or not.

I think the original assessment document when we looked in October, wasn't it steepness 0.7? I mean, I could be totally wrong, but I think it was very different. So we had a 0.7, then we're considering 0.95 now, those map directly to an FMSY, which we would basically call a proxy in the sense that it's consistent with the steepness that you're choosing but it's not something that we claim is exactly right, but we're tying it to what we think we can define maybe better, which is steepness.

Now, I don't know if we can. So, I was just throwing that out there. Does anyone feel like they have a better handle on steepness versus an SPR proxy for FMSY?

RICHARD APPELDOORN: Yes. So, Shannon will respond.

SHANNON CASS-CALAY: Yes, I would say that the steepness was fixed at a value close 0.7. We also ran the profile, which you may recall, in the original base case that was submitted through the SEDAR process. We assumed the initial catch, we did not explore the uncertainty. In that model with a fixed initial catch steepness profile suggested it was estimable and something approaching 0.7.

What we have discovered since is that in fact, not surprisingly, steepness is confounded with your assumptions about initial catch.

That's what the presentation we showed today. And so, it likely is not estimable unless we assume that we understand the initial equilibrium catch well. Right. So, I would say--

JASON COPE: That's right.

SHANNON CASS-CALAY: Yeah. And I would say also in response to Jason's question that I think it's my recollection that-- Sorry, well, okay, maybe I shouldn't go that direction because it could be incorrect. I will say that we did a work, and I sent the paper to Graciela and to Rich, to share with the SSC. The Science Center and Bill Hartford worked together to produce a paper and in that analysis, which relied almost entirely on simulation work, it supported proxies as low as SPR30 when steepness was likely to be relatively high. It was when steepness was lower, or stocks that are very long-lived or hermaphroditic that it started to support SPR proxies of 0.4 or higher. I think that's a fair summary of the general conclusion of that paper.

So, in short, I don't think there's strong support for estimability of steepness in this model. It's been our typical practice to fix steepness near one, in those cases, and rely on a proxy. We've had some experience that SPR30 tends to be a relatively safe proxy. However, you know, there are certainly circumstances such as one Doug mentioned, which is Gray Triggerfish, where we continue to see, for example, low recruitment and the stock doesn't recover as we expect. So, we need to be wary and continue to monitor this stock. If we used a steepness of FSPR30, I would not be concerned that that's a decent value to start with but I do think it requires monitoring to ensure that the stock is responding as we expect.

RICHARD APPELDOORN: Thank you. Doug, and then Jason again.

DOUGLAS GREGORY: Doug Gregory. Thank you, Mr. Chair. I appreciate Erik's comments and Shannon's just now. And we're going with the proxy and not the estimate of MSY and that makes a big difference. We're starting at 30 and not at 16. I feel much more comfortable with that. However, with knowledge of a potential refuge in the deeper water, that should give us some confidence that we're not going in the wrong direction. So, with all that I still support 30% being a starting point, and I agree with continuing to evaluate it and continuing to do management strategy evaluations and simulations to try to get a better handle on all this. Thank you very much.

RICHARD APPELDOORN: Thank you, Doug. Jason? Yeah.

JASON COPE: Just to make sure everyone's on the same page with

how all of this goes together. Because I hear the idea of sticking with the proxy of 30. And I don't have a super strong opinion on that. I do tend to have more of a strong opinion of setting steepness at one, because using an SPR proxy of 30% on a stock that has a steepness of one versus a stock that has a steepness of 0.7 is very, very different.

The one that has a steepness of one can really, you were saying has the qualities of the potential of bounce back at very low levels. If you decrease it very low, it can jump right back up. Whereas the one that's a steepness of 0.7 just doesn't have that capacity, reproductive capacity. So that's a very, very different thing and as I've been saying, if you choose that proxy of 30%, there is a life history presumption that it matches a certain level of steepness. And when you don't accept that and you accept a higher one-- I'm not saying you can't do it, and Erik's pointed out that you definitely can do this, and it happens all over the place. I just think it needs to be very it needs to be acknowledged and understood, maybe even explained why that's acceptable, to decouple those two things and allowing something to be very, very productive, yet fish it at a much lower rate than it thinks it should. Now, maybe that's a precautionary choice. I'm not sure. I just, I think it deserves some sort of explanation why that would be a preferred way to go forward.

And then, as Shannon said, the third thing here is the initial catch, right? So, you have three moving parts. They're all connected. And I think at the beginning, I outlined whether you're going to go with FMSY or proxy. Alright, sounds like we are leaning towards proxy. That seems very, like a good decision. And then from that point, what is it? and do you want to define it itself? Or do you want to define it through steepness? Do you want those decoupled? And if so, then you're going to want to ultimately, it sounds like, from what Shannon was saying in this discussion, we would then want to match, whatever steepness is ultimately chosen, match the initial conditions with that steepness, because that is also related. So that seems to be the order of operations again.

But I think what is outstanding to me is whether people feel comfortable decoupling FMSY proxies from steepness and moving forward from that. And then if you do that, you have to define both. And it sounds like one suggestion is steepness equals around one, FMSY SPR equals 30. And then I guess an alternative would be, if you're picking 30, I would suggest you match it to the steepness. Those are two things that could be discussed. There are other alternatives that could also be put forward. Thanks.

RICHARD APPELDOORN: So, I'm a bit confused. So, one of you can

explain this to me. I was kind of thinking that if we're going to go with that proxy, that the model is no longer incorporating steepness in whatever else it's doing, but it sounds like that's not the case and therefore we have to make a choice about whether we're leaving steepness high or whether we wanted to balance it. Is that, Shannon, the case?

SHANNON CASS-CALAY: Yes. So that's correct. So, the initial hypothesis from, or the initial procedure-- this is Shannon --that Erik had recommended a few SSC meetings ago, maybe now, was to, if we believed in the estimate of steepness, to actually go ahead and trust the spawner recruit relationship and directly use FMSY no proxy.

We can use an SPR reference instead and say, "we don't have reliable information about the spun recruit function, and so we want to retain the stock at a certain level of biomass that we believe will support something that approximates maximum sustainable yield." You can, furthermore, you can assume that you understand something about the productivity of the stock, the resilience to fishing pressure, and use the steepness value. We've done that in certain assessments.

More commonly, we have just, essentially what Jason has said, decoupled it and basically said, "we don't know much about spawner recruit relationship at all, or the implied productivity of the stock, and therefore we're going to set that SPR proxy and we're going to tell the stock assessment that we don't know what the expected recruitment is. So, we're going to assume that it will continue much like it has during the historical data period." Basically, the mean recruitment will continue in perpetuity.

Now, clearly none of these things give you a satisfactory answer in the far future, right? The equilibrium results a hundred years from now, no one believes that our assumptions would be true forever, right? So, we would caution that the true MSY is very likely unknown and that the short term management advice could be useful, but it needs to continue to be monitored to make sure that, you know, if, for example, there are indications from an index or from the length composition data, that the stock is increasing rapidly and we didn't expect it, or declining rapidly and we didn't expect it, that it needs a reevaluation. You know, the model needs to be at that point reevaluated because it would suggest that our assumptions, that something about the environment has changed or that the assumptions of our model are incorrect.

RICHARD APPELDOORN: So, is there a scenario where you would specify SPR as your proxy, but somehow the model would still be

using an estimate of steepness? That's where I'm stumbling.

SHANNON CASS-CALAY: If we fix the steepness in the model of, say at 0.7, we're essentially predicting the recruitment that will occur in the projections with the spawner recruit relationship that is in the model that is-- so we'd use the steepness value in the model, we'd assume it's a Beverton-Holt function with the R-naught that's been estimated in the model. We'd assume that we can make those predictions about what recruitment will be in the future, or we can say we don't want to make those predict-- we don't want to impose a spawner recruit relationship. We're just going to expect that recruitment will continue at about the average level that it has in the historical period.

RICHARD APPELDOORN: Okay. Got it. Thank you. Yeah, go ahead Todd. Sorry, I've just been writing.

TODD GEDAMKE: No, no, no, I wanted to follow up. I think some of the sidebar conversations and many of my comments earlier were on the fear of applying a, what I think Jason and Erik, Central tendency to this, that is then turned into MSY. And I think what Shannon just said is key. And it's basically what everyone else is kind of saying in the back burner, which is the true MSY is unknown, and can you use a proxy, but it has to be monitored over time. Yes, yes, yes, yes, yes. I vote for all of that. The problem is, is that what I see is we get into the legal realm here of putting a number down that turns into MSY. And if we had the ability to basically change that number in an adaptive framework, and I'm hearing some kind of indications that that's possible, I think that would, I think, addressed some of, at least, my concerns with this in there. Because once that's in there and locks solid, it's just, you know, it's challenging to move out.

JEREMIAH BLONDEAU: Yes. I'm here, sorry.

RICHARD APPELDOORN: Shannon, you want to respond to that? And then Jason has something.

SHANNON CASS-CALAY: So in my, you know, I know that this comment is probably somewhat controversial, but it has been largely the advice of Clay Porch, the Center director, for quite some time, that in situations where we use proxies and we assume mean recruitment and rely on short term projections for annual catch limits, that we actually don't define MSY and we actually leave it undefined because it's basically saying we don't know what recruitment will be, but in the next three to five years, we think it'll be much like it has been recently.

TODD GEDAMKE: I don't want to make a blanket statement for myself, but very much of my critiques and many of my criticisms with the opening part and what Erik and I we're not saying is you're determining stock status at the beginning, you're therefore going to get something out at the end that's similar. But as long as that's not pinned from here till eternity and have to go through a whole process as it's known. So, if MSY is undefined, but you have a proxy in place, then you can re-look at that proxy and change it until a method becomes available to you for you to apply MSY. Is that fair?

SHANNON CASS-CALAY: You know, I say that that's fair, Todd, but I don't want to leave you with the impression that it means that we would never-- the problem has been that even if we don't define MSY, we are still defining stock status on the basis of the proxy reference point. And so there can still be at some point a determination of overfishing. So, it's not a completely satisfactory-- Okay. So, it's only MSY that we have largely said in these situations really ought to be undefined because that's the truth.

TODD GEDAMKE: Shannon, thank you for your comments and yeah, this is challenging, and I've been in these other seats on this and I know this is really, really-- But what I heard coming out is that, yes, I can look at the fishing community and say, by doing this, you're never going to go overfished. But as a scientific community that has to re-look at this, we can look at a situation, that we do not feel is appropriate given the new information that's available and we could revisit the proxy. Yes? So that would be, I think that's kind of an in-between in here, but this is where legal kind of jumps in and says, I don't know. And we've had issues with this before. But that to me is, I mean, that to me is a path forward that allows us to revisit. And as long as it's not pinned as MSY defined, it's going to be easier for us to revisit and modify.

So, for example, the proxy, you want to talk environmental indicators, you could say there's a huge, you know, an El Niño that has wiped out recruitment and therefore we have a proxy that needs-- and I'm just making this up don't hold me to it. I'm just saying it might add a little bit of flexibility in the ability to change. But this and this office are going to have to have a big conversation about how this works. And I wouldn't take anything to Shannon or that the team says right now on the specifics component of how that may work until they have a little consult, if I'm not wrong.

RICHARD APPELDOORN: Alright. Thank you Todd. Jason?

JASON COPE: Yeah. Thank you. Jason Cope. Yeah, I think Shannon is hitting the key here, is that everything has to be very short term on this because of the scope of uncertainty and that it plays into both scale and status. One, thing I couldn't tell from the new runs was the overall trajectory of the population. And if I missed that in one of the documents, I'm very sorry. But comparing that to what a steepness of 0.95 looks like versus a steepness of 0.7. Because the steepness of 0.7 runs, the population was coming in really, really, really low and it only rebounds, it still ends at a very low value, but it rebounds from a very, very low in the teens percent depletion.

And I would think that if, I mean, I think what's hopeful here is, is if there is some sort of historical catch reconstruction, you would think with that contrast of a population going that low, you would have that contrast needed to actually estimate steepness. And so, there might actually be hope, unlike many assessments where there's just a lack of contrast, you might actually get something in the near term to help inform steepness if you can reconstruct those catches backwards a little bit.

But, again, with the steepness of one, I don't know how much it goes down and I don't know what it looks like, but I think it's all pointing to very, very short-term estimates. And Todd, what you're saying is, don't lock in anything. And I think we're all consistent with not locking in anything here, but using this as the best scientific information available at this time to make some short-term management decisions and prioritize a revisiting of this, with the key, again, making progress on some very specific things because there's no sense in doing this again in the short term, if you don't improve something key, that's going to actually help. And I think we know where we need to help this model. Thanks.

RICHARD APPELDOORN: We have Erik waiting the wind, but you have a response? Okay. Erik?

ERIK H. WILLIAMS: Yeah. Thanks, Rich. Erik Williams again. I think it's all kind of been said, but the key here is we are probably just going to be dealing with short-term projections until this assessment gets readdressed. And in that sense, the other thing that's important to this is, how we forecast future recruitment in the short term.

And what I can't recall is, what the recruitment time series looked like and whether we should be looking at using the average recruitment for that whole time series or maybe looking at just recent values, if they've been higher or lower and that'll be

important as well. With the short-term projections is, what do you use for future recruitment? It's all wrapped up in this conversation in the sense that you often build off of your stock recruit curve. But I think another piece of that puzzle is looking at the time series itself and whether you should be using the whole time series or a subset, usually, a more recent period from that time series of recruitment.

RICHARD APPELDOORN: Thank you, Erik, good point. Shannon, do you have some comments on either how you've been doing this for other species or--

SHANNON CASS-CALAY: Yes, so this is Shannon and yes, Erik is correct. it would be advisable to look at the recruitment time series, so we can pull that up for you and make that available. Basically, how the SSCs have tended to do it, is to look at whether there has been a major change in recruitment in recent years. For example, implying recruitment failures or very successful recruitment. And then they, you know, basically the SSCs have asked us to evaluate various assumptions about recruitment and they have chosen, you know, one of those. The only thing I would caution-- well, it's fine, as long as we're-- I think we'll be okay.

I'll show it to you. If anything happens that I think there would be worries, there are some concerns about, if you want to impose something like, that there's been some massive change in the climate that will never allow recruits to-- that has caused a shift in the level of recruitment that is permanent, that also changes your reference points then. So that's a situation that's a little complex, but I don't think we see anything like that in the, my recollection at least of this stock assessment is that it's a fairly uncomplicated time series of recruitment. And we'll pull that up. If we can do that tomorrow, that would be fantastic. I don't have it handy.

RICHARD APPELDOORN: Yeah. So given-- were you going to comment? Yeah, go ahead.

TODD GEDAMKE: For tomorrow discussion, if possible, think of our lobster scenario. We've suddenly got a great good recruitment year and timing on things. When people ask about these modifications, could there be timing things that are, hey, we've got a good signal coming in. I don't think the timeframe is going to be compatible within end year changes. And the only other thing I was going to do before a question was a kumbaya moment in that, I really feel that we can move forward with this and give the Center guidance so that this can be applied to many species. So, some of these decisions that we're making now are, "okay, we don't like this.

I'm blanking about the sensitivities to A and B." We can just set up for multiple species and say, "We want to see, upper and lower confidence intervals on the growth curves. We want to see a break between this and that." We could come up with a procedure that is pre-approved for them and they can run these things one after the other in SS and show up with, I was going to say 10, but whatever. You could show up with five of these things or 10 of these in a session and we can sit down and go, "We don't like that one. We don't like that one. We like that one. We like that one."

So, anyway, I just wanted to kind of retract any of the tension that I had earlier, on some stuff. And this is very much what I see as ideal.

RICHARD APPELDOORN: Kevin.

KEVIN MCCARTHY: Yeah, thanks Todd. This is Kevin. I really appreciate that kind of outlook. I mean, that kind of-- if we can get ahead of things by making some of those broader decisions that are, if you're talking about a particular data set and we can make standard kinds of decisions that, we may later find that there's idiosyncrasies with particular species and all that, but if we can get ahead of it, you're absolutely right. That's a game changer here. And I think that's the way we need to go. So, I appreciate that thought.

RICHARD APPELDOORN: Okay, so I like where we're moving but it is after five, so I'm hoping we can pick this up tomorrow morning and that, Shannon, you might have the recruitment stuff to show, and we can finish this off fairly quickly in the morning. Uh, final comment, Shannon?

SHANNON CASS-CALAY: Yes, thanks. This is Shannon. So, yes, we can absolutely have that for you. I heard Jason mention the trajectories of spawning stock biomass, was that for the steepness 0.7 and one, you wanted to see that?

JASON COPE: Or 0.95. Whatever was the profiled MLE that Nancie was showing, just something on the higher steepness. I was just curious to see how those trajectories looked.

SHANNON CASS-CALAY: Alright. Yeah, we'll provide that too, as long as we can get those data quickly. I'm sure we can. It's just, I'm not doing it myself tonight, it's probably Nancie. So, we'll get it to you as soon as we possibly can.

JASON COPE: And you do not need to make a-- you could pull out the SB trajectory from one of the plot folders, pull it out from

the other models plot folders. You don't have to do some fancy ggplot. Put them on one plot. no worries about that if you don't feel like it or the team doesn't feel like it.

SHANNON CASS-CALAY: Well, we'll make it super ugly for you. [laughter]

JASON COPE: Yeah. Thank you.

RICHARD APPELDOORN: Alright. Thank you everybody, and we're adjourned till tomorrow.

(Whereupon, the meeting recessed on November 30, 2021.)

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DECEMBER 1, 2021

THURSDAY MORNING SESSION

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RICHARD APPELDOORN: Okay, I'd like to get started now. This is day three of the SSC meeting. It is, wow, it's December people. December 1st. Yeah, if we get through this day, it'll be a Christmas present for me.

So, all the points that I read out in first day, regarding the conduct of the meeting, still apply. And again, please remember to give your name when speaking, and turn on the mic when you are speaking.

First thing is a roll call. I'll start with the committee and just to mix things up a little bit, let's start with the committee members who are online. So, Erik?

ERIK H. WILLIAMS: Yes. Good morning. This is Erik.

RICHARD APPELDOORN: Doug.

DOUGLAS GREGORY: Yes, Doug Gregory, here.

RICHARD APPELDOORN: Jason.

JASON COPE: Good morning. Jason Cope.

RICHARD APPELDOORN: Okay. And then Walter.

WALTER KEITHLY: Good morning, Walter Keithly.

VANCE VICENTE: Good morning. Vance Vicente, member SSC.

JORGE R. GARCÍA-SAIS: Reni García, SSC.

MICHELLE SCHÄRER-UMPIERRE: Michelle Schärer, SSC.

RICHARD APPELDOORN: Rich Appeldoorn, SSC Chair.

TARSILA SEARA: Tarsila Seara, SSC.

JUAN J. CRUZ MOTTA: J.J. Cruz, SSC. Good morning.

TODD GEDAMKE: Todd Gedamke, SSC.

RICHARD APPELDOORN: Okay, let's continue.

KATHERINE M. ZAMBONI: Kate Zamboni, NOAA Office of General Counsel.

SARAH STEPHENSON: Sarah Stephenson, Southeast Regional Office

LIAJAY RIVERA GARCÍA: Liajay Rivera, Council staff. Buenos días.

CRISTINA OLÁN MARTÍNEZ: Cristina Olán, Council staff.

RICHARD APPELDOORN: Shannon.

GRACIELA GARCÍA-MOLINER: Kevin.

KEVIN MCCARTHY: Kevin McCarthy, Southeast Fishery Science Center.

SHANNON CASS-CALAY: Shannon Calay, Southeast Fishery Science Center.

ADYAN RIOS: Adyan Rios, Southeast Fishery Science Center.

NELSON CRESPO: Buenos días. Nelson Crespo, DAP Chair, Puerto Rico.

JULIAN MAGRAS: Good morning. DAP chair Saint Thomas/Saint John, Julian Magras.

GERSON MARTÍNEZ: Good morning. Saint Croix, Gerson Martínez, stepping in for Chair, Edward Schuster.

IRIS N. OLIVERAS: Iris Oliveras, Council Staff.

GRACIELA GARCÍA-MOLINER: Buenos días. Graciela García-Moliner, Council Staff.

RICHARD APPELDOORN: Okay. We have lots of people online. Jeremiah Blondeau, Alida Ortiz, Jason Cope, Jay Grove, María López. Tania Capote, Marcos Hanke, Martha Prada, Rachel Eckley, Julie Neer, Carlos, I'm assuming it's Farchette, Virginia Shervette and Nathan Vaughan.

So, where we left off yesterday was, we were talking still about Queen Triggerfish for Puerto Rico. We had agreed that we have a model that is useful that. We were going to go with an MSY proxy, whereas MSY itself is going to remain undefined. And we were then talking about what that level of SPR, something percent, would be the proxy. And so, what that percent would be is under discussion. And also, whether we would go with a definition of steepness or whether we would just say recruitment was going to continue as it has in the recent past, recent being not quite defined yet. And so, I think Shannon, your group had come up with some of the recruitment information for us to look at.

SHANNON CASS-CALAY: So, my apologies, Rich. It's not quite ready yet. It is still in progress, and it will be ready very soon, but we're not quite ready to present yet on that. But we are ready to present U.S.V.I. when you would like to see it.

RICHARD APPELDOORN: Not quite means, how long? I mean, is it—

SHANNON CASS-CALAY: I'm guessing half an hour.

RICHARD APPELDOORN: Okay. So, can you present at least one part of the Virgin Islands in that kind of timeframe?

SHANNON CASS-CALAY: I can present the Saint Thomas presentation in about 30 minutes.

RICHARD APPELDOORN: Okay.

SHANNON CASS-CALAY: I mean, right now. It will take about 30 minutes is what I meant.

RICHARD APPELDOORN: Yes. Okay. So why don't we do that while your team is finishing up the rest of that?

Review SEDAR 80 Queen Triggerfish—St. Thomas/St. John

SHANNON CASS-CALAY: Alright, so sorry for the technical issues. I think we are ready now to show our preliminary work for Saint

Thomas. And this SEDAR report is available, but you have not seen this work presented to you yet. And so, in our mind, you know, this is still a candidate-based model, but we could use SSC feedback to finalize the model.

Okay, this was prepared by Nancie Cummings and staff, and I am presenting on her behalf, and I apologize if I don't know as much detail as she would. So how do I advance? Okay. Wow, this is trigger happy. Is there a way to do this?

Okay, so a quick outline. We'll show you the base model run. As I said, it's candidate based, that fits and results of that model, as well as the diagnostics, some sensitivity work, and a review of the next steps. You've seen some of these slides before. This is SEDAR 80. It was conducted for all three island platforms simultaneously through the SEDAR 80 process, which included three topical working groups, a life history working group, index of abundance and fishing behavior. And these were, at least, open and available and attended by a wide variety of people. The work conducted for SEDAR 80 was described in 11 working papers and in the stock assessment reports, these are available at the SEDAR website, which is listed here in blue. There were also 18 reference documents submitted, which had been published elsewhere.

The stock management boundary that was used for this assessment is the island-based management. So, it's the Saint Thomas/Saint John EEZ. There was evidence presented in a few working documents that there was connectivity across the region and that there was no isolation detected for fish sampled in waters throughout the U.S. Caribbean, which suggests that the stock does extend past the management boundaries.

Queen Triggerfish has been assessed previously in our SEDAR process where a mean length estimator was used. That's the Gedamke and Hoenig approach from 2006. But essentially there was insufficient information to determine status, determination, criteria, and annual catch limits. We have also attempted to create management advice using ORCS approach by Berkson et al., 2011. But in the SEDAR 80 stock evaluation, we did explore, as we did for Puerto Rico, the use of SS a statistical catch at age model in a data-limited modeling framework, very consistent with what was done in Puerto Rico.

So, you have seen these slides before. We used exactly the same life history information across all three of these models. They're summarized here in case you had questions or concerns about them, but they are exactly the same as what was used in Puerto Rico. So, I will just briefly discuss it. The weight/length conversions came

from a manuscript by Shervette and Rivera-Hernandez. Age and growth came from Shervette and Rivera-Hernandez working paper. We did use a constant coefficient of variation on the mean size of age, and that was set at 0.18. Natural mortality, which is shown on that bottom right hand panel, it's an age specific Lorenzen M function. It's shown in the blue line, and it was a maximum age of 23 and a Lorenzen scaling that used the growth curve that had been estimated by Shervette and Rivera-Hernandez.

The spawning stock biomass metric we're using is female biomass, and it's estimated essentially just by the female body weight times the maturity. We don't have specific information about batch fecundity, for example, in this model. So, this is showing you the maturity function on the top side. So essentially the 50% maturity is at about 20 centimeters, and they're fully mature by the time they're 30 centimeters, certainly. And the fecundity relationship, as I mentioned, is a proxy. It's just the female body weight function. Combined sexes were used for the base model fix.

Okay. So, this model only uses data from 2000 to 2019. It's a single fleet model. It uses commercial catches that were combined, and 97.9% of those catches are from the trap. So, there was a small amount of other catches that were added to the trap. Like the Puerto Rico model, we did not assume that there was no fishing occurring in 2000. So, we did not assume-- there was fishing, let's put it that way. There was fishing occurring before 2000, and that value for the equilibrium catch, in this particular case, was calculated as the average of the first three years of data. So, 2000 through 2003. We did use an extremely small CV of 0.05, so in effect, this model does fit to the reported catch quite precisely. The discards are assumed to be zero. We have length composition data from the commercial trap and from NCRMP that can be used in this stock assessment. We had two abundance indices that can be used, the commercial trap index and the NCRMP visual census.

So, the plot that we're showing here with the blue lines just tells you when data are available for each one of those data sources. So, you do notice right away that the RVC survey, which had been done annually for a number of years, and the more recent time period is not conducted annually. So, the data are available every third year, I believe.

This slide, I won't go over in detail except to say that there are a number of outliers in the length composition data and they were removed, filtered, using an approach Estruch-- am I pronouncing it correctly, Adyan? -2013. It is a method that uses the Fulton Body Condition Factor to identify outliers, so that we can remove them. And if you're interested in this procedure, Adyan, did execute it

and she can provide additional detail.

Okay, so my apologies that the trap index figure on this is mislabeled. So, the index itself is very likely the orange color, which is labeled upper 95% confidence interval. The very light, sort of yellow color on top is the percent positive trips. So, what you can see is that most of the commercial trap trips do catch Queen Triggerfish. So, about 55% to 60% of the trips are positive trips, they do catch Queen Triggerfish and the index is relatively flat across the time series. There's no real discernible trend here. The bottom panel is showing you some of the diagnostics from the model fit. So, there is some skew in that model diagnostic, which is not ideal, but it was determined to be acceptable by the panel who considered the syntax.

This is the NCRMP Visual Census Index, which does show a relatively strong increase after 2013. And the CV—

RICHARD APPELDOORN: Excuse to Shannon.

SHANNON CASS-CALAY: Yes, please.

RICHARD APPELDOORN: Was 2013-- when did the full island platform was begin every two years.

SHANNON CASS-CALAY: I believe that in 2013 is when. That was expanded.

RICHARD APPELDOORN: Okay. Thank you.

SHANNON CASS-CALAY: Am I correct, Kevin? Yeah, I believe I am correct.

KEVIN MCCARTHY: Yeah, I think that's right, and Jay just confirmed it.

SHANNON CASS-CALAY: Excellent. Thank you.

Again, we have the authors of this index present on the webinar, so if you do have specific questions, they can address those. So, the assessment model configuration, and this model was completed about the same time that the initial Puerto Rico runs were done. And so, we can apply some of the same evaluations that were done to the Puerto Rico model, but in this case, I'm showing you what's in the report, which is our base candidate run.

So, this is a one area model. No mixing is assumed. It's also just an annual model. So, it's not seasonal. The maturity is a function

of age. It uses the combined male and female spawning stock biomass. The native input units for SS are metric tons. It uses a von Bertalanffy growth parameter with fixed inputs for L infinity, K and Lmin. And that was again from the information provided by Virginia Shervette. And it uses a Lorenzen natural mortality function that was estimated outside the model using the maximum age from Virginia Shervette study in U.S. Caribbean and the growth parameters estimated by Virginia Shervette. And it was then fixed in the model, as a vector of natural mortality at age.

For the length-based selectivity functions, we did assume a constant selectivity for the fleet, in this model, across time. And it was estimated as a length-based selectivity function and it used the length composition data from that fleet to estimate the selectivity function. We assume that all animals are retained by the fishermen and that commercial discards are zero, and so that is certainly something that could be investigated in the future.

The stock is not assumed to be an unfished condition at the beginning of the time series, so we estimated an initial F value for the trap fleet as the average catch, essentially, informed by the average catch from 2000 and 2003. Very much like in the preliminary Puerto Rico case.

So, the base model results are as follows. This is the fits to the trap landings, the commercial trap landings, and you see only one line here, even though the observations and the predicted values are shown on this figure. So, you can see that the model essentially assumes that the landing state is known nearly exactly. And that's not surprising because we did have standard error on catch at 0.05, which is a very, it's basically telling the model to assume we know catch relatively exactly.

These are the fits to the index data. So, you see the observation in the open circle and the 95% confidence intervals on this plot after the fit to all data components from stock synthesis occurs. So, there is a model re-weighing that can occur here, but in general, the fit to the commercial trap data is a relatively tight-- well, I mean, that's actually a relatively good fit to the commercial trap data. The model does not fit well the visual census survey and part of that is that the model sees some, well, clearly you see some difference in the trends here. And so, the model does down weight the RVC data as it did in Puerto Rico as well.

These are the selectivity functions that were estimated. It's a length-based selectivity that we're using in this model. So, on the left-hand side, you see those selectivity patterns that come from the commercial trap and from the RVC survey. And this case,

you know, they are essentially logistic in nature. The age-based selectivity that you see on the right is model derived.

The fits to the length composition data are relatively good. You know, you see the green line shows the model prediction to the length the model expects to see, and the gray surface. The gray area shows you the actual length composition information. So, the fits are quite acceptable. The model fits the length composition data quite well.

The NCRMP length composition data is fit less well, and especially in the earlier years of the survey where the spatial frame of the survey was smaller and the sample sizes are smaller, so that's not unexpected. If you look at this very carefully, what you'll see is in the very small words at the top right corner of each panel, it shows an effective sample size. And their range, sometimes less than 10, a sample size less than 10, is the model and effective sample size. It shows you that the model is not expecting to fit this very well. We're basically giving us a lot of latitude to not fit the data well because the samples of sizes are so small. In the later years, the fits are better as the sample sizes increase.

So, this is the aggregated fit to the length composition data. So, this is when you take all years, and you see that across all years, the model fits the length composition data quite well. There are some indications you know, of an imperfect model fit in the tails of the distribution.

And these are the Pearson Residuals, for folks who enjoy looking at these and, it gives you an indication of both the sample sizes that were available and where there were residuals. In the case of the trap, you can see that the residuals range essentially from negative two to two. There is no strong indication of a banding. You don't like to see banding patterns. You don't like to see, you know, strong diagonal patterns fit here. So, this is a relatively acceptable plot. The NCRMP has much larger residuals across the top. You can see that the size of those circles is larger from negative 35 to 35, and that's just implying that there's more of a lack of fit to NCRMP, which I showed you in the previous panels as well. So that is the case, but once again, there's no strong pattern of banding vertically, horizontally, or diagonally, so it's at least not a pathological fit.

Alright, so likelihood weighting. These models, we did likelihood weighting. It's a multinomial air distribution assumed in the size comp. We applied a McAllister and Ianelli method to reweight the data components. So, this process adjusts the sample sizes based on the variability in the observed mean length by year, and the

samples are adjusted so that the expected mean length within the uncertainty intervals. I'm trying to read the words, but I'm not doing a good job here. I will just skip to the next step that I think it's the more important one. Essentially this reweighting is accomplished manually, and we're adjusting the input variance standard errors from the SS runs by a model recommended variance adjustment that comes directly from the model results. And we rerun the model with those new variance inputs and repeat it until that adjustment essentially converges so they don't vary from one run to the next. And that generally takes two or three sequential runs of this reweighting process. And so here, we're showing you kind of the initial input weights from the model, and then the final. So, in this case, the adjustment is not doing a strong reweighting of the two data components. The final weights are similar to the input rates.

This is the model estimate of fishing mortality over time. This is an annual exploitation rate. So, it's essentially all of the biomass killed, removed, from the fishing process above age one divided-- or sorry, age1+ divided by the total biomass. So, it's a measure of fishing mortality, and it shows you that in the initial year from about 2000 to 2010, the fisheries were removing about 30% of the biomass above age one each year but that has declined in the more recent years. And so now we're removing about 15% of the population each year through fishing. The animals age one and above.

This is the fit to the—well, this is the model estimated mean length over time, shown in the blue line. And then you see also here the observation of mean length in the circle and then the 95% confidence intervals on the estimate. And there's no strong pattern here in the mean length over time, it's relatively constant at about 31 centimeters. In the commercial data on the panel, which is on the left, and the RVC data is actually catching somewhat smaller fish. The mean length was about 25 centimeters in the RVC data with no strong pattern in either data source.

So, this is another measure of fishing mortality, which basically shows you exactly the same pattern. This is the continuous F that's estimated by the model.

And these are the results for the total and spawning stock biomass. And the point you see in year 2000, is the estimate of unfished total biomass. So, it says that essentially this model estimates that before fishing began, not in 2000, but at some theoretical time when there was no fishing, that the stock size, total biomass, was close to 400 metric tons. But that throughout the time series, throughout the period from 2000-2020 we're running at roughly 100

metric tons. So, you know, basically it does show some depletion from an unfished condition. And the same in the spawning biomass, the same kind of pattern. And that's of the adult spawners.

And this figure is the same, but it just does show you the confidence intervals on that estimate that come from the model. And the panel on the right-hand side shows you this model's estimate of number of fish at age in each year. And the red line is the model estimate of the mean age of the population, which is between one and two throughout the time series. This model is indicating that the number of old fish in this population is relatively small and has been relatively constant throughout the time period.

This is the estimate of the spawner/recruit relationship on your left-hand side. This model, like the initial Puerto Rico models, has steepness fixed at 0.7 and SigmaR fixed at 0.6, and we, I will show you the diagnostic on that estimate coming up soon. So, this model indicates some evidence of a spawner/recruit relationship. You can see that as the spawning biomass increases on the X-axis, the predicted recruitment increases somewhat as well. So, there is some weak evidence here of a spawner/recruit relationship. These plots on your right-hand side show you the estimated recruitment that's coming from the model. The top panel is just the recruitment deviation, so you can essentially ignore that if you choose to, it's the deviation from the expected value. The age zero recruits just in numbers, thousands of fish are shown in the bottom panel here. And so again, you're not seeing strong evidence of a trend here in recruitment is essentially variable throughout the time series with some years that experience better recruitment than others. But there's not a pattern here of strongly increasing or decreasing recruitment over time.

We did perform some model diagnostics. So, we did run a jitter analysis where we jittered the initial parameterization of the model jittered by about 20% from that initial best estimate, ran 200 jitter runs, and each time it came to essentially exactly the same maximum likelihood estimate, which is a good. It's also not entirely surprising because many of the parameters in this stock assessment model are fixed parameters. But at least it does indicate that the model is stable for those parameters that were estimated.

This is the likelihood profile of the initial recruitment. So, this is the recruitment that would occur in the unfished condition, and there is relatively strong evidence here that this is unestimable parameter. The natural log of R-naught was 6.3, which means that the unfished recruitment value is about 548,000 fish.

And the different data components here are shown in the different colored lines.

So, you have the equilibrium that initial F estimate, the generalized size data recruitment and index data, and they generally agree, they're not in conflict, which is good.

This is the likelihood profile on steepness. And so, very much like Puerto Rico, there is some evidence that steepness could be between 0.7 and 0.8, but it is weak support, essentially there are a number of values between 0.7 and one that are almost equally likely in this model. But in this particular case, we did fix the steepness at 0.7, and that decision can certainly be-- we can basically do the same procedure that was done in Puerto Rico.

Alright. SigmaR is not estimable in this model, and that is not unusual. We often see this, especially when we lack strong information about recruitment from, say, a recruitment survey. So, this was fixed at 0.6 and that certainly could be evaluated in sensitivity runs.

And this is that initial F that's estimated from the trap. So here we do see some data conflict where the information that is from each data component tells you a somewhat different story about that initial F estimate. It was a black line, the black shows you the total log likelihood, and that does have a minimum value of about 1.13, which suggests that it is somewhat estimable with the acknowledgement that there is some data conflict here from the different data components.

So additional work was done to examine some of the sensitivity, or you could say diagnostic fits to this model. One of those is the retrospective analysis where we remove sequentially one year of data and rerun the model, then remove another year of data and rerun the model. And what you would like to see is that the model doesn't vacillate dramatically when you remove a year of data. And so, this model is robust to the retrospective analysis. Basically, the pattern that's indicated by the model is retained as each year of data is removed.

RICHARD APPELDOORN: Shannon, this Rich. By removal, you're talking about most recent year, most recent two years, correct?

SHANNON CASS-CALAY: Right, exactly. That's exactly right. We remove one year of data, rerun the model. Remove two years of data, rerun the model. All the way to, I think, five years [inaudible].

And so, what was I showing you there? That was the spawning stock

biomass in this figure. And the same analysis, the retrospective analysis, this time with, this is actually a measure of fishing mortality. There is some sensitivity here in the model estimates of fishing mortality as you remove data. So, you can see that the lines does start to deviate somewhat with each year of data removed, suggesting that as we remove each year of data, the fishing mortality is somewhat higher in the terminal year. So, if you remember the trend of fishing in the same time period, the fishing mortality has been decreasing. So, this is not a surprising result because you're essentially removing years that have a lower fishing mortality.

Yeah, absolutely.

TODD GEDAMKE: Sorry, this is Todd. I'd just like to see that plot right there. All I'm looking at, Shannon, you've made a good point about the deviations there and I just was trying to see if I could see it in this plot, but I can't.

SHANNON CASS-CALAY: And this plot we all know could use a little work. This is on our list of plots to improve because it's showing you error bars here too, which makes the plot very confusing to read. But this is the recruitment and the same process where we remove one year of data at a time. And there is, you know, some insta-- well, not instability in a model, but in the estimate of recruitment, as you remove data, the estimate of recruitment does change somewhat from year to year.

Alright, so this is a figure that Nancie prepared to show you what the estimate is of that initial recruitment value, the unfished recruitment value, as you retrospectively remove data. And so, you see that the model re-estimates that unfished recruitment value with each peel, and it does vary somewhat from one peel to the next. So, there is some shifting of the result from one peel to the next.

So, a more traditional sensitivity run that we explore is dropping various sources of data in the model. And so, the blue here, this again is the spawning stock biomass estimate, the blue line shows you that a SEDAR 80 candidate base and then in red dropping the trap index and then in blue dropping the RVC index. And so, while there's not an enormous amount of sensitivity to dropping the indices, we do see that by dropping the trap index, the red line, you have a slightly higher estimate of terminal spawning biomass than in the base model. And by dropping the RVC, you actually have a somewhat lower estimate of spawning biomass. The shaded areas are the 95% confidence intervals.

This is the same, what we call a jackknife analysis. This is index removal, and this is showing you fishing mortality now. So again, the blue line is the SEDAR 80 base case. Dropping the RVC suggests that the fishing mortality is somewhat higher, well produces a fishing mortality that is estimate would be somewhat higher. Dropping the trap data suggests that fishing mortality is somewhat lower.

RICHARD APPELDOORN: I'm sorry, Shannon, I can't re-- go back to that. I can't read the Y-axis lable

SHANNON CASS-CALAY: Yeah, That's because it's in SS babel.

RICHARD APPELDOORN: No, it's actually too small. And then it's in SS babel.

SHANNON CASS-CALAY: Yeah, it's the absolute F. It's essentially the exploitation rate. So, it's fishing mortality, it's the fraction of the stock that is removed by fishing in a year that is age one and above. So, 0.3 means you remove 30% of the animals age one and above each year.

This is the sensitivity run with the index removal and the estimated age zero recruitment. So, relatively consistent except in year 2015 where dropping the trap index produces quite a high estimate of age zero recruitment in 2015.

Okay. That is what we had prepared. And so, I think that our question to you moving forward is, do we make the same—essentially, use the Puerto Rico example to produce essentially the same types of model outputs for you that were done for Puerto Rico? Or is there something more pathological about this model that would suggest a need for a different evaluation?

Questions

RICHARD APPELDOORN: Okay. I have actually some-- some things stuck out when you were showing some of these things and I think they might be due to things that are different between the situation in Puerto Rico and the situation particularly in Saint Thomas. And I'm sure Julian is going to correct me if I'm wrong. So what is-- okay, again, looking at NCRMP and we're looking at a trap based estimator. The criticism that was applied last time, actually it came from Julian and second by some of the other fishers, was that the habitat that they would get Queen Trigger, is not the habitat that the NCRMP is primarily sampling. So that was a real problem when we looked at it in terms of Puerto Rico, and it would still apply here.

I was really actually, I really enjoyed seeing that, in the last bunch of years, where you were looking at, what I'll call a full shelf NCRMP, that the two metrics actually behave very similarly. And so maybe going forward, even though they're not targeting the same area, might still be getting a relative index that's valid, from that. But it didn't apply to the early years and again, we had a situation where in the early years, all the samples were really in the part and, for the visuals. And then later years you're getting a broader representation. However, unlike Puerto Rico, most of that shelf is deeper than divers can go. So, you have the area right around the islands. You have some areas along the mid shelf ridge, and you have some places along the shelf edge that are deep enough to, or shallow enough to get divers down there to do those surveys. So, it doesn't quite have the coverage, still, that you would like to see, but it's much better than the coverage of the early years, which was pretty much associated with surveys in the park in Saint John. So, I think there's something that we can look forward to, in terms of the visual census being a better indicator in the future, as we get more years. But I think those past years I would feel uncomfortable with. And I think you were showing that if you threw out the RVC data, the model wasn't all that sensitive to what the output was.

The other thing, however, that you mentioned is that you assume commercial discards to be zero. And again, this is where I'll turn to Julian. I thought Queen Trigger was almost the poster child for, if it gets bigger than plate size, it goes back. And so far, there would be a lot of, not discard mortality, but certainly a lot of discards. Um, so I'm not sure whether you would be capturing that or not. So, I have Julian and then Todd.

JULIAN MAGRAS: This Julian Magras for the record. And that's one of the things that stuck out at the beginning of the survey of the presentation where you had no discards. That's incorrect. We release all the small ones. We fish a two-inch mesh, so anything that's smaller than a two-inch mesh is released also. And because it's a market driven fishery, what the restaurant wants is what we provide. So, most of the larger fish are released. Now, I must say, when we did some of the studies to gather the information, one of them was with Virginia Shervette. And the one that we did back in 2006 with Todd and Hoenig, we brought in the bigger fish so that information could be gathered. But on a regular daily basis, we don't bring those bigger fish in. The same with the smaller ones. Anything pretty much under one pound is released back.

So also, in the study when it was asked for me to bring in a few

small ones, I did that. So, if that's information that needs to be gathered, that's something that we need to put a study together so you can build a data set and gather in that information and the release of those size of the fish, even to the extent of maybe building a couple traps where you can get some of the real, real small ones to see that that selectivity out there. So, I think we need, we need to look into that. [crosstalk]

RICHARD APPELDOORN: Alright , so this is obviously a selectivity issue as much as a mortality so—I want to go around, so Todd.

TODD GEDAMKE: Well, Rich, I'm glad you went with Julian first. It's very important that we listen to our advisors in these committees and the people that know what's going on. Yes, I've been hammered backwards and forwards on plate sized fish, and your point is very well taken and what Julian just said too.

So, the question to our fishing people would be, since we've heard about all the small fish and all the big fish being discarded, what percentage of your catch are you not retaining? So the number they need, is they have a hundred percent discards. So, what is the percentage of catch that you're discarding when you're out there?

JULIAN MAGRAS: Julian Magras, for the record I can't give you a number right offhand because each fish area would vary. So it's information that it would have to be gathered. In my case, I would say that I release for the Queen Triggerfish at least 20%, and that's the largest size fish. Let's use Mr. Blanchard, who was a Council member also, because he fishes in my same area. He releases anything above two pounds because he has zero sales [rate?]. Anything between one-pound to that two-pound range is what he would retain. So, I would have to ask him, what percentage does he think that he releases in order to gather that information? So that there is something that we can do.

TODD GEDAMKE: So, Tony's releasing more, like probably closer to 30% or so. 35 or somewhere in there. So, I think Shannon and Kevin can know what to do with this number, but I think it's pretty important.

RICHARD APPELDOORN: Okay. There's lots of hands up. I'd really like to get the other committee members and then give you a chance to respond to everything. If that's okay. Okay, Shannon.

SHANNON CASS-CALAY: So, the second piece of information we need is, what is the discard mortality? Because if the fish are released and they are alive, that's fine, because to the model, it doesn't

matter. If the fish are released and subsequently die. That's what we need to know. So, what is the condition of the fish that are released?

JULIAN MAGRAS: Just a quick answer to that. I would say the mortality rate is a little to none. Because it's a species that's full of life and it's totally different than the Gray Trigger. As that fish hits the water, it's gone, it disappears. You don't, you don't see where it disappears. The sharks don't have a chance, none. These fish are just, they're gone. They go back to the bottom, wherever they hang out. So, from my experience, it's little to none. Because as we pull a trap, when we dump it out into that bin, whatever needs to be discarded, we discard that. And if you go back and you look at the studies done for the bycatch, by the association, under Dr. Olson, you could be able to get some information where we retained everything to do that bycatch study. So, there should be some information in those studies about the Queen Trigger.

RICHARD APPELDOORN: Okay. Thank you, Julian. So, Shannon, when you were saying discards equal zero, that's discard mortality equals zero, is that really what that statement was and I was just misinterpreting it.

SHANNON CASS-CALAY: I'm not certain if Nancie is available right now. You want to answer it, Kevin?

KEVIN MCCARTHY: Sure. This is Kevin. So, I think the dead discards are assumed to be zero. Not that there aren't any discards because we're well aware that, you know, the guys are, when they're out there, they're selecting what's going to sell, but because it's a hardy fish, the assumption was that the dead discards are very low.

RICHARD APPELDOORN: Okay. Erik?

ERIK H. WILLIAMS: Yeah, thanks Rich. This is Erik Williams. So, alright, I've got a laundry list of issues, but let me start with the simple one, with some graphical stuff. So, if we go to slide 36, this sort of bugged me with the Puerto Rican assessment as well. And that is, here we see, what, six likelihood components on the likelihood profile, yet the others don't show all six. We need to see all of the likelihood components on each and every likelihood profile plot. I'm not sure why subsets are being shown, but it really is, it's just a graphical complaint. And there's no answer for that. Just, fix it if you can.

The other sort of note on graphics is Pearson Residuals, the latest

CAPM workshops have sort of indicated that Pearson Residuals are sort of slightly flawed. Um, it's fine for this one but just be aware that Pearson Residuals are prone to what looks like outliers when they're not really outliers. So, there is a problem there. But that's just a note for future reference that you might want to consider getting away from Pearson Residuals for those length composition data.

But one of the things that stood out to me with this is, there's something going on that I don't fully understand in the dynamics of this stock. And let me start by, why don't you go to figure 29 and I'll explain what I'm seeing here, to everybody, hopefully.

So, in this plot, what we're seeing is that that unfished spawning biomass is pretty high, right? You see. It's three times what this current spawning biomass is, correct? That's a big difference. That's suggesting, you know, a fairly decent exploitation rate going on. Now, if you go to the very next slide, I'm trying to understand what is supporting that high biomass, because if I'm reading the bottom right figure correctly, your unfished recruitment is not much different from the whole rest of the time series. So, recruitment looks like it's at about the level of unfished, maybe slightly lower. So that's one puzzling piece of this.

The other part of this is, so now if we scroll up to figure 27, is if I read this, so let's just focus on your 2010 to the present. You've got essentially a 50% or even more than 50% drop in fishing mortality, but the spawning biomass is not responding at all in the model. And the recruitment is the same or very similar levels to the unfished conditions. So, why is the stock not responding? And that even goes as far as, why is it not fitting that RVC Visual Census survey? which shows an upturn in the most recent years particularly from 2010 to the present. There's a reasonable consistent increase in that RVC survey. So, something is not making sense to me from a population dynamics standpoint in this model. And I'll stop there. There are some other issues too I want to bring up at some point, but let's just stop with that one, because that one-- I don't know. Somebody needs to explain that one to me.

RICHARD APPELDOORN: Todd, if you have a direct response to that.

TODD GEDAMKE: Absolutely. Erik, thank you. Thank you. Thank you. What you're seeing from 2008/2010 to current is the 60 to 70% drop in landings that have been reported since we started discussing ACLs. So, we started discussing ACLs in 2008/2009. The reported landings went down from a 100% to 30%, suddenly. We're not really sure why, but it's clearly something that those reported landings

are not agreeing at all with the length comp and the other information that's in there. I've been arguing this forever and ever and ever that that landing time series is just, at this point, without any attempt to correct it, for reporting rates, is useless and you can't do anything with it.

And Erik, from the outside not having the history on this, not knowing anything about it, for those that may think I'm biased or whatever, Erik's is picking this out analytically from looking at plots. It's obvious and this is even support of what I've been talking about for the last seven years. Thank you.

ERIK H. WILLIAMS: Yeah, and Rich, if I might. To that point, Todd just mentioned the length comp data, which is my other issue. And I think he's right. I think what's going on is the length comp data. I'm not sure what the length comp data is telling us at this point because it's just a unimodal consistent distribution over all years. I don't know how we're even getting recruitment estimates out of those length comps. It just makes no sense to me. I'm trying to understand what is the information that we would expect to get out of that length comp data when it's unimodal? We're clearly not seeing your classes pass through it. We're not seeing any truncation, any severe truncation like you would expect with the level of exploitation and even change in level of exploitation that the model is suggesting is going on. It's not tweaking those age comps or length comps in any noticeable way. So yeah, something's not making sense to me in terms of the dynamics that we either would expect or are being driven by this model given the data.

RICHARD APPELDOORN: Yeah. I would say that the length comp data is showing you they have a slot fishery and that's the length that's coming to the shore and that's the length that's going to be measured. Jason?

JASON COPE: Yeah. Jason Cope. Rich, thank you. I was exactly going to say the same thing. Hyper stable length compositions are often a sign that you're doing a couple things. One, you have a slot or a dome-shaped selectivity, which is something that others have mentioned already, that definitely stood out to me in reading the text of the assessment. It seems like a dome-shaped or an avoidance of landing bigger individuals is a feature of this fishery and needs to be captured in the selectivity of the assessment. So that I think is one explanation.

Another explanation, right, is you keep moving around and finding where the right size fish are and you get a hyper stable signal in your length compositions, which I don't think we have any evidence,

could be happening, but more likely is this dome-shape selectivity. So that's one big issue.

And just to like kind of say this, I have whole long list of things that I would love to see and explore more. I think this assessment, in the way that it's presented, makes sense but there's a lot of issues that need to be sorted out before you can interpret anything else. It's kind of like building a house, right? You have to build a floor before you build a ceiling or you have to put the walls up before you can get the ceiling, right? So, there are orders of operation here that we need to sort out. The selectivity issue is one of the higher ones.

The other thing that sticks out to me is, and this I think maybe gets at some of Erik's questions, is that the initial conditions are set, and Shannon correct me if I misheard this, they're set by the equilibrium catch assuming an average catch at the beginning of the time series, which is some of the highest catches of the whole time series. And so basically what you're saying is what was going on in the early 2000 has been going on in perpetuity. When you apply that to the information here in the life history, given it, you enter the data portion of the population having it reduced to like a below a third of the population size. And so, when you get down to that low of a value, you do add some constraints as far as how much it is able to react to the information when you have mostly stable signals. Again, if you have a mis-specified selectivity curve and you have this, mostly stable, length composition, you're not going to get much of an interpretation out of it, as has been said. Now if you put the dome-shapeness in, you could get quite a different picture of what's going on here, and you're going to get a much higher scale. The population's going to be much, much less depleted. I shouldn't say much less. I don't know if it's much less, but it should be less depleted, and it may make a bit more sense.

So, I think before we start digging in, there's just no use in me going through this whole list of things. There are some diagnostics, I think, that should be, maybe, a little more standard that we might want to look at just regardless of the model. But before getting into all the other nitpicky details of the assessment, I think there are some real initial things that need to be sorted out. And I think that most of this comes down to two things right now. The equilibrium catch level and the treatment of selectivity of the fishery. Those two things have to be sorted out before we get into anything really else.

The other thing that stuck out that was really fascinating is, that steepness profile showing to me that this is a very different

profile than the other one that we saw. And there is way more information in steepness and it's much less productive, and that's what you're seeing here, is a much less productive model. When you knock it down, it can do less to build itself up even when you're reducing catches.

There was also that very weird-- well, there's a bit of a disconnect in the indices. One, they almost seem to be lagged. They're both saying that the population's going up, but in different years. That's an interesting thing to kind of reconcile in any model that goes forward with those indices. But I think those are the major things that we should talk about before we get into much anything else?

The last thing I will say, as far as just a general treatment for modeling, it is, and this goes for all areas, there is the possibility, and again, this might be a future research recommendation just to note at this point, to build-- if there is some thought that there is a general recruitment pool that these areas are sharing, if you are willing to explore what percent those recruitment pools might be contributing to each of these assessment areas, you can build a multi area but within one stock synthesis model that allows you to set up the same biology, which we have across these stocks. Put in the data as different areas, but then it basically has a pooled recruitment that it allocates each year to each of the areas. And so, if that is something that might be biologically interesting, like not super inconsistent with the biology, might be worth looking at, it would reduce the need of doing three different models because there was a lot being shared here. But it would still allow each area to speak for itself, under the condition, that each area is receiving a certain amount of the tooled area recruitment. I'll stop there. Thanks.

RICHARD APPELDOORN: Shannon.

SHANNON CASS-CALAY: Yes, thanks Jason. And I wanted to thank everyone for this feedback because we don't disagree. And I do think this model can be improved. So, my question I think now is there are certain things that we can absolutely do within the constraints of our schedules, right? So, we could certainly look into the issue of the slot or the dome-shape selectivity. We can certainly explore whether or not to use the NCMPR index. I can't remember the entire list. Another thing that does occur to me, is that SS does give us the capability to use year specific variance on the landings data. So, if there is particular speculation that the late period landing data is unreliable, we could increase the CV on those landings, and I'll let the model fit it less well. Let's say it that way. So, we can develop a list of things that

could be examined. I think what Jason mentioned with the cool based the selectivity and the three-area model, that absolutely can be done. But now we're probably talking about just putting SEDAR 80 back on the assessment calendar for a full evaluation, for restarting essentially.

So, is there interest in this SSC to have us do some of these initial examinations and bring this back to you next time to see if you're more comfortable with it, or are we at the point now where we need to remand this to a future date for another assessment process?

RICHARD APPELDOORN: Well, thank you for putting it in terms that we can understand. Todd.

TODD GEDAMKE: A forward thinking suggestion, and that is that we have talked a little bit about some of the diagnostics that we would like to see. Maybe if the idea of getting many of these done at one time, maybe we could use this case right here as an example to build up that sort of list. Like Jason was just talking about some diagnostics that would be very nice to see. He's the expert, I already had on my note, ask him what some of those diagnostics are. So maybe we could come up with just a guidance for the Center to apply, not only to this case right here, but also to use as our starting point for research recommendations and for these components. I think that that would be really helpful, not only for this process, but also to get us into the next one on this. And I think that, given that we know there's multiple questions, this will be a perfect opportunity to kind of go back and go, "Oh yeah, let's start with the raw data. What is the raw data in this case?" And Shannon, you know, like through your time series, I think that that's a reasonable way of approaching concerns about reporting, is that you could just put an upper limit on that, or change the range on those last years.

Anyway, without all the details, my suggestion is that we use this as an opportunity or as a case to come up with a list that they may be able to apply to other stocks.

RICHARD APPELDOORN: That sounds really good. I'm not sure how that works in operation. So, I would look for your guidance on that when we get to that kind of stage. Kevin?

KEVIN MCCARTHY: Yeah, this is Kevin. Todd, I think that's a great idea. I think we have a perfect opportunity, as you mentioned. It was when you were saying Jason's list, it's on my list as well to ask him and everyone else, because it is certainly, to everyone's advantage, for us to come in in the future with the set of

diagnostics, the set of plots, all of the stuff that you all need to see, rather than we're missing something because we didn't think of it but you all think it's a high priority. So, I think that's a great idea and I welcome that conversation.

RICHARD APPELDOORN: Sorry, Erik.

ERIK H. WILLIAMS: Yeah, thanks Rich. This is Erik Williams. One of the topics that probably needs to be addressed for this species and this may apply to the Puerto Rico assessment as well, is, is we need to understand the data sources that are being put in these models and what we expect to get from them when we put them in the models. So, the one that really draws my attention is that length comp data. It shows, virtually, no change from year to year. And the question is, why is that? And when you put it in as an annual length comp, what is the model expecting to be able to see in that data? When you put it in as an annual length comp, it's expecting to see recruitment signals and they're just not there. And so, we have to step back and go, well, why is that? What's going on with this data? Why are we seeing just unimodal length comps?

Jason suggested it could be dome-shape selectivity. I don't know that that's entirely the explanation. I think one of the problems you run into with these tropical species is, you get protracted spawning seasons. So, they're spawning can happen over a longer time period, and therefore you don't get a pulse recruitment signal. You never will. And if that's the case, then we should not be putting these length comps in as annual length comps because there's not a recruitment signal. The only thing we should expect to get from those length comps then is a selectivity. And that's even, as Jason pointed out, that's going to be tricky. Should it be dome-shaped or not? You know, if this is an inshore fishery and we're missing a bigger portion that might be offshore, you know, there's a reason to maybe consider dome-shaped. And once you go down that road, things get tricky too, because that's confounded with natural mortality and some other issues.

So, anyways, I say that-- so that's one, is the length comp data, is making sure we understand the dynamics that are occurring with that data and what the bottle is expecting to see from that data. The other thing I would say is the indices. In this case, you've got an example where you're fitting a fishery-dependent index better than a fishery-independent index. That just sort of flies in the face of common sense typically, with stock assessment model. You usually want to fit your fishery-independent index better than your fishery-dependent or maybe even drop your fishery-dependent altogether if it's not really reflecting abundance.

So, maybe I'm saying this does need to go back to a bit of the drawing board, so to speak, in terms of constructing the model. I think you still have the basis here. I just think, you know, for instance, one thing that that might need to be done is not put in annual length comps. Put in a single length comp that is summed across all years and use it only for fitting selectivity. And then you're boiling this thing down to an age structured production model and then start to look at the estimates that way. But anyways, I think that's enough said.

RICHARD APPELDOORN: Jason.

JASON COPE: Yeah. Jason Cope. Let's see. Where can I go from here? Yeah, I mean, the other thing that pops up maybe that we're talking about lengths, is that the CV at lengths are assumed to be 18, which is relatively high. And what that means is that it really can smear out any signals contained in the comps and that'll decrease your ability to pick up recruitment signals and other things. And this is I guess back to my point where there's a lot of moving parts here and any one of which might hold a key to something really important. But I think maybe at this point we want to be productive with this model, get some very clear guidance on what should be done next.

I want to say that all this work that's put into this model, that allows us to actually look at it like this and then really kind of tear it apart, is so useful and it's part of the process. Like this is exactly what we should be doing. If we think that people just get data and then produce these perfect models, and then we just move on with decision making. That's not often what happens. That can be expedited with people just wanting to get to that point. But having them all like this and being able to shed light on all of these places where we would like to see improvement is just so, so useful.

So, I hope folks in their mind aren't feeling like this isn't a good use of time, having seen a model that's in a fairly rough state. This is a really good place to be able to evaluate what are obviously very big questions, not only for this stock, but for the region, for multiple species, right? We're going to encounter these things. And so, I think, maybe at this point, there are some bigger items that we really need to look at to really fully understand what we can do moving forward.

And so, I propose maybe outlining two or three of those things and letting the team go and make some progress on that, and then go from there.

RICHARD APPELDOORN: Thank you, Jason. Julian, you had your hand up?

JULIAN MAGRAS: Yeah. Julian Magras for the record again. So, it goes back and I listened to Erik suggestions and comments and that size that he's talking about, the length, what is missing that you're seeing that one size over and over, because that's what we bring in for the market. So, if you want to get the other sizes, then that information needs to be requested and it needs to be surveyed in order to get that to fit the model.

If not, you're going to continue seeing that same size of fish over and over and over, because that's what we sell. It is market driven. Nothing is exported. So, you know, I continue hearing it's in there but where are we going to fit the market driven aspect of what's going on into these models. We continue going round and round and round and forgetting that, especially with this species, it is not going to be the same across the board for all species. This species is a specific size that we target that can be sold in the fishery. Thank you.

RICHARD APPELDOORN: Shannon?

SHANNON CASS-CALAY: Yes, thanks Rich. This is Shannon. Yeah, I think, I absolutely agree with the comments of Erik and what Julian has just said. I mean I think that what we need to do is focus on that length composition data, is probably appropriate to estimate selectivity, which is dough shaped. Basically, means only that group of fish that you're bringing in is all we're seeing. We're not seeing the younger fish or the older ones. And then, I guess then, what you need though is an index of abundance and that gets back to the decision about, is the NCRMP information useful? Because the only other abundance index we have is a fishery-dependent index. So, it would be helpful if the group is, for example, more satisfied with the latter period of the NCRMP survey. It would be helpful to explore that in the model as an indicator of abundance because that's when you're going to start to see the model respond, you know, to a decrease in fishing mortality as consistent with the increase in spawning stock biomass that might be reflected by NCRMP.

But, you know, what I'm getting at is, Julian, you're probably quite correct and in this case, especially the length composition data, is never going to give us a signal about abundance because we're not going to see the older animals suddenly get into your length composition data because you don't bring them in. Alright, so we need an index of abundance now.

RICHARD APPELDOORN: So, one of the things that Julian was suggesting was that if you want that data, ask them and they'll bring it in. And if you had someone there to measure the fish, not obviously every day, but periodically you can get a record of what those larger individuals and smaller individuals might be that they're encountering in their traps. But I'd like to-- well, there's a conversation going on in the chat, but I'd like to get back to Erik's comment in the chat that you're not seeing the length composition from the RVC responding and all. And I think that's because the RVC can't go deep enough to pick up the larger individuals. And we had this conversation with respect to Puerto Rico as well. So, I don't think it's-- even the recent stuff isn't going to be good for the length information, but it is going to perhaps be some indicator of abundance just because it seemed to be matching what was coming out of the catch per effort information there in those latter years as well, even though we already had criticized, for this species, that RVC doesn't target well its habitat.

And so, if Erik or Jason want to continue their chat with the rest of the committee, then we can hear what they want to say. Okay. Erik?

ERIK H. WILLIAMS: Yeah. Thanks Rich. This is Erik, William. So, the other thing I'll add to this is, yeah, I think the length comp data being fit annually is kind of dominating this model and it's taking away from the fit to the indices. I would say, and I don't recommend this usually and this is, you know, not to sound arrogant, but this is from 20 years or 25 years of doing stock assessments. If I were to eyeball this data and do an internal assessment, the stock looks to be in fine shape because the length comps are not shifting at all. The landings have gone down and the index has gone up, basically, from 2010 on. That tells me there's actually even an estimable production function there somewhere. This model's not picking up on that. And that's my main concern because it does look like there is a fishery reaction and a population response that the model should be able to pick up on. and it's not.

TODD GEDAMKE: Just a quick comment. Erik, thank you for the recruitment comments. I like that. And I just wanted to, I'll highlight something that Jason said too, without going into a full three box model or whatever else. I think it's just important for us to recognize the pointing towards steepness of close to one and pointing towards steepness of close to seven for the same species.

Not that we have to say that they're correct, but I think that that some of the gut level looking at it, that Erik just did, is

also what we have to do looking at the models between Puerto Rico and the Virgin Islands, productivity, the species, that's a biological characteristic or trait. So that's going to be something we would imagine are to be closer together. And I think Jason's idea was just borrowing information from other places, and that ends up with a much more complex model. But our role, and as we're reviewing these, is to keep in mind the decisions that we made for the other ones or our thoughts on the other areas, is we would like some consistency in the biological parameters that are describing how the population dynamics of this species works.

RICHARD APPELDOORN: Yeah, so there's the biology and then there's the differences in, you know, what the model's coming up with. And part of this may be due to scale because Puerto Rico is a much bigger island. It has a large platform; it also has some deeper areas that we would expect to find Queen Trigger and that would also provide breeding areas.

And the Virgin Islands, you know, I admit I don't have any real good feel for the North Coast, but the South Coast, you get to the shelf edge, and it just drops off there. So, there isn't much habitat down there for a deeper population. They could reside there, but to spawn, they're going to have to come up to the shelf or this places to do nest building. And therefore, the differences in the size of Puerto Rico and the shapes and geomorphology to the shelve, in this particular case for this species, may in fact have a difference in the relationship between what is the real spawning stock and recruitment that we're seeing in the parts that we're getting today.

Plus, the Virgin Islands has a direct connection to the British Virgin Islands. Again, a much smaller scale relative to Puerto Rico. So, the potential for feed in from that population might actually be greater, but that would be kind of opposite to the trend we were seeing.

So again, it's complicated. The biology should be the same, but it's just distributed over different platforms and different spatial scales. And so, it leads to these kinds of differences. Todd.

TODD GEDAMKE: I agree with that. I'm looking at, I'm just reading what Erik and Jason are doing. I just wanted to make one more on the length since I've spent exhaustive amounts of my time staring at these lengths over the years. I think some of the understanding for people that have not been in this room, like Jason and Erik, asking about the length comp, it is, how the data are collected. You know, do we know how the sampling program works? Are we getting

random samples, are we not? one of the evaluations that was required of me in previous ones was seasonal patterns. So, if you're basically having stuff being all sampled in one month, you might not pick up the ribbon signal. Do we know whether samples being taken outside of the year? So that's one of the things that I would recommend as a plot for the raw data would be seasonal patterns or time. I'm just, I'm throwing it out there. But I do think that there is-- and even the sample sizes of some of the lengths we've been shown outputs and models, but I don't think I've seen the raw information for the length in here directly, but you do have huge gaps in Virgin Island's length structure for lack of sampling during time periods and those are holes in the data. So this is, I think, a good highlight with the discussion they're having about not only the data itself. And they, both Jason and Erika, have both said numerous times that we assume the data are correct and we assume that the data abide by all of the assumptions of a proper sampling program. And we have, in the Virgin Islands, we have sampling that has occurred sporadically. And the sampling is also not, it's basically not random. It's being done when people call in at times.

So, we have a difference that the process over there is being modified right now. I'm unsure as to what's actually going on, but I think it's really important, for anyone else that's looking or listening at this, to really get a feel for the data itself and how it is collected.

RICHARD APPELDOORN: Okay. Jason has his hand up. There are some comments in the chat, I just want to relate to what we've been saying. First is from Jay Grove, who's been looking at the RVC running RVC, and she says that you know lately they've been, as was pointed out, they've been using mixed gas diving to run deep stations for the RVC data in Saint Thomas so that the most recent year data would start incorporating some of those deeper things. That's a feature that's not available yet in Puerto Rico. And I don't think in Saint Croix either, as a routine thing. I know Reni has been doing that in certain areas in Puerto Rico, but it's not the routine survey. But you can correct me if I'm wrong.

The other thing is that at some point, Miguel has asked to speak to the committee. I'm hoping he will wait till we kind of have a little bit of closure here, and then we can hear what he has to say. So, Reni has a response to me and then Jason.

JORGE R. GARCÍA-SAIS: Yes. Reni García here. I can share my experience with last two RVC surveys. We've been doing most of the survey in a three-month lapse. Typically, from October to December. That's when we have done the surveys. The point I want to bring

regarding the death distribution of the Queen Triggerfish, it is not that much associated with the depth, it's associated with the habitat.

You know, it's a Queen Triggerfish. They like horizontally distributed platforms and where the adult population meets and apparently spends a lot of their lifetime is on rhodolith deposits, where they can build their nest. So, the thing is that those type of habitats are typically found at depths that are below a hundred feet, you know, and we have a depth [inaudible] of that habitat from a 100 to almost 300 feet in different, horizontally distributed platforms, of the insular shelf. Meaning that, you know, not because you are surveying areas below 100 feet, you're going to find the habitat where the Queen Triggerfish is found. For example, if you're serving areas in the, in the 30-to-60-meter depth range, and you are surveying along slopes, you are not likely to Queen Triggerfish because Queen Triggerfish do not like slopes. They like horizontally distributed platforms. That's where they reproduce, that's where they build their nest and they guard their nest and apparently, they spend quite a bit of their lifetime in that process, you know?

So that was my contribution. I was just wanted to make-- I just don't want you to think that "Okay. Anywhere that you look in the, 30 to 60 or 50 or whatever the depth contour, you're going to find that that's a habitat for Queen Triggerfish."

RICHARD APPELDOORN: Yeah. Thank you. That's where I was going with my point about the geomorphology of the Puerto Rico platform and the Virgin Islands' platform. These parts, that I know, can be quite different and would affect the distribution. Jason.

JASON COPE: Yeah, thank you. Jason Cope. Just curious process wise here, I think it's very clear that there are many things we would like to see before we move forward with understanding what kind of model could help move forward decision making. And so, at this point, should we start outlining requests?

I'm assuming the analytical team is not expected to make those things done and available to us today and this is our last day together. So, I'm assuming that this should be a fairly decent list of things that we would like to see. And this is where another question comes in at some point, I'm not sure when, I don't know how the process is laid out at this point to move forward. So maybe if I can get an answer to that question. And then, are people in agreement that we should start laying out very specific things for

the team to consider?

SSC Recommendations to CFMC

RICHARD APPELDOORN: Okay. I think Shannon kind of put something out for us before. Shannon, you want to speak to that.

SHANNON CASS-CALAY: Yeah, thank you, Rich. This is Shannon. So what I'm hearing really is that, I would think that the best possible approach is probably to really start, you know, with a basic conceptual model and to look at the data and see what we can expect to get out of it. And when you start to talk about that, I think it's extremely appropriate and I think it's very useful. But it does say to me that this has probably become, we're way outside of the bounds of SEDAR at this point, so we probably need to talk with Julie and set up a new project schedule to start to have these discussions and to rebuild these stock assessment models.

You know, it's all so useful, you know, you could outline a few things that you'd like to see us do, and we could bring that to the next SSC meeting. But I'm wondering at this point, I think these discussions are going to require some in-person or virtual workshops with some of the, with Erik and Jason and any member here who would like to participate, to really peel this back to, you know, what we believe is the best model configuration, given the data limitations. And I don't know that that's easy to do just by coming to each SSC meeting with a new set of products. I think it's going to require some, between SSC meeting, work.

So, I see Julie is on the webinar, I think it would be productive for us to create a new project schedule for SEDAR 80 and a new set of expectations, to be honest.

JULIE NEER: Well, Shannon, this is Julie-- Rich, can I chime in?

RICHARD APPELDOORN: Yes, go ahead, Julie.

JULIE NEER: So, Shannon, two of SEDAR 80s tasks, two of the three assessments you were producing have already been released, right? Puerto Rico and Saint John. Saint Croix, you were still working on. So essentially SEDAR 80 is complete for Puerto Rico and Saint Thomas/Saint John.

Under the current definitions, once it is disseminated to the cooperative, the Caribbean Council, in this case, SEDAR is done. So, I don't think an option is creating a new SEDAR project schedule. I think the better option, honestly, and all of this discussion has been incredibly valuable in what we need to do and

how we need to move forward. And I agree that it can't just be you guys working on stuff and bringing it to the SSC, I mean it could, but it's not terribly efficient or focused. I would suggest that the SSC, if they see fit, make a recommendation that they don't accept SEDAR 80. Maybe they can accept Puerto Rico because you guys have had extensive discussions and maybe they're comfortable with that, but they don't accept Saint Thomas or Saint John, and that it be remanded and we start a new SEDAR whenever we can fit into the SEDAR slots, maybe 2025 and you start fresh. And you put together a panel that can discuss all of these issues all the way back to a data stage.

Because recall, this was an operational. So, the only data that was delved into in great detail were the things that had those topical working groups. Some of your concerns that you guys have brought up were not subjects of a topical working group, so they were not discussed at the level you're discussing them here and clearly, they need to be. So, from a SEDAR perspective, procedurally, what I would suggest is if you're happy with the Puerto Rico and the work that's been done, the SSC can certainly recommend that and use that for management.

You're not comfortable. It sounds like with Saint Thomas/Saint John, there seems to be a great bit of work that needs to be done there for sure. And you haven't even seen Saint Croix, but I'm assuming many of those issues will likely be the same or even more. So, I would say that, you know, you might say, "okay, we've seen what you've gotten." The SSC is perfectly fine to allowed to say, "we don't think this is useful at this time under this current thing." And then you give all your lists of what you would like to see later. It goes back, goes to the Council, the Council requests it gets put back on the schedule. That would be my suggestion.

I mean, it could be put back on the schedule as soon as 2023 if you're willing to postpone what was scheduled for next year's assessment. We haven't started that one yet. But that's kind of what I'm hearing from you guys, is there's a lot of work that you'd like to see, particularly for the U.S.V.I. stuff that might be better suited to start over. I hate to say that, but the work you've put in now is really going to help move that one forward. And I think when you set up the set of things you'd like to see and the diagnostics you want to see forward, it will be incredibly efficient for the rest of the assessments that are going to get done in the next couple of years.

Sorry if that's not what you want to hear, but that's what I would suggest. Thanks.

RICHARD APPELDOORN: Thank you, Julie. I've got like five hands up. Shannon, do you have a direct response to that, or you want to wait your turn?

SHANNON CASS-CALAY: My direct response, and I'll make it quick, would be that I don't want to lose the inertia that we're achieving now. You know, I don't want to avoid the work that needs to be done until 2025. And so, I would like to find a way to do it sooner. But, I think that the Science Center's going to have to regroup a bit and see what we would propose, but I don't disagree with Julie. I would just hate to see it loose inertia.

RICHARD APPELDOORN: Okay. I have Erik, Doug, J.J. and Kevin. So, Erik.

ERIK H. WILLIAMS: Yeah. Thank you, Rich. Erik Williams. So, yeah, you know, kicking it back to SEDAR or not, the way I look at it is, you have a good model construct. If the data isn't going to change much, maybe just some more thinking about how to use the data. I would say this can be resolved without kicking it back to a full-blown SEDAR assessment. Because I think if the data doesn't need to be readdressed in any way, the index calculations are fine, the length comp is what it is, then what we're left with is really just model configuration in a way. And so that's solvable without having to go back to a SEDAR. But if there are bigger data issues, there are other data that might come to the table, other things, then yeah, then I would say kick it back to a SEDAR.

But if, if, the data looks good the way it is and it's just a matter of model configuration, then I'd say there's no need to kick it back to SEDAR.

RICHARD APPELDOORN: Okay. Thank you, Doug. I think what Shannon was talking about is they're booked full and so they would've to find some place in their schedules to deal with that. But so Doug, you're next.

DOUGLAS GREGORY: Thank you. This is Doug Gregory. I guess I'm more comfortable dealing with messy data and to me, this assessment is acceptable. I think we all know the challenges of knowing what real landings are, what discards is, and mortality and this is an honorable effort to get at all that. And the model seems to work.

I would like to see updates or if other people have strong concerns that I heard this morning, throw it through research back with SEDAR at some point. But we may not have-- we won't be able to overcome historical data problems, but we need to do something. We just can't throw our hands up and say, “well, it's insolvable.”

So, I'm comfortable with this with, you know, caution and I personally have no problem going forward. Thank you.

RICHARD APPELDOORN: Alright. I remind the committee that we have to do something, but you know, we do have a tier four, which is a solution if we can't do tier three. J.J.

JUAN J. CRUZ MOTTA: Thank you. Just from-- I haven't run the analysis I show you yesterday for the Virgin Islands because we don't have the data. But if the results are similar, to Puerto Rico, it wouldn't matter if we move the Queen Triggerfish later on. There are other species, like for example, the Yellowfin Snapper that is about to come. I would say get all the energy there. But just in a cost benefit, I know without other consideration. Thank you.

RICHARD APPELDOORN: You moved. Yeah, Kevin.

KEVIN MCCARTHY: Thanks. So, this is Kevin. So, a couple of things. I agree with Shannon about not losing inertia, and I think we, in the Science Center, can figure out if we can do this in an extra SEDAR fashion. And SEDAR, we can put whatever stamp on it that ends it as necessary and then we can move on with, you know, so that we don't lose this.

And over and above that, these are critical decisions that we have got to decide on because these data sets go into every assessment here, right? So, we've had to figure this out, or we're going to be up again on the rocks with SEDAR 84, which is the Yellowtail and Parrotfish.

So, this is crucial, and we really want to take advantage of this great conversation that's going on so that we-- I was chatting with Adyan, you know, if you're in the Gulf, if you're in the South Atlantic, we've reached the stage there with stock assessments that you're building on things that have already happened. A lot of this stuff has already been figured out right now. There's always new stuff coming in, and there's always new twists and turns. But here in the Caribbean, this is all brand new. You know, we're figuring this out for the first time. Let's get it as right as we can moving forward so that we don't keep having-- people have talked about this a little bit. Todd talked about this a little bit yesterday. You know, we don't want to keep having the same conversation, so let's figure it out as best we can because all of these data concerns, these general data concerns, you know, what are we seeing with the landings? Do we think we have an explanation? How do we handle it? That's going to be true of Queen Triggerfish and it's going to be true of Yellowtail, and it's going

to be true of everything we do. So, we really want to have some kind of standard approach or common understanding of how things can be handled. I think we're having a conversation now, and I think it's really valuable.

RICHARD APPELDOORN: Shannon.

SHANNON CASS-CALAY: I think Kevin said it very well. Thanks.

RICHARD APPELDOORN: Okay, then I have Doug and Jason. So Doug,

DOUGLAS GREGORY: I'm sorry, I just forgot to lower my hand. But I will add [inaudible] A lot of these criticisms could be leveled against other assessments that we've had in the Southeast or maybe elsewhere. We definitely have a different environment here than the Northwest United States, but it's not unique. Western Pacific has it. Erik's dealt with it with the South Atlantic side quite well, but I'll lower my hand. Thank you.

RICHARD APPELDOORN: Okay. Jason?

JASON COPE: Yeah, Jason Cope. I really appreciate what Kevin said. I really support all of those words. I guess I want to make it clear here that what I see is certainly not an impossible task. I see some major model specification issues that have to be addressed before this is really adequate to move ahead.

And the fact is, in my mind, if we had an extra day, a lot of these things can get sorted out. I mean, if we had like three hours, we could probably sort a bunch of these things out. Assuming that the data, like Erik said, we're assuming the data are the data, and in its present form, the best thing that we can use.

So we're really just tweaking how we treat the data in the model and how we specify the model. And we're actually, I don't think, that far off of something very, very useful. Which brings me back to my question about process, given how close we are, and we don't have the time to sort it out today. This whole, keep the momentum going, I really don't think it would be all that much to get this moved ahead quite a lot. What do we do?

RICHARD APPELDOORN: Okay. Jason, so I'm asking you a follow up. What I have in my notes as specifics that need to be addressed. You had mentioned initial conditions and selectivity, particularly, dome-shaped selectivity. And there was also the suggestion of down weighting the recent landings by increasing the variances on those. Are there other issues that I have missed that are on your list before I turn to others?

JASON COPE: Sure, yeah. Yeah. I mean, because the big issue here and Erik, I think, brought it up well, previously is that the lengths are disabled in many ways. Um, one of the ways they're disabled is the probable misspecification of the selectivity.

Another thing that I think is that the CVs at length at 0.18 is quite high. I would love to see a model run that, put it at 0.1 and to see if that does change anything and how the model reacts to that. So, a addressing the variability at length is definitely another highly valuable run that should be done.

And then additionally, what Erik had thrown out, was the what if scenario. What if you took all the lengths and just compiled them into a composite length, which we see the fit in the model of the composite length. Shannon showed that to us. But if you actually put all the lengths into just one big composite length and then fit the model that way, how do things change? So, I think that would be a very simple, valuable model run to do as well.

RICHARD APPELDOORN: I missed what you wanted to adjust the CV on to 0.1.

JASON COPE: Yeah, there are two input parameters. There's a CV at the youngest age, however that's specified in the model, and at the oldest age. You want to, right now those are quite high, which means for any given age it can be a large range of lengths. And when I mean disabling the length signal, what I mean by that is because the lengths can be of any, basically, any age, and this is ultimately an age structured model, there really is not much value in the lengths anymore when you have such a high CV.

I'm not sure where that 0.18 came from, if Triggerfish truly have a massive range of possible lengths at any given age. Uh, oftentimes it's typically 10% CV on that, is not unreasonable. It can go down to 5%. Hitting around 15%, you're getting pretty high. And so, my recommendation is just to allow the lengths to speak a little bit more, take away some of that smearing variability and lowering those two parameters to 0.1 and let's just see if those changes anything. Thanks.

RICHARD APPELDOORN: Okay. I'm not sure which one of use first. Todd?

TODD GEDAMKE: I have some little, bigger picture comments, and I think that retaining this thought will come back to me after we close this thought out. All it is, is data's decisions and how I see progress. But I think you're onto a list of things, right now,

that I just don't want to divert conversation.

RICHARD APPELDOORN: Oh, I thought maybe you wanted to add to that, list. Okay. J.J.

JUAN J. CRUZ MOTTA: Also, my comments around the brother picture rather than the list. So, I don't know if you want to finish the list, but then come back to me after to talk through the broader considerations. Thanks a lot for those comments, Kevin. I think we really need to tackle that. Thank you.

RICHARD APPELDOORN: Erik.

ERIK H. WILLIAMS: Yeah, thanks Rich. I was just going to add one more item to that list, which is to upweight the RVC index, so that it fits better. Or maybe even make a run with just the RVC index as the only index since we typically believe fishery-independent data over fishery-dependent.

RICHARD APPELDOORN: Thank you. But I'd point out that if you're talking about the most recent, I think it was four surveys, I'd agree with you. I think if you're putting in all the past stuff, which was really just kind of one shallow-ish area around Saint John, heavily done, but still just one area, that it's not nearly as representative as to later full shelf surveys. So--

ERIK H. WILLIAMS: Yeah. And I get that Rich. So, Erik Williams again, sorry. Yeah, just to follow up. Yeah, I get that. I'm not suggesting that that's a new base run, but that's an exploratory type run that should be done anyways. Usually looking at one index at a time is a typical process and upweighting certain indices in a group setting to make sure that you're fitting data sort of appropriately, is just exploration. It may not result in the base model, for the reasons you exactly just pointed out.

RICHARD APPELDOORN: Okay. Thank you for that clarification. So, Todd, you have a hand—

TODD GEDAMKE: It's not the list. Is that cool?

RICHARD APPELDOORN: What's that?

TODD GEDAMKE: A little bit bigger than the list.

RICHARD APPELDOORN: Yeah, so I'm actually going to, we are going to hear from Miguel and then break for lunch soon. So, I'm asking Jason if he would write down something as a list that we could

look at when we come back from lunch because I'm sure I'm not going to express it well from my jittering, even if I could read my jittering. So and then that'll give us something to work with as we're moving forward. So, Todd, your comments.

TODD GEDAMKE: I think it's a good idea, Richard. My comments are two twofold. One, Kevin made the point about data and data decisions. Um, I woke up at two in the morning last night and drafted like a quick motion along the lines of we always fight with the first year of data in all of the Caribbean. We always discuss that first data point because it's so much higher than the others. We could in a-- I'm not sure this is the setting right now, but some of those data decisions that are made over and over and over, we could cauterize, we could put them on the books and say, "I make a motion for all and SSC recommends that for future assessments the first year be eliminated and the prior conditions are two to three times what that vision level was at that point." All I'm getting at here is that we as a group could make some data decisions across the board that would apply for everything that they're doing, getting some guidance from them. That would be good.

Another thought, Shannon, I don't know how this might work, but I just called it the QT plus, where if you wanted to revisit this, you also pull out the top three or four species that are caught with Queen Trigger and you run the same thing to show basically, I mean, these guys are looking at ecosystem stuff and we're looking at a comparison of steepness to 0.7 to one. This could be an example of how you could do a potentially suite of species all in one shot.

And I know that's beyond what you want to discuss right now, but if there was some, as you discussed, scheduling and so on-- and I'm not saying that those other three or even the suite has to be perfect, but I think for us to move out of this cycle, getting that system or process moving would be fantastic. And this is an opportunity, I think, to do it.

RICHARD APPELDOORN: Sorry, Shannon.

SHANNON CASS-CALAY: Thanks, Rich. Shannon. Yeah, I think ideally, Todd, you're quite correct. I mean, we still have a little bit of a bottleneck and data provision that challenges our project schedules. We're working on automation, and we'll get there soon, I would think. So, that may become possible very quickly.

I think with this assessment-- I do think it-- well, I think it can become-- a lot of the explorations that we need to do here and a lot of the decisions that we need to make can be done with the

data that we have extracted already and so, we can continue to make progress with Queen Triggerfish. And I think these lessons that we will learn, can be documented and it can become a template for the way we do assessments in the Caribbean, which would be very useful. And then at that point, we can really talk about what the most productive assessment approach is. You know, if we do go back to trying a few species at a time, for example. So, I think I see your vision. I think that ultimately that is probably an appropriate vision. And I just think in the-- I think there's an interim process going on right now where we probably need to take what data we have already prepared for Queen Trigger and you know, really put it through that process of determining what information content is here, how do we best use it in the model configuration. And then I think with SEDAR 84, it's Yellowtail Snapper and Parrotfish. Correct? And, you know, we can start from that basis. These are essentially the same data sets that are going to be available. Hopefully more will come online that we can use.

But anyway, I'm babbling now, but I'll just wrap it up by saying that, you know, this type of focused, pragmatic and, you know, discussion that we're receiving right now is excellent and we appreciate it and I think it's a great step forward for us to better understand how to configure these models. So, I do appreciate all this feedback. I wanted to let you know.

RICHARD APPELDOORN: Todd.

TODD GEDAMKE: Shannon, I'm not going to disagree with anything you said nor even push any more work on it. I see the data coming out, there's a hesitancy to put something forward that may not be perfect with some other species. So just keep that in mind. I think that the holdup is data extractions, is that—

SHANNON CASS-CALAY: Well, you've seen the length composition data in its raw form, so there's a lot of work that goes into detecting outliers, QA/QC. It's not entirely representative, so it needs to be weighted properly by the different fleet components, for example. So, there's a lot of work that needs to be done.

TODD GEDAMKE: That was what I was going to try to tease out of you, because those are, I even wrote a motion for outlier detection. You know, like we could actually give you some of the feedback if you show us some of those things. Whereas you, that way where we've vetted the whole entire thing. And I also, part of my comment about adding other species in, you are looking at multiple species that should have experienced the same rate of fishing, Yellowtail and Parrotfish. One result doesn't help you with the other. It's two entirely different fisheries, two entirely

different things. You have no ability to look at those two and go, "yeah, these are one single person or another, you know."

And again, I'm not pushing to do this, I'm just pushing this conversation forward.

RICHARD APPELDOORN: Alright, I'm not seeing any hands up. Miguel requested some time to address the committee. So, Miguel, if you're there, I see your face, the floor is yours.

MIGUEL A. ROLÓN: Thank you, Mr. Chairman. Sorry to interrupt your time for lunch. But this is sort of important because we want to recognize two ladies who are in that room, Graciela and Iris. This is the only time for the rest of the year that they're going to be together. So, at the end, I would like to ask for a round of applause. The Council recognizes people who work in the staff for 25 years or more and Iris and Graciela, notwithstanding her white hair, she's a young lady, but she had been working for more than 25 years with the Council. Angie just reminded me of that and because of Covid, we haven't been able to meet in the last two years. But at this time, Mr. Chairman, thank you for this opportunity to recognize, Graciela García-Moliner and Iris from our staff for an excellent performance this year. They work very hard to put together this meeting for the SSC, to make them a success story, as you see. So at this time, we would like to recognize those two ladies Graciela and Iris they will receive a token of opposition from the Council in terms of 25 Benjamin Franklins. And please contact Angie and she will have an envelope for you.

So, at this time I will just ask for a round of applause. for these two ladies for their excellent contribution to the Council. Thank you. Thank you very much, Richard. And please continue on an excellent, excellent meeting. Thank you again.

RICHARD APPELDOORN: Thank you, Miguel, for recognizing the contributions. I'll say as chair for the last, I think, 10 years that, you know, I would not have been able to do this without Graciela guiding me along. So, I really appreciate the efforts of her. Of course, Iris, behind the scenes, getting everything organized makes all these meetings run. So, I reiterate my thanks. Yeah, well I was almost there too.

And with that, I think we're going to break for lunch, and we'll pick up and end, hopefully, our Queen Triggerfish discussions in the early afternoon to get onto some research priorities. Thank you. Back at 1:15.

(Whereupon, the meeting recessed for lunch on December 1, 2022.)

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DECEMBER 1, 2022

THURSDAY AFTERNOON SESSION

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RICHARD APPELDOORN: We'd like to get started again. Welcome back from lunch. I hope you all had a good break.

Where we left off was considering what to do about, Queen Triggerfish and Saint Thomas. And we were considering, in an effort to not lose momentum, a recommendation of certain things to try that, might prove useful in resolving some of the issues or nailing down some of the issues that have been raised in the conversation. And to that end, I'd ask Jason to put together a list which he has done. So, if we could get that up on the screen and if we can make it much bigger, just a bit more. Here we go.

Okay. Jason, if you would, just for the rest of us, go down the list for us, assuming you're there. And if not, I'll just read it.

So, this is a list of specific recommendations suggested to understand and move forward with the model. So, the first one is explore the equilibrium catch value by profiling from half to double the current value being used. Second point was to buy a dome-shaped selectivity to the fishery for the reference model and make sure that the model can either estimate this or fix it to a value that the fishers think makes sense. Third, change the CVs at length values from one from 0.18 to 0.1 for both CV parameters in the reference model. Fourth, make one composite length composition for the fishery and put it in as the terminal year and refit the reference model with recruitment deviations turned on and turned off. Fifth, consider a range of index weights for both indices, including dropping each, may already be part of the process. And last, using the Francis weighting option instead of the McAllister-Ianelli to weight length compositions.

I think there was one other, and maybe Shannon, you can express this, but I think someone had said about de-weighting the catch from the most recent years by increasing the variance on those, I think is how it was phrased.

SHANNON CASS-CALAY: Yeah, that's exactly right. Rich, this is Shannon. That is a possibility that if there, since the imposition

of the ACL, so there is a concern that we are more uncertain about those landings, we could increase the variance on those estimates.

RICHARD APPELDOORN: So, there was a question about whether that variance would be increased uniformly around the reported value, or if there's a direction, we think the questions go, would it be non-uniform uniformly applied? I don't know if that's something that can be done or makes any sense for them or--

And for those of you not in the room, there's a little sidebar conversation going on that we're waiting on.

SHANNON CASS-CALAY: So, Adyan was bringing up, one of the SSC members expressed a concern about discards and we did agree that the dead discards are likely to be negligible, but there is still the issue of whether the selectivity that we've estimated from the fleets, whether there are discarded fish that are not retained. Right.

That the issue though is, although we can make assumptions about the magnitude, we don't have any information other than, we'd have to make an assumption about a knife edge retention function. Because there's nothing to inform an estimate of the retention function, it would have to be an assumption. And it won't have a lot of impact on the stock assessment because it doesn't contribute to any dead fish, no removals, because those fish are released. So, I don't think it's a high priority at the moment, but if the SSC wanted us to investigate it further, we could.

RICHARD APPELDOORN: Yeah, I think we would like you to investigate it further, without having to shoot yourselves to do it.

So, Jason also added a general recommendation at the bottom that you can read. One general recommendation for the reference model is to provide the folder of model outputs created by stock synthesis as well as all the plots generated by-- I guess that's, is that stock synthesis. Is that what that is? --r4ss. This will allow reviewers to look around at the variety of things in the model without having to request them or take up time in the meeting.

And Jason put on the chat that his sound had not been working. So, if you'd like clarification at any point, he's willing to provide that.

So if there are no comments or questions on that list, adding the part about de-weighting the recent landings, then we can close discussion on Saint Thomas Queen Triggerfish. This still leaves us

with Puerto Rico and what do we want to do? In light of our earlier conversations and our more recent conversations again, to remind you where we were, was thinking about what proxy we want to use for MSY and what do we want to do about steepness or estimating recruitment or just taking an average recruitment over a time period, which would also have to be defined. And I understand now that recruitment plots are available to look at. Go ahead Shannon.

SEDAR 80 QT for Puerto Rico (continuation)

SHANNON CASS-CALAY: They are. I can show my screen in just a moment. Alright, let me make this larger.

So, the SSC asked us to provide trajectories of spawning stock biomass as well as recruitment. And we have done this, and we did it for three different treatments of the SEDAR 80 Puerto Rico model. And I just want to point out some characteristics of these plots. So, first of all, this is spawning stock biomass in thousands of pounds, from 1982 or whatever the start year of that model was, my apologies that I'm-- was it '82 or '83? '83 to 2027. And so, at 2020, that's the actual terminal year of the data-- I need to get a mousepad-- and then after that, these are projections that have different assumptions.

So, the gray line is the projection, assuming a steepness of 0.7 and an SPR30 reference point. The orange is a steepness of one and assuming SPR40 as your reference. And the blue is steepness one with an SPR30 metric. So that's what the trajectory of just stock biomass looks like, for both the model period as well as the projected years. And if you actually divide it by the reference point, then it looks like this.

So now you've got spawning stock at biomass divided by that biomass reference point. So, the blue line is the model with steepness of one and using SPR30 as the metric. So, you can see that in the projection years, after some initial model assumptions about catch and some transition to the projection assumptions, what the model does is essentially remove biomass until you reach the SPR30, 30% essentially of your virgin biomass. So that's what you see is the model taken out catch until you reach the reference value.

The orange line is steepness one in SPR40. So, it's the same deal except now you're below SPR40, in the terminal year. You're actually below the reference point. So, the model rebuilds the spawning stock to your reference. And then, the gray is assuming the steepness of 0.7. So, some spawner/recruit relationship and still using the proxy SPR30. So again, you're seeing a stock that's

actually rebuilding to the reference point in that case.

So, this is what the recruitment time series looks like and I haven't had too much time to make the plot prettier, but I think it does the job.

So, this is recruitment in thousands of fish from '83 to 2020, which is right here, your terminal year of the stock assessment and the projections, right? So, what you see in that first year, the projection is now we're basically using the predicted recruitment that comes out of the stock assessment model. So, for the two that are steepness one and SPR30, we're essentially just using median recruitment. In the case of the gray line, which is the steepness is equals 0.7, we are actually using this spawner recruit relationship to predict recruitment and it's a little bit lower than the mean of the time series. But, so this model is currently configured to use the mean recruitment from the entire time series, and that's kind of, I think, it was one of either Erik or Jason who was talking about, it's customary for SSCs to look at the time series of recruitment values and try to determine if there is a more appropriate assumption to make about what you expect to see as recruitment in the next few years of the projections.

Yeah. Jason has his hand up.

RICHARD APPELDOORN: Yeah, I'm still looking at the graph. Go ahead Jason.

JASON COPE: Yeah, Jason Cope. Thank you, Shannon. I'm trying to take this in, and I feel a bit confused and maybe if we go to the top plots of the relative biomass and the spawning biomass. I guess I would've expected-- and I'm wondering if this is just a mislabeling here --I would've expected the H equals one to be the same up until the point where they're forecasting forward different SPRs, which are going to give you different rates of [forecasting cat?]. So, what I'm surprisingly seeing here, if this is right, is that the H equals 0.7 and the H equals one, are identical in absolute biomass, in spawning biomass, and in relative biomass. But the one where you have SPR40 is slightly different in both of those things.

SHANNON CASS-CALAY: Well first let me check that the labels are correct because in one case the labels were missing, and I was rapidly attempting to fill them in. But Nathan, are you online to answer questions about this work?

NATHAN VAUGHAN: Yeah, I can answer questions.

SHANNON CASS-CALAY: Thank you.

NATHAN VAUGHAN: This is Nathan, by the way. No, I think in that figure it's correct. If you look there, Jason, the orange and the blue lines are both the steepness of one run with different SPRs and they both have identical historic SSB. The gray is the H steepness of 0.7.

JASON COPE: Oh, okay.

NATHAN VAUGHAN: So, they are, they are identical in the historic period and then the steepness of 0.07 is different because that's re-estimate.

JASON COPE: I don't know why, its playing with my mind.

NATHAN VAUGHAN: Yeah, exactly. It might just be.

JASON COPE: It is both. Okay. And then they differ, yes. Okay, that's super weird. Okay. Now if you could scroll down just a little bit. Let me look at that depletion thing with these new eyes. Okay. Okay. So, maybe this is the one that confused me because—

NATHAN VAUGHAN: In this case the depletion is relatively similar depending on both of the SPR30 ones. It's slightly different because they're not identical, but it's similar. The bigger difference is the one that's targeting SPR40, which is much lower, that's more depleted because, it's got a higher reference target.

JASON COPE: Right. But the biomass trajectory above, basically to get this, what you're doing here-- Oh, the SSB. Oh, the SBC. Okay, so this isn't SSB divided by SB zero. This is SSB divided by the [crosstalk]

NATHAN VAUGHAN: the reference point. Yes.

JASON COPE: By that reference point. Gotcha.

NATHAN VAUGHAN: Yeah. So, this is the depletion relative to the depletion at OFL or the SSB at that reference point, equilibrium SSB.

JASON COPE: All right, thank you.

NATHAN VAUGHAN: Yes. Otherwise, you're right. That would be really weird if that was divided by the [female?], which should be the

same across models.

JASON COPE: And I think that's, that's what I had meant to want to see, but that's alright that we have this too. I just didn't update the fact that this label wasn't what—

NATHAN VAUGHAN: Yes, no worries.

JASON COPE: Great. Thank you.

RICHARD APPELDOORN: Shannon can we go, or whoever is controlling that, go back to the recruitment figure. So, you're saying one of these is using average recruitment, or are they all using some steepness value to estimate?

SHANNON CASS-CALAY: So, the—

NATHAN VAUGHAN: Let me double check that, sorry, Shannon.

SHANNON CASS-CALAY: Okay, go ahead Nathan. Double check away.

NATHAN VAUGHAN: I believe all three of these are using the spawning recruit curve to do the projections. So, the mis-- not misunderstanding, but the slight confusion comes from the fact that in the two cases where steepness is one, the spawning recruit curve is the average recruitment, they're the same thing because there's no stock recruit relationship. So, the steepness of 0.7/1 is using the stock recruit curve, which is less than the average if it's depleted.

RICHARD APPELDOORN: Okay. Thank you, Nathan.

So, does this mean going back to the question of do we want to let the model specify recruitment or do we want to use average recruitment? Average recruitment, we're specifying basically the steepest of one anyway.

SHANNON CASS-CALAY: So, obviously the SSC-- this is Shannon. This is actually a question that we typically do ask the SSC to provide input on. It's the more common practice recently in the Gulf that when we don't know the spawner recruit relationship and can't estimate a steepness value, we would essentially use mean recruitment for the forecast unless we had evidence that recent recruitments were much higher or lower than average. And then you have to make a decision about what you think will occur in the immediate future. A short-term future projection, three to five years. So, in this case, it would, I think, it's most customary for us to go ahead and use the average recruitment over the time

series unless there was a specific recommendation from the SSC to use a different assumption.

RICHARD APPELDOORN: Yeah. It looks like, at least if you're looking at, say, the most recent years, they're pretty much, or that averages anyway. Jason and then Erik.

JASON COPE: Erik, go first. I've been talking a lot.

ERIK H. WILLIAMS: Okay. Thanks, Jason. Thanks, Rich. Erik Williams. So, the only counter I'd say to that, if I go back to the assessment report, is the recruitment deviations are all on the negative side for the last seven years of the assessment. So that might be considered a strong enough pattern to take advantage or use that pattern. And I say that with-- the other notion is that recruitment does tend to be auto correlated more often than not, I would think. Maybe that's a heretical statement, I don't know. But at least, put it this way, we recently did an analysis in the South Atlantic and we saw a lot of lag on auto correlation in our recruitment time series and I think that holds, in general, for stocks.

So, saying all that I would say that we might want to consider, for the short-term forecast, and this is just for the short term, considering an average of say the last seven years. Or actually better, use an average of the last seven years recruitment deviations and then you can still use whatever stock recruit function you want. Whether it's a mean model or a 0.7 Beverton-Holt model but use the last seven years deviate, the average of the last seven years deviations as the future recruitment, at least for at least the short term.

RICHARD APPELDOORN: Okay. Jason, you've had a break. You still have a comment?

JASON COPE: I do. Yeah, yeah, yeah. But I appreciate what Erik just said because he points out, this looks like a kind of an open mouth there, right? You have low recruitments in the one and you have the assumption of larger recruitments in the other, and that's what you're taking into the projection period, and that's a significant difference. I guess I just wanted to point out that when we talk about this steepness average recruitment thing, what we're saying when we say average recruitment is, we're saying, we're decoupling. Basically, the spawning stock doesn't tell you how much recruitment you're going to get. You're going to get whatever you get no matter how low you go and that's a very strong compensatory assumption when steepness equals one. And it plays all the way back to the beginning of the time series. And I just

want to point out, that choosing steepness equals one and average recruitment isn't just a forecasting decision, it's the whole model decision. And if we go back, if we look at that relative spawning biomass in terms relative to the unfished, not to the adjusting or moving around B target, but the actual unfished estimate, you're going to see, I assume, that steepness equals one is going to show you a much less depleted stock than the steepness equals 0.7, which I think is really, really low coming into this model after the equilibrium catch, at least it was in the original model, that used 0.7. And so, you're going to have very different starting conditions for which the data are going to be acting on and translating the rest of the information through the model.

And so, I just want to bring that awareness to folks that we're not just talking about forecasting when we pick steepness equals one. We're talking about the whole dynamics of the model up until there, including how we go into the model. And what Erik is saying is that you could inherit this 'what if situation' of lower recruits entering that forecasting period that you would have to take from this assumption that there's lower productivity when steepness equals 0.7. I hope that's helpful.

RICHARD APPELDOORN: Thank you, Jason. Shannon.

SHANNON CASS-CALAY: So, it sounds like there is a recommendation to use only the most recent years and seven years, or at least the recruitment deviations from those seven years. Is that the consensus of this group? We can work with that. I just want to make sure we have agreement.

RICHARD APPELDOORN: Right? That's what Erik had put out. And is there any feeling from the committee that would not go with that? Jason?

JASON COPE: Yeah, I guess I just put out that I don't know if steepness equals one here. I have a hunch that it does not. I'm very intrigued, even though we picked apart that last model, that that profiling over H was very interesting, that it was much lower and did not really include these high values of steepness.

And then, if you look at the Saint Croix, it has no idea what steepness is, it just thinks it's one. And so, I just think that this is one of the critical ones, that every assessment that uses a Beverton-Holt stock recruit relationship has to deal with. We typically don't know steepness really well; we have to pick a value. The default of just picking H equals one is a very, very, very strong assumption that cannot be tuned upward. It can only be tuned downward, which means you're maximizing the productivity of

the stock. I feel less comfortable about that base assumption. But I am one person. If everyone else feels very comfortable with that, if that's kind of the way it's been done and you think it should keep being done that way, then I am only one voice. I'm just expressing concern about that critical assumption of what steepness is.

RICHARD APPELDOORN: Jason, you had mentioned yesterday about turning steepness to match whatever we felt was comfortable as the proxy of MSY. Could you kind of explain how that works and the ramifications.

JASON COPE: Sure. Yeah. And I think it was really, really well illustrated in what Nancie was showing yesterday, in the differences between the MSY estimate of catch and the catch coming out of the [inaudible] FMSY of SPR equals 30 as you assumed, Basically, there was this relationship we saw yesterday between initially equilibrium--

RICHARD APPELDOORN: Hey Jason, we lost you there.

JASON COPE: I'm sorry.

RICHARD APPELDOORN: Yeah, you have to repeat, we lost your audio for a bit.

JASON COPE: If it's worth putting up those slides from the presentation yesterday to make a visual for folks to see this, this would be the updated Puerto Rico assessment for Triggerfish work that was presented. I think that was yesterday. I don't even know what day we're at but whatever day that was, there were some really nice visuals there that showed this.

Anyway, what you see is as the difference between the maximum sustainable yield that the model was that difference gets smaller and smaller and smaller until it's basically zero, meaning a steepness of 0.75 around that, somewhere between 0.75-0.8, is giving you essentially the value of an MSY that the SPR proxy, or 30% proxy that we're using, gives you. If you keep it at one, you will just understand that the MSY coming from the model and the proxy you are using are going to be very, very different. The MSY is going to say it should be much higher. The proxy's going to say it should be much lower. And so, you are establishing from the get-go a conservative application of the FMSY proxy in the OFL calculation, that's outside of our controls. Right? That's not a control rule sort of thing really. I mean, it's part of the control rule because FMSY times splitable biomass gives us our OFL. But when we think of P* and all that sort of thing, it's not really in

that part of it.

So just again, an awareness. If you pick H equals one and a proxy of 30% SPR, you are establishing a big difference between what the model thinks MSY should be and what the proxy says it will be. If people are comfortable with that difference, that is something you can do.

RICHARD APPELDOORN: Julian?

JULIAN MAGRAS: Yes. Julian Magras for the record, the least concern I have with using the last seven years is, we had two years of pandemic and we had two hurricanes, Irma and Maria. So, those numbers are lower than I believe would be actual landings before that. So that's just my comments.

RICHARD APPELDOORN: Yeah, these aren't landings. This is recruitment. Estimated recruitment.

SHANNON CASS-CALAY: Thanks, Rich. But Julian actually makes an excellent point and kind of putting all this information together. You know, an SSC member, I'm sorry, I don't remember which one said, the model surprises them because we see this big decrease in fishing mortality and no response in spawning stock biomass. Right? Spawning stock biomass is flat, even though fishing mortality has been reduced. And this is why this is happening, because the model saying the recruitment was low, that's how the model's explaining that. It's saying recruitment is lower than expected in those last seven years. So, the question in front of you is, do you believe it? Or do you think that it could be just a rising from the estimation of recruitment within a model that has data limitations?

RICHARD APPELDOORN: Yeah, Reni.

JORGE R. GARCÍA-SAIS: Is this referring to recruitment into the fisheries population overall? And if it is recruitment into the fisheries, what would be the size range that you would be expecting to see an increment?

RICHARD APPELDOORN: Shannon.

SHANNON CASS-CALAY: So, SS is set up that recruitment is always at age zero. So, this is probably, you know, a little bit lagged, right? They probably don't enter into the fishery at age zero, at least not as larvae. So, there is a lag here. But what this model is-- what we're trying to decide is, you know, what do we expect the magnitude of recruitment will be over a short-term projection,

say in the next three years? Do we expect that recruitment will remain as it has been in the recent seven years? Or more like the mean of the complete time series? And this is age zero fish? I think it's calculated… Midyear. I'm not positive about that. I have to look it up.

But, you know, these fish do enter the fishery pretty quickly, at small sizes, but I'm not sure exactly how old they are when they're first selected by the fishery.

JORGE R. GARCÍA-SAIS: Okay. Because I remember that when you were talking about the outliers in the size distribution that you removed the smaller than X and the larger than X. And I am wondering where is the threshold, you know, where is the cutoff? Where does the size distribution start for your model to consider?

ADYAN RIOS: Just to speak to the outlier removal-- this is Adyan, sorry. Just to speak to the outlier removal, what it actually did was use the Fulton Body Condition Factor. So you look at the relationship between the length and weight of a fish. So basically, a fish of a given length can feasibly only be certain weights. And so, the range of, that range that found, came from the fishery independent data provided by Virginia Shervette. And then, so basically saying this fish is unrealistically skinny or unrealistically overweight, to be of that length, such that we don't think that it belongs.

JORGE R. GARCÍA-SAIS: Okay. Yeah. Thanks. You know, I didn't know that it was in, that a length/weight relationship was implicit there, and that that was the criteria for the-- yeah, because you know, we don't know all the names of the models, you know, and the-- so thanks for the clarification.

ADYAN RIOS: Sorry. There was one, this is Adyan again. There were cases where weights were not available, so you only had the length. And if it was a length that was outside anything we ever saw, from data that were retained using the method that I just described, then those were not retained because we didn't have anything to validate that that's a length that belongs in the realm of what we're seeing across all of the information where we have lengths and weights.

RICHARD APPELDOORN: Alright, we have Jason and then Doug.

JASON COPE: Doug [inaudible] after you.

RICHARD APPELDOORN: Uh, Jason, we're not hearing you.

JASON COPE: Oh, can you not hear me? Hello?

RICHARD APPELDOORN: Yeah, you're breaking up from time to time. Alright. Doug, go first.

DOUGLAS GREGORY: Okay. This is Doug Gregory.

JASON COPE: If you can hear me, I'm going to try to let—

DOUGLAS GREGORY: You want to go, Jason.

DOUGLAS GREGORY: Okay. This is Doug Gregory on the recruitment trend. Erik suggested the last seven years. My question is, starting at what year going backward? And I don't know if it really matters that much. If you take the orange line and the gray line and average the two, you get the thing but if we're not going average them, which line will we take forward? I mean, it makes a difference. And I do not see the H one SPR30% line. I see blue lines, but I don't see any blue dots. Is that identical to the H one SPR40 trend?

NATHAN VAUGHAN: Yes.

DOUGLAS GREGORY: Okay. So, if we take, what I think we've been talking about, the SPR30, 0.7 and take the last seven years, that [inaudible] recruitment, then that is dramatically lower than the overall average and that's worth considering the ramifications of that. Thank you.

RICHARD APPELDOORN: Thank you, Doug. Jason, have you reconnected?

JASON COPE: I've tried to. Can you hear me?

RICHARD APPELDOORN: Yes.

JASON COPE: Yeah, sorry. And maybe the last couple times I've talked, it's just been broken up and I apologize for that. Formally, I want to say, thank you to the analyst for doing this work and providing it for us. I don't know if I've said that yet today, but I really appreciate it.

I feel like we're back to where we are with the choice of, what is steepness? What are we willing to go with? Once you make that decision, the rest of the stuff kind of falls. And then, you have to decide, do you want that proxy to match that decision or not? Once you make those decisions, the rest of this kind of falls into what it is. The model will translate it, given that very strong parameter choice, the data are fitting. There are all these things

that make this a very useful model. We're just stuck on this one parameter and the relationship of the proxy to that parameter. So, I mean, I think the rest of this is just kind of going around and around, I think, until we make that decision, we really go forward.

RICHARD APPELDOORN: Doug, is your hand up again or you forgot to take it down?

DOUGLAS GREGORY: I forgot.

RICHARD APPELDOORN: So, speaking for myself, I don't have a good feel one way or the other. I can make arguments in my brain for either one of these values and that makes it kind of out of the realm of informed, I guess, since I can inform myself either way on this. So is there kind of like, if you don't know, is there a default that one would go to? For you people who have a better background in this than I, Erik?

ERIK H. WILLIAMS: Yeah, thanks Rich. This is Erik Williams. I think the default is what they did and how they forecast recruitment, which is fine. I would just recommend, this is kind of going back to the step back and look at standard practices, we might want to consider applying to all assessments in this region and that is, what we're missing here is an analysis of the recruitment residuals over time to look at any time properties that might exist, whether it be breakpoints, trends in the recent years, auto correlation. Those are the things you want to look at. And the reason is, because we've seen enough stock recruit plots, for those of us in fisheries, where it just looks like a giant shotgun blast and so that the mean model is never, by itself, a good predictor of recruitment. And so, sometimes by looking at the time series properties of the residuals in particular, you can, maybe, gain a little more accuracy. For instance, if there is strong auto correlation, you want to carry that forward into your recent projections. If there is a string of years that are below average, below the stock recruit line, you probably want to carry that into the near future as well.

But when I look at the plot, they're not that far off. I'm not seeing any of those major trends. So, I think just going with what they did here, is perfectly fine. But it's something to note for future is, it's probably should be sort of part of the standard analysis package, looking at those recruitment residuals to ensure that you're not getting yourself into a situation where you're forecasting recruitment based on a model when you've had a string of really low or really high years. And I think Shannon alluded to this earlier.

RICHARD APPELDOORN: Thank you, Erik. Which brings me to ask Shannon, what did you do? because I don't remember. We had 0.1 and we have point-- we have one and 0.7. So, when he says, "go with what you did," what was that?

SHANNON CASS-CALAY: Well, we have already calculated the OFLs for each one of these cases. So, you know, basically we needed decision from the SSC to finalize the management vice.

But we have already projected it with each one of these possibilities. What we haven't done is restrict it to say the last seven years of the time series that would need to be a new analysis. If we wanted to say, recruitment deviations from the last seven years is what we'll use to project, then we'd have to rerun.

So, what have we already done? I mean, basically. I think any of these options are relatively satisfactory. Some are more precautionary than others. You know, SPR40 is a higher level of biomass. So, you're basically saying you need to keep a larger amount of fish in the water to produce yield at MSY, right? To produce that maximum sustainable yield. SPR30, says you only have to have 30% of the unfished condition in the water to produce MSY.

So essentially, there are some choices here that are more conservative than others, but I'm not concerned about the selection of any of these choices. I don't see anything here that would not be scientifically defensible.

So, this is really, if you want me to tell you my opinion, I will, but this is more-- what we typically ask us to see is to weigh in on. If we can provide additional information, for example, we can show you the recruitment deviations, that information is available. It's already, it would take a few minutes for Nathan to locate the appropriate figure, which is produced by r4ss, or to create it in Excel.

I mean, the one thing that I would kind of caution you on in interpreting these plots is that, you know, this is a model estimate of recruitment, which is not informed by a recruitment index. And if in fact the fishermen are discarding fish that are small, that could give us an indicator of the recruitment strength, and we don't have that information in the model.

So, this is strictly a model estimate of recruitment. And it's possible we're overinterpreting it, we're relying on it too much. So, the simplest scenario might be to just go ahead and either use a recent time period, if you choose to, that implies that recruitment in the projected period will be somewhat lower or just

use the average of the time series and just say, "look, we really don't know, but it's probably going to be similar to what we've seen before." In which case, you know, we can show you the OFLs right now and you can make a selection.

RICHARD APPELDOORN: Yeah. I really don't want to make our selection based on what the answers are. So, Jason.

JASON COPE: I will just throw my, again, my opinion. There's a lot of unknowns here, so I don't claim I know any of this stuff. I think what one of my preferences is not to kind of Frankenstein things together. I think models that are more internally consistent and using the signals within the model are-- it's nice to be able to do that if you can. And so, this lower recruitment going in, right, that's based on a steepness of 0.7. What I've seen is that-- I will just recommend something that I think is most consistent and a balance between precaution and biology and so forth.

I think if you went with the steepness of around 0.75 or 0.8 or something, pinpoint it to where it's consistent with SPR30, which sounds like others have said that that's a reasonable proxy at this point, that needs to be, in short forecasting, updated and kept track on. Then you will get a model that produces naturally, these recruitments [inaudible] I'm assuming in these lower ones. And then you go put it into a forecasting that will, again, be consistent with the model that went before it consistent with a proxy that folks think is reasonable and doesn't pin you to a very high productivity. Cause my worry is, as this modeling exercise evolves, into the future, with better understanding biology, there is a very good chance that steepness will not stay at one, that will come off of one, because it can only go below one, it can't go above. And so, you are going to be then revealing a less productive stock over time. And it may be better to, expert opinion, guesstimate what that reduced compensatory ability is in the stock right now. And if, if indeed you go above 0.75, right, it'll improve the productivity in the future.

I can tell you that when we look at flat fishes, which are pretty productive stocks, they have steepness around 0.8, 0.85, something like that. So, there are other fish that we can look at [inaudible]. We think Queen Trigger fish are more productive than these sorts of things. I just, I find it unlikely that that might be the case, but I am not the local expert in this and so if you just do have a better opinion, go for it.

But that is my recommendation. Find the steepness that is consistent with the proxy that people are comfortable with. SPR30. Do short forecasts. Let the model be consistent to the end of the

models, inform time series and into the forecast and build from there.

RICHARD APPELDOORN: Thank you very much, Jason. Shannon.

SHANNON CASS-CALAY: Yes. Thanks. So, I think I understand what you're getting at, Jason. I think what you're saying is, you know, basically make sure that the steepness value we fix, that when you project out, you achieve SPR30, at that steepness level. That they're consistent. Is that right? And so, it may not be at 0.7, it could be at—

JASON COPE: that's why I think it's higher than 0.7. It's 0.75 [inaudible] higher.

(Part of Dr. Cope comments are inaudible on the audio recording.)

But that's right. And I think you also want to change the equilibrium [inaudible] because that's going to raise the R zero. It's actually going to raise the whole scale of the stock. And it's going to be interesting to see how that raising of the stock, even though this is going to be less productive, in order for it to reconcile the catch, it's going to have to raise that R zero value. Um, which is why I think we saw, with Nancie stuff yesterday, that profile over the initial equilibrium catch,

(Part of Dr. Cope comments are inaudible on the audio recording.)

I think it went up or something like that. But I think R zero still goes up as well. Whereas, this is typical, if you increase steepness usually have a lower R zero, which means you think there's less fish normally out there, but they're just more productive so they can make up for anything you take out. Whereas less productive stock usually raises, or often raises, how many fish we initially think were out there. But they're just less productive overall.

RICHARD APPELDOORN: So, two questions. Anybody on the committee kind of disagree with that? And secondly, Shannon, do you understand that?

SHANNON CASS-CALAY: Well, I mean, we can look back, I think we might be able to pick the steepness value off of the figures we showed yesterday. So maybe we need to open that report again and actually look at the value Jason's talking about.

Um, it's close to 0.7, but we don't know exactly where it is, Nathan is looking into it. So, do you want to open that other

document and start looking at those plots? or do we have sufficient instruction, which is just use the steepness value that is consistent and the entire time series and produce OFL that way?

JASON COPE: Yeah, and I also want to make clear that I'm making a very specific recommendation here in order for others to express where they might feel very uncomfortable about those things. This is all else being equal. This is what I would probably do at this point and then with the encouragement that future models are going to build off of this. I would feel less cornered by the productivity assumption by this. But also, I don't want to say, this is the way that this has to be done and anything else is wrong. I would love if others had a discomfort with this recommendation. Yeah.

(Part of Dr. Cope's comments are inaudible on the audio recording.)

If this is something that seems-- I think I had suggested that earlier, but I probably broke up when I was talking to y'all. because there's some real valuable information that we can look at in that stuff presented previously.

RICHARD APPELDOORN: So, any discomfort from the-- okay. Nathan?

NATHAN VAUGHAN: I was just double checking with Jason. So he's saying to get this run with where we're fishing at MSY and that corresponds to the SPR30. For the 0.7 run I just looked at MSY would be 0.33. So, it is very close. And this is Nathan, sorry, by the way. So yeah, it is really close and so it's probably, like you said, a little bit closer to the 0.75 to bring that down.

JASON COPE: Yeah. And, and we're not looking for exactness here and [inaudible] something more comparable.

RICHARD APPELDOORN: Okay. Committee, anybody have any discomfort with going with Jason's suggestion as our recommendation to the Council?

I'm not seeing anything. So, my understanding as I would phrase this, and maybe Jason, you want to send some exact wording, but-- We're going to go with SPR30, and we want to make the steepness compatible with that. And otherwise, you're running the model as you have.

JASON COPE: And just the one last part of that I think would be to also investigate adjusting that equilibrium catch. That was the other part of that. That's also another very important assumption and if people are-- I don't know what I fully think about if this

model's informed, it seemed like it actually was kind of informed to tell you what that equilibrium catch could have been. But that's also a huge unknown and a big scaling decision. So that would be the very, very last thing. Do you use likelihood profiling to find that value of equilibrium catch and set it to that? Or do you use expert opinion to say the equilibrium catch should be this and then you send them all forward?

RICHARD APPELDOORN: Alright, thanks for giving us more questions. Erik?

ERIK H. WILLIAMS: Yeah, thanks Rich. This is Erik Williams. I don't disagree with the recommendation by Jason. I think that's fine. We find the steepness that matches SPR30, so things are internally consistent. But what this plot actually raises some issues though, which sort of gets back to my original comment. And if you note the difference in recruitment, particularly in the recent years. So if we're looking at this plot, the difference between the gray line and the orange line for the years from 2019 to the last, you know, years leading up to that, there's a big difference, which tells me that the stock recruit function itself, is affecting the recruitment estimates, which tells me that the model doesn't have a whole lot of information to tell us what those recruitments should be. So, it's starting to lose information, which is common for these assessments. As you get to the tail end of them, you start to lose recruitment information.

But what the model that Jason's proposing, it also implies that there's going to be a jump up in recruitment immediately in our first year of our projection. Um, and that's a result of those negative residuals that I was pointing out. So, in other words, if you look at that run in particular, the H equals 0.7 run, there's a string of negative recruitment residual in the most recent years. And the question is, should you carry those forward or not into the short-term projections?

I, you know, it's small. It's a minor issue because you can see the difference in recruitment it creates. I mean, what the difference would be is whether that trend from 2015 to 2020 or 2019 would continue into the near future, or will it bump up according to the stock recruit curve? It's not a whole lot, but I just want to get that on the record, that that's the issue I'm talking about when you do short term projections is looking at that most recent recruitment pattern to sort of capture any properties there that might be important. In this case, I don't think they're that important. And I am fully in agreement with Jason's recommendation of, you know, fixing steepness at the value that's equivalent to the SPR30. So.

RICHARD APPELDOORN: Jason.

JASON COPE: Yeah, I really appreciate what Erik's pointing out because there is something that we can do, I think, in this model to still make it consistent but not inherit this decline, which he's absolutely right. The thing that we suffer from [inaudible] use length data and the sensitivities of those things that are informing us is there's always a line [inaudible] what they inform as far as recruitments and those, because they're usually getting recruited into the fishery at ages 2, 4, 5 or something like that, right, there's a bit of a lag there and you expect these final recruitments not to be well informed unless you have special data recruitment, index ages, something like that.

Outside of that, what is very typical, and this is a question maybe back to the stock assessors is, was recruitment estimated all the way to the end of the time series? If so, you can actually say, for the last five years, we're not going to estimate recruitment. We're going to take it off the stock recruit curve and that might flatten this issue a bit and resolve a bit of, what Erik's really good concern is, that jump up of an assumption that, oh, all of a sudden you're in the forecast and you're getting all this great recruitment [inaudible] little strange because is not informed by anything other than we're going into a forecast that assumes something different than the rest of the model.

So maybe if we start with the question, can we look at the recruitment behavior? And was recruitment estimated all the way to the end of the time series? or was it stopped maybe four or five years before the end?

SHANNON CASS-CALAY: Thanks. This is Shannon. So, it was estimated through the end of the time series. We can absolutely do, just as Jason suggested. So, the SSC would prefer to see that approach, it can be done. We could pull the recruitment deviations for you if you wanted to look at them.

JASON COPE: Yeah, no. If you know that you ran it all the way to the end-- I think if we just said, let's cut it off at the last-- And I don't recall, are these fish-- How old are they roughly when they're getting recruited to the fishery?

SHANNON CASS-CALAY: I saw Virginia in the chat. She was looking up that information and I can look it up from the model estimates as well. I'm just going to have to close this Excel file so I can look it up.

UNKNOWN: I believe it's two.

JASON COPE: And also, like in this place [inaudible] what's the sample size in the last couple years? The last three, four years? So, it might be a combination between sample size, informative lengths, recruitment to the fishery, etcetera. It may be wise to say the last four years or so, let's just not let the model do that or whatever the stock assessors think is probably the best reasoning of highly uncertain estimates.

The other thing you can look at, if you have those r4ss plot-- and sorry if that wasn't clear before. r4ss is just a package that makes a bunch of diagnostic plots for your stock [inaudible] in that if you, I'm sorry, this is going to get minorly technical, if you estimated the variance in the model, it should provide you variance estimates of the recruitment deviations, which we use as a diagnostic to tell us which recruits are actually informed, and which ones aren't. And we often apply a bias correction to discount ones that are less informed. So, it also can point to which years you might want to turn off in the estimation. So, we could also look at that plot. That could be a real simple way of diagnosing this. [inaudible] I'd be, if we want to pull that up, if it's available, to quickly walk the group through what we're looking for. It would only take 60 seconds, probably.

And if you have that plots folder, that r4ss produces, there's HTML pages. If you just click on that that'll open up all of the plots and I can navigate us to the right one to look at if that's the easiest thing to do. If folks want to see that.

SHANNON CASS-CALAY: So, there's been a lot. This is Shannon, my apologies. I'm a little bit confused at this point. So, what exact model run do you want to see? And then, we can get those plots for you, either with the R plots, r4ss output. Remember that this was profiled and so I don't know that we created the r4ss plots for any given combination. So, we might be in a situation where they're not completely available. But what is it that you want? Because I've lost track of what I'm trying to do here.

JASON COPE: Yeah. Yeah. So, thank you. And this is Jason Cope. How about the original model that uses steepness of 0.7? Let's just take a-- because I don't think-- I think you should have that estimates recruitment. So, if you have a model that used steepness at 0.7, the estimated recruitment, I think that's the base of what we looked at in October. Let's take a look at that one.

SHANNON CASS-CALAY: Okay. So, give me about five minutes and I'll pull that up.

RICHARD APPELDOORN: In the meantime, Nathan, do you have a comment?

NATHAN VAUGHAN: Thanks. I was just going to say to Jason, we've been sending these plots because I don't have everything set up to do the r4ss plotting. I'm one step away from that final part in what I'm used to doing. So that's why I've been making them by hand.

I did run the steepness 0.75 estimate, and that is basically right on the nose for the SPR30. It's like MSY is like 0.301. So that looks like what you're targeting. For the decisions that you guys need to make, though, I did want to point out that, if we go to changing that initial catch, and that's what you're talking about with equilibrium, right? Is that initial [crosstalk]

JASON COPE: Yeah, that's what I was talking about.

NATHAN VAUGHAN: Yeah. That initial equilibrium catch, that is obviously from, if someone has the plots up there, that is very different at a steepness of 0.75 than it is at the 0.95 that we came up with as a current based model. So that will make, it's like almost twice, it's maybe like 80% larger.

JASON COPE: Yep.

NATHAN VAUGHAN: And it results in a not that big of an increase in the OFL, but a reasonable bump. So, deciding which way we go is really important as well.

JASON COPE: Absolutely is. And did it change the R zero? Did it make the R zero go up as well?

NATHAN VAUGHAN: I didn't look at it when I went look back at the old figures that I have, but I assume that it did. Yes.

JASON COPE: Yeah, that's great. And just with these recruitment estimates that we're looking at, like I don't know. Nathan, maybe you have that 0.75 run, but it would have to do the Hessian for us to get the variances to look at the plot that I want to see. So just a heads up, like—

NATHAN VAUGHAN: Yeah.

JASON COPE: Yeah, yeah, yeah. As long as if you have that, that's something we could just look at right now.

NATHAN VAUGHAN: I don't have the plots; I have the run. So what we've been talking about with that recruitment deviations is the steepness of one profile, the recent recruitment deviations come in at pretty close to zero. There's a lot of very negative recruitment deviations when we go down to those lowest steepnesses in these final years. So, the models saying, in that case, it thinks they should be [inaudible]. It's like, no, I want much lower recruitment in these recent years,

I think Shannon and Kevin have that figure somewhere. If we're seeing their screen, I'm not sure whose screen we're looking at, at the moment. [crosstalk]

JASON COPE: Virginia [crosstalk] Six years! Wow. To get fully— Yeah, so I mean that's kind of that five year-- it'll be interesting-- Yeah, if you-- Anyway, I think we got a really good thing to look at here, with that information, that, like, four or five year shutoff of estimating recruitments at the end, is not inconsistent with what the fishery would expect, as far as when they see these things. So that's good information to have.

And then we can look at this variance plot and probably confirm that you don't know much about those last ones anyway. We'll have to understand that we should just shut those off as estimates. They'll pull them straight from the stock recruit curve. That's probably going to bump those negative residuals or [inaudible] to get that. The model still might be reconciling the fact that it's got to fit the length data and the other data and the only way it can do that, with these big recruits that it showed, is to have some negative recruits. Because remember, these recruitment deviations-- I don't even, I shouldn't say remember --just know that these recruitment deviations, they have to sum up to zero. So that's a constraint in stock synthesis. So, if you have a big recruit, you have to take them away somewhere. And so, that's just the nature of these.

RICHARD APPELDOORN: Alright, we're going to take a, a five-minute break while the group gets those plots together and whatnot.

(Whereupon, a brief recess was taken.)

RICHARD APPELDOORN: I would like everybody to get back to their seats so we can get the meeting going again.

Okay. I'll turn it over to Shannon or whoever's going to present some of the information that was requested.

SHANNON CASS-CALAY: So, we have, I'm going to show you one that's

steepness 0.75. We also have 0.7 and one, but .75 is the one that is most consistent with SPR30. And since these take a while to download, it's the first one I have available for you. I can try to make this larger. One second. How do I do that? Anybody know the sneaky way to make this bigger? Alright, thank you.

Okay, so we can go through all of the results tabs, anyone you want to see. This is the recruitment deviations, and we did assume the spawner recruit relationship for 2020, but we actually did estimate recruitment deviations through 2019. And you can see, as Erik's already mentioned to you, that the recruitment deviations in the last, you know, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 years are lower than average. So that's the recruitment deviations. What else did you want to see, Jason? We have every tab available now.

I don't think he's returned yet. If you are speaking, Jason, we cannot hear you.

LIAJAY RIVERA GARCÍA: Jason, if you can hear us and can you write in the chat?

RICHARD APPELDOORN: Shannon just so I make sure I got this, this is the case for 0.75? Okay.

SHANNON CASS-CALAY: How did you do that magic, Kevin?

KEVIN MCCARTHY: Ctrl +.

SHANNON CASS-CALAY: So, as you can see now with steepness fixed at 0.75, you know, we do, at least in the terminal year, you are at a SPR of 30%. We'd have to look at the projections to see, but I think this is the correct steepness value that's consistent now with the SPR30. I don't know what folks want to see though.

RICHARD APPELDOORN: Well, you could just run through all those. You just did it so fast, so I can't read the axis.

SHANNON CASS-CALAY: Okay, sure. So, we can make this figure, these plots available. This is the standard output of stock synthesis. And so, these tabs all show the various results available in stock synthesis.

So, the initial tab is just the biology that was fixed in the model, so that's not a particular interest. But it shows the growth curve here that was used and the mean weight length relationship, the maturity function, fecundity function. Essentially, as I said, the proxy is just the body weight of females.

The selectivity functions that were estimated for the trap and for the dive fishery are here. And this was estimated as a length-based function. So essentially there was a question earlier about how old these animals are when they're selected to the fisheries. These were length-based selectivity functions, so by the time they're about 20 centimeters, they're already starting to become selected in the trap fishery, and they're fully selected by the time they're 30 centimeters. In the dive fishery, they're selected at slightly larger sizes. So, they're not fully selected the dive fishery until they're slightly 35 centimeters or so.

This is the model derived estimates of the age of selectivity. So basically, these animals are not selected by the fisheries until they're roughly age two, and then they're increasingly selected as they age.

And that's basically the-- there's a lot of more detailed plots here, but that's the main story. Sorry, are there questions?

RICHARD APPELDOORN: Yeah. Jason's back online, by the way, and has a question.

SHANNON CASS-CALAY: Hey, Jason.

JASON COPE: I'm so sorry. My internet is just awful. Can you guys hear me?

SHANNON CASS-CALAY: Yeah.

JASON COPE: Did you want me to take us over to that one recruitment thing to look at?

SHANNON CASS-CALAY: If you could drive the bus on this discussion, that'd be great.

JASON COPE: Yeah. Totally. yeah, go ahead and scroll down. So that's our recruitment deviations. Great. Those are the estimates. Keep going down. And here is-- Yeah. Okay. Okay. Yeah. Yeah. This right here and this right here. Yeah. I mean, boy, looking at this, this is saying there's really almost no information. Actually, scroll up from this, yeah, to this next one. That's the one right there. What it's saying is that you have, basically, that red line, anything below that red line is a decrease in the variance or basically the way to interpret this is anything below the line are informed recruitments to some degree, and the more it drops away from the red line, the more information you have. This is saying there's really not much evidence in the data for any recruitments. So you see [inaudible] [spurious?] might be a bit sketchy.

And so, then if we scroll down a bit more, there's this next plot and below this next plot is a series of numbers that recommend how one might go about estimating recruitment in this model. And so, in here it's no bias adjustment because it doesn't know what's going on and it recommends that you start this estimation. Basically, the main estimation is between the years 1994 and 2015, that's where it thinks you have the most information. And so, anything after 2015 is not going to be super well informed. And anything before '94 is a little iffy too.

So, here, at minimum, at minimum, it's confirming the fact that after 2015 there really isn't much information at all and those should, at minimum, be taken off the stock recruit curve. But there's also a really strong argument here that no recruitment is estimable and that this could be a deterministic model. So that deterministic model run, I don't know if there is a version of that somewhere, but that could be an additional run to have and understand. But I think at minimum, where we're at today, you'd want to turn off the recruitment estimations from 2015 onward or after 2015. Is that helpful? Any questions?

TODD GEDAMKE: Jason, Todd. That was awesome, thanks.

SHANNON CASS-CALAY: It's also quite possible, so we can definitely do that. It requires running the model again, but we can do it.

JASON COPE: [inaudible] yeah, exactly. You just rerun the model with the 0.75. This is just the additional run. I don't know how long the thing takes to do [inaudible] and all that stuff. Hopefully not too long.

RICHARD APPELDOORN: So, you can do this because [crosstalk] on recruiting until after the model would be over and then after 2020, so it's not an issue.

SHANNON CASS-CALAY: It just doesn't estimate deviations from the spawner recruit function after 2015. So, it just would assume whatever comes out of the spawner recruit relationship is what the model would use for recruitment. Without deviations.

RICHARD APPELDOORN: Okay. Thank you, Shannon. Nathan.

NATHAN VAUGHAN: Sorry I scrolled away. I did that. Shannon, have you got the new, the 74 metric tons. I also did a run just now with the initial catch, initial equilibrium catch, that roughly correspond-- this is Nathan by the way, sorry. For the record. The initial equilibrium catch that matches, that's the most, the

maximum likelihood estimate that pairs with a 0.75 steepness.

And that comes out with fairly different results. If you had that, then maybe Jason could tell us, we could make a decision on what to do with that run rather than rerunning the 0.75 that had the 39 metric ton initial catch.

SHANNON CASS-CALAY: So, these take a while to download. Has anyone successfully downloaded and unzipped this yet or should we just ask Nathan to show it?

Nathan, can you show it if I stop sharing my screen?

NATHAN VAUGHAN: I can try.

LIAJAY RIVERA GARCÍA: Let me make you co-host.

NATHAN VAUGHAN: I can just send a picture of this. I can send the figure to Shannon in one second. Let me do that. That might be easier. We're looking at the same thing as each time. They're all generally load that line. Just to double check the, what we've got going on here.

LIAJAY RIVERA GARCÍA: You are co-host now, you can share your screen.

NATHAN VAUGHAN: Oh, okay. Perfect. Come back. I picked the wrong day to come into the office I only have one monitor, little laptop screen. There's lots of things I can share. Oh, I have no idea how this is going, but perfect. Okay, so can people see that?

RICHARD APPELDOORN: If you could make it a little bit bigger, if that would help.

NATHAN VAUGHAN: That works?

RICHARD APPELDOORN: Excellent.

NATHAN VAUGHAN: Okay. Sorry. There's a lot of things squished under one little laptop screen.

So, this is from an initial catch, initial equilibrium catches at 74 metric tons and then steepness of 0.75-- well, the estimated steepness from the model, which is like 0.749. So, this is just the run that we did from those original ensembles that estimates steepness and use a stock recruit curve. So everything is generally falling in line, like Jason wanted. Like a consistent model that's just letting the model do what it does under those assumptions.

So, these are our recruitment deviations, which no longer have that drop in the final year. It seems like that is sort of an artifact of using a steepness and an initial catch that don't pair well together. Again, we've still got very large variances on all of these.

We've got that, everything is now below that line. It doesn't think that it can estimate anything. So, this is what I was checking.

JASON COPE: Wow, that looks way better. That looks way better.

NATHAN VAUGHAN: And then we've got this, whatever's going on here, I don't understand this yet. It's the first time I've looked at these plots. And then here, I'm not sure what it's trying to say.

JASON COPE: Yeah, what, can you guys hear me? This is Jason.

RICHARD APPELDOORN: Yeah, go ahead.

JASON COPE: I mean this is basically the inversion of that other plot that you were showing that is right above it.

NATHAN VAUGHAN: Okay.

JASON COPE: This is a ramping-- this is a bias correction plot. Yeah. And it's suggesting-- So this looks way better than whatever we were just looking at, because it had no bias correction, it had no idea what was going on. This version of this model right here is much happier figuring recruitment from the data, for whatever [inaudible]. So yeah, this looks a lot better.

And it's just saying in the model, right now, you have this bias adjustment in the model, which by the way looks totally fine. This weird blue line. That's weird. I would, this doesn't always come up with the optimal solution. Because I guarantee you, if you put that blue line in, you run this model again, it's going to come back with something that looks more like the red line you have now. It's going to flip flop. So, you're fine. What you have specified right now for this recruitment setup is great. Yeah, I wouldn't change it.

NATHAN VAUGHAN: Okay. That's what I was suspecting because it seems that there was something going on with when we fixed that initial catch that doesn't pair a well with the steepness, it loses its mind. So, excellent.

JASON COPE: Interesting.

NATHAN VAUGHAN: So, once I get that downloaded, this is, I think, closer to what you guys are all trying to game for a final model.

JASON COPE: And, sorry, this was the adjusted R-- you adjusted the equilibrium catch already. That's what you were saying? With this model as well as, 0.75 steepness.

NATHAN VAUGHAN: Yes.

JASON COPE: Awesome.

NATHAN VAUGHAN: So this is one of those initial ensemble runs where we just estimated steepness, but I went back through, until I found the starting, initial, like, equilibrium catch that estimated the steepness of 0.75. So, there's one where everything is consistent. All we did was pick the initial catch that worked best for everything else we've been talking about.

So, it ends up with an SPR of about 0.3 and then, you know what I mean, like an MSY SPR ratio that's about 0.3 and steepness about 0.75, with this initial catch. So, this is the most consistent model we have, which is probably why it can estimate things.

JASON COPE: Looks really good. I know we haven't looked at the biomass or anything. Hopefully it's not like [inaudible] or doing some weird stuff, but this part of it looks really good.

I hope, I'm assuming it's fitting the data and all that stuff, we should maybe do a quick look at the length. Where are the length fits. It's wherever that tab is for the length fits. Yeah, scroll the top. Go all the way to the top, yes. Perfect. Ooh, that looks really good. The composites fit really well, and you can go down and look at the individual ears and you can scroll down through this.

Doing a nice tracking of the mean lengths. That's good. Yeah. Another really good fit. That's a pretty good fit to these mean lengths. And I'm assuming this is just carrying over that McAllister-Ianelli weighting that you did, which the Francis weighting is actually not bad. It's pretty good by itself. So, there was a recommendation-- oh, that was the other model. Sorry. That was the other model. Anyway, exploring other data weighting probably isn't really necessary. That's a pretty good fit.

We could go over to the index tab, see how the indices are fitting. Those look pretty good.

NATHAN VAUGHAN: We should have gone with this all along.

JASON COPE: Yeah, I was going to say this is-- the data are fit. Yes, it's constrained in the sense that we can't estimate all this biology, but everything seems to be talking pretty well and fitting. I mean, I would take these fits for the assessment. I have to do this summer. We could trade them.

NATHAN VAUGHAN: That's very nice.

JASON COPE: You could also maybe go over to the selectivity tab, the Sel tab, just to make sure that that checks out with everyone in the room. Like those selectivities seem not unreasonable. Look pretty similar to before.

And if those look good, you can go to the time series. We can take a look at the time series plots.

Yeah. The rest, these are just individual-- Oh, here we go. Sorry. I got a lag. Yeah. Okay. I mean, so what, again, you're inheriting a really low population that is growing over time because the equilibrium catches just thought to be hot.

And I don't recall what the stock status target is for this fishery.

NATHAN VAUGHAN: It should be .3.

SHANNON CASS-CALAY: Yeah, and there's a stock size threshold in the Caribbean where you declare an overfish status if the spawning stock biomass is less than 75% of SSB at SPR30.

JASON COPE: Okay, so you're nowhere near that. So, this is near target then, is what this is. This has been built up over the last few years towards target. And Shannon, I don't know if you said that, if it holds for this one, that it was near, like the current fishing rate is near SPR30. I don't recall if that was true for this model.

SHANNON CASS-CALAY: I think we were talking about spiny lobster at that point.

JASON COPE: Oh, sorry. Yeah. I'm all sorts of lagged here. I'm on a device falling along now. I'll stop talking. I think this looks very useful for management.

NATHAN VAUGHAN: Is there anything else useful to see, or I can give my screen back to Shannon?

JASON COPE: I'm satisfied. I've seen all the stuff that I would have been interested in seeing, unless anyone else wants to see something.

RICHARD APPELDOORN: I think we're good.

SHANNON CASS-CALAY: So, then we can get the OFL recommendations from this model for your consideration.

So Rich, you might want to move on to another topic while we get those for you, since it'll take a moment.

RICHARD APPELDOORN: I wasn't sure if you were saying you can get those shortly, or eventually.

SHANNON CASS-CALAY: It could be today, but it's going to take more than 30 seconds.

Review SEDAR 80 Queen Triggerfish—St. Croix

RICHARD APPELDOORN: Oh, okay, that's fine. And before you do that, we've had a couple side conversations about this and so we haven't formally addressed the situation with the model for Saint Croix. My understanding is, given all the stuff that we had talked about with respect to Saint Thomas, that the Saint Croix model is all that, and even more or worse, however you want to put it, largely just because of the lack of data that goes into it and therefore perhaps not even worth presenting to the committee. Is that your kind of sense there? So, we could just formally say we discussed this and—

SHANNON CASS-CALAY: So, yeah, I mean, you can look at the presentation. The issue that we've got with that model run is that it is even a little bit less, you know, there's even a little bit less available data, right? And so, what we see in that model, and the reason I actually decided not to post it to SEDAR, is that there is some model instability that's revealed in the profile plots.

And so, I think that the improvements that we are evaluating for Saint Thomas/Saint John, we can also discuss making some of those same changes to the Saint Croix model. And I think it might be possible for it to be re-presented to you at another time. But in its current configuration, which I'm happy to show you, it is not acceptable for use in management, which is why I did not want to post it to SEDAR because I wanted there to be no misunderstanding

that currently we don't support it.

I think that the discussions we had during Saint Thomas apply also to Saint Croix. And that may or may not help the situation when we apply those changes.

SEDAR 84 Appointments

RICHARD APPELDOORN: Okay. So, we'll let you go on and do some calculations.

So, one of the things that is actually left over from maybe two meetings ago is the participation of committee members in SEDAR 84. Also, do you have a graphic on that with suggestions that we can put up on the screen or-- the names as they go to the various

GRACIELA GARCÍA-MOLINER: The email?

RICHARD APPELDOORN: Yeah, essentially the email. Do you have something that we can actually just display on the screen or are we just going to read that out?

So basically, what you're going to see, I think, is suggestions, tentative suggestions, for various people to be participating at different stages in the SEDAR process for SEDAR 84. Remember that's Yellowtail Snapper for Puerto Rico and Saint Thomas and-- was it Parrotfish? Yellowtail Parrotfish for Saint Croix.

The 'you' there is me, in case you're wondering. So, you'll note that Todd, you're here, J.J. is not, but the two of you are being tentatively recommended to be in two of the workshops, the data and the assessment. So just reading that for the data assessment the recommendation would be for Todd, J.J., myself and Reni to be involved. For the actual assessment, it would be Todd, Walter and J.J. And finally for the review workshop, it would be Erik and Jason with Vance acting as Chair. Because you were so good at it last time. No, you just thought you weren't.

Anyway, so that's kind of a tentative list that Graciela and I kind of discussed and dropped it because I haven't had internet reliably for a long period of time, so we're here to discuss that now. Of course, Tarsila, you're not there at all. Anyway, Kevin.

KEVIN MCCARTHY: Thanks, this is Kevin. Just to give you a little background for those of you who are new to the SEDAR process and if Julie's on still, she can correct all the misinformation I'm about to give you, but I think that I'm right. So, the data workshop will be an in-person workshop and that typically is, I can't

remember what we decided for this, but it's, I think there's a day per island, typically. And in other SEDARs where there a heck of a lot of people, we break into working groups. But in the Caribbean, what we've found is, the best way to go is to have everybody in the room to discuss all the issues, so that we don't break into these smaller working groups, everybody's involved with the whole process at the data workshop. So that's an in-person thing.

The assessment workshops are virtual, and they run over the course of several months. There'll be a meeting. They'll have these kinds of discussions about the modeling aspects. Then the assessment folks will take it for a couple of weeks and work on all those recommendations. Then they'll come back, have a follow up, and that happens for three or four of these meetings.

And then I think the review workshop is another in-person thing. It's similar to what we've just been going through in many ways. Over the course of a couple of days, there's this kind of critical review of the work that's been done. So just to give you a little background on what you're being recruited for.

RICHARD APPELDOORN: The review, did you say that was virtual or—

KEVIN MCCARTHY: The data's in person, the assessment is virtual and the review workshop, the top one is, again, in person or that's typically how it's been.

JORGE R. GARCÍA-SAIS: When is this?

RICHARD APPELDOORN: What's the timeframe for these?

KEVIN MCCARTHY: I'll have to-- oh, Julie! Julie probably has it. I'll let Julie talk.

JULIE NEER: Yeah. Hi, this is Julie from SEDAR. We have a tentative schedule, but it might need to be adjusted after your additional request for 80.

Currently we're looking at a data workshop in late April, early May. We're looking at assessment webinars for several months over the summer and into fall. And a review workshop was supposed to be, I believe, February of 2024. But that is dependent on how things go in the other stages. But there might be some delay, a shift-- let me see, not a delay, because we haven't started yet. We're not late yet, but there might be a shift in the entire project schedule back after I have a chance to discuss with the Science Center, after they have a chance to look at their schedules

and your requests for 57 and 80 moving forward. Because it is the same analytic team working on this and it is the same data providers and such.

So, starting in 2023, ending in early 2024 is the current schedule. That may shift a bit back. It won't be earlier.

RICHARD APPELDOORN: Kevin.

KEVIN MCCARTHY: Yeah, this is Kevin. Thanks Julie. I think that 57 is wrapped up and so that won't impact the folks who are going to be heading up 84. This ongoing work in what had been SEDAR 80 and is now sort of an extra SEDAR process, I don't think that'll impact the SEDAR 84 timeline. But I appreciate you're trying to be kind to the Science Center, Julie. I know you were looking out for us there. But I don't [crosstalk]

JULIE NEER: I don't want you overextend yourself.

KEVIN MCCARTHY: Right. I don't think that's going to affect the timeline for 84, all this work that we've been discussing here today. But thanks.

JULIE NEER: And Rich, if I may, just so the other people that are listening.

RICHARD APPELDOORN: Yes, Julie, go ahead.

JULIE NEER: Thank you. I just want to be clear that the SSC members are only one component of this process. There will also be industry reps appointed by the Council to participate as well, particularly in the data stage where they are, obviously, going to be needed to help sort through the data. So, the Science Center will, I mean, the Council will be reaching out to that as well as other data providers such as the territory participants and that sort of thing. So, just so everyone who's listening, this is not the whole panel, this is just dealing-- This list is just from the SSC appointment portion. So, thanks.

RICHARD APPELDOORN: Graciela.

GRACIELA GARCÍA-MOLINER: So, in addition to that, we already have the suggestions from the Saint Thomas group to participate in the SEDAR. We're waiting for Puerto Rico. We've been scouting and calling on people to see who's willing and able to participate. And the same for Saint Croix. So, fishers will be present throughout the SEDAR process.

RICHARD APPELDOORN: And if anybody not on this list Tarsila, Michelle would like to participate, I'm sure you would be greatly welcomed. So don't be shy. Bring your children.
Any major dissensions with this. I'm not seeing any. Okay, it's passed. Okay. Sorry Todd.

TODD GEDAMKE: I'd like everyone to know that I've never known anything about this. So, the silence of dissension and the decisions that was just about to be made, I was never consulted on this, nor was I emailed.

RICHARD APPELDOORN: No. This is why we're bringing in right now, [crosstalk] I was just kidding.

TODD GEDAMKE: I am not retired. I do not get a paycheck for sitting here, I'm a volunteer. I cannot commit weeks of my life to other-- I am happy to act as an advisor. I'm happy to act and review something, but I'm not going to commit, at this point, for a time period that I can't commit. Because I'm working all over the globe and I may be in the South Pacific, or I may be in the Caribbean. So, I'm not going to change my schedule around and my consulting work to accommodate an unknown schedule at this point.

So, Tarsila or Michelle, you're happy to jump in. And the data, you know, we've had this conversation before, a lot of the data work I'm doing, is part of something else. I'm happy to advise on this one, but I'm not going to-- I can't commit to that time blocks in my life. Thank you.

RICHARD APPELDOORN: So, thank you Todd for that candid assessment and, you know, we all face these things to some degree or another in terms of how they should with schedules that we either have already planned or don't know, but we've already made commitments too.

So, as a replacement for Todd the question was, would I be willing to move there? And I said, I can do that, but then I don't want to be in data and would Michelle then be willing to work on the data workshops.

MICHELLE SCHÄRER-UMPIERRE: Sure, no problem.

RICHARD APPELDOORN: That's sounded very enthusiastic. You want to take my place on the assessment?

GRACIELA GARCÍA-MOLINER: So, this only relates to the appointment of the SSC members, so there are other appointments that the Council can make and that's what we're dealing with, with the

commercial and recreational fishers. And we also need appointments from the local governments, the data providers in general. So that's another set of people that we need to talk to.

RICHARD APPELDOORN: Go ahead Kevin.

KEVIN MCCARTHY: This is Kevin. So, I guess this is a question for Julie. So procedurally, while we have people on the call that are interested in participating, I don't know what the procedure is, if they're going to be Council appointees or, I don't know, at large appointees via SEDAR. How do we work this? Because I'm seeing, in the chat, people are asking about participation. So while we've got them, how do we rope them in, Julie?

JULIE NEER: Yes, this is Julie. Richard, may I respond?

RICHARD APPELDOORN: Yes, go ahead.

JULIE NEER: Okay, thanks. All the appointees are appointed, everyone is appointed by the Council or the Science Center. The Science Center usually appoints the Science Center personnel. The Council appoints everyone else. So hopefully Graciela is seeing in the chat the people that are saying, pick me, pick me, and they can then reach out to them about their participation. SEDAR provides travel funding for a certain number of participants. I think it might be 12 for this assessment, but I'd have to go look at the memo that the Council's already received. And then the Council can always appoint additional participants if they so choose to, on their own dime.

So, like I said, the Council makes the appointments for, usually, all the non-NOAA staff. We will have to reach out-- they'll have to do some communication for Erik and Jason and their respective people. Maybe not so much Erik, but definitely Jason from the other centers. But yeah, the rest of those people will be appointed by the Council, if the Council feels they're valuable and ready to participate. And we can find a way to pay for you. Or you're willing to pay your own way, in which case, then you can come.

And additionally, they're all public meetings, so anyone is welcome to wander into the room or join the webinars. They'll all be noticed. [crosstalk]

RICHARD APPELDOORN: So, Julie, is the data review a hybrid?

JULIE NEER: No. The review workshops are in person. Currently, SEDAR does not have a hybrid option. We are in person or we are virtual. SEDAR Steering Committee will be discussing that again.

but that is our current policy.

RICHARD APPELDOORN: Okay. And since now I'm looking at being on the assessments, which you said was summer/fall, if you would look ahead in your scheduling and make sure that you schedule that around the hurricanes that come through.

JULIE NEER: Absolutely. We will do our best. Now they will be in the summer and so if we have to reschedule something because a storm is barreling through, we will have to deal with that obviously as well. That is one of the things where we're kind of, we have to work quickly now, only if we're going to still make that April workshop date because we're trying to get that in before hurricane season. We could maybe stick it in May, very early June if we're lucky. but we are restricted by that. Or else, as you know, you could be out for weeks to months at a time, and that's not good.

RICHARD APPELDOORN: Kevin?

KEVIN MCCARTHY: Yeah, this is Kevin. So, one clarification, Julie. The summer meetings are virtual, right? It's the data workshop that's in person and the final review is in person, right? But the assessment workshops are virtual, is that correct?

RICHARD APPELDOORN: Yes. Correct.

KEVIN MCCARTHY: And those are typically, we'll meet for a day or something like that.

JULIE NEER: Couple hours.

KEVIN MCCARTHY: Yeah, an afternoon to see, you know, the work that's been done on the models. And then there'll be a few weeks, while the modelers take the guidance from that meeting and implement it. And then you have another review meeting. And so, it's a series of these meetings that are virtual.

JULIE NEER: Yes. You're correct. That was Julie.

RICHARD APPELDOORN: Okay. Any other discussions on the recommendations as they exist at the moment? Then we will take those recommendations to the Council. Kevin.

KEVIN MCCARTHY: I don't know what you've got next on your to-do list. I would like to thank everybody who's volunteered. It'll be a lot of the same kinds of discussions we've been having today, and the last couple of days, which have been extraordinarily

valuable and it's great to have those throughout the process. So, I'm very, very pleased that folks are able to volunteer some of your time. I have a request to ask for some more time from some people, as well, if I can have a couple minutes.

RICHARD APPELDOORN: Uh, this is to get the—

KEVIN MCCARTHY: For the strategic planning exercise.

RICHARD APPELDOORN: Oh, you want to present a request for that or?

KEVIN MCCARTHY: Yeah, I do.

RICHARD APPELDOORN: Well, we're waiting for the calculations to be made. So you should go ahead.

KEVIN MCCARTHY: Yeah. I'm also filling in time while Shannon is over there, busily working away. So two birds.

So, if we can do that I think Rachel's got a slide that will provide a little background. If we can make her the presenter that would be great. So that you all have a little context in what my ask is. And, and one of the people that we want to ask is not here. So that's great, volunteer him while he's not around.

SHANNON CASS-CALAY: It's better to do it when they're not here though.

KEVIN MCCARTHY: Right, because then they can't make the very reasonable objection that I don't have time. So, you've seen some of this. Rachel Eckley's presented this to you all in the past, this Caribbean strategic planning workshop that we have been holding.

So, you can see the objective there. We're in the second year of a three-year project to develop a strategic plan for data collection that informed stock assessment and EBFM in the U.S. Caribbean. In the first year, last year, we had a virtual in-house workshop that was Science Center specific, and now we want to expand that to our regional partners to include you all in part of that process.

We're thinking that it will be, hopefully, it won't end up conflicting now with any slight change in the SEDAR 84 process, but we want to have a workshop, correct me if I'm wrong, Rachel, I think we're looking at April, perhaps the first, or no, sorry, May or perhaps the first week of June. Again, we want to avoid for

obvious reasons, hurricane season.

And what our ask is, from the SSC, is underneath that little thing there. So, we'd like to get somebody from the SSC. We'd like to get somebody from the EBFM TAP, hopefully, Sennai as the Chair. Doesn't have to be the Chair, could be anyone, but someone to represent the EBFM TAP. And we're also looking to involve researchers from the universities. And so, we added, hopefully J.J. because, well, I thought he was here, he managed to escape. But also, if we get him, we've got sort of a triple threat there, right? Where EBFM kinds of things and he's also on the SSC. So, we get a lot of value added if we can talk J.J. into it. And I have mentioned it to him, and I know we can't just rope him in when he's not here to defend himself, but it would be great to have this kind of representation. Sennai was on the call earlier. I don't know if he is still.

But what this will involve is-- oh, great. Excellent. So I can directly ask you for your participation. So, what this will involve is, a travel day on a Sunday. Monday, Tuesday, Wednesday, Thursday of meeting. And this is a true strategic planning workshop. We will come out of this with action items. And just to give an example of what we have done coming out of the workshop that we held for the Science Center is we've identified-- you know, there's a million things that could be done, right? But out of that list, we identified the items that are drivers and others that are outcomes. And so, if you can get to work on things that drive a lot of processes and this workshop is meant to identify those, you can affect a lot of change, right? For the better. And so, some of those things are like, how do we get funding? How do we-- you know, we know about projects that need to be done, but how do we make those happen? So, what are the drivers for those things?

And so that's some of the work that's done. And so, it's four days with a travel day on either end. Four days of meetings. I know that's a big ask, but we are paying for-- we can't pay for your time, unfortunately, because it turns out these things are a heck of a lot more expensive to put on than I would've ever imagined. But, like SEDAR, we'll pay for travel and per diem and that sort of thing. And so, Rachel and I, after this meeting are going to meet and make some final plans on which hotel. It will be down here. We've looked at, originally, I wanted to have it in Saint John because we never do anything in Saint John, but the one hotel that could have done it, no longer hosts meetings. So, that was out, but we looked in Saint Croix, Saint Thomas and here in Puerto Rico and we've had to make some final decisions. So, we'll be in the region. We will pay for travel; we will pay for per diem and hotel and all of that.

So that's the ask. And I know it's a big one because it is a fair amount of time, but it really will be, I hope, as what came out of the Science Center workshop. We've got action items that and things that we're working on. So, the whole idea is to not just make a wish list, but to identify things that we can act on. And of course we start with the low-hanging fruit and work up from there. So that's my spiel.

RICHARD APPELDOORN: Kevin, would this include the kinds of things that throughout our discussions here have popped up, especially the way Todd expressed things that we could sort of automate for future assessments and whatnot.

KEVIN MCCARTHY: Absolutely. I mean, it's all kinds of processes. It's not just-- because collecting the data isn't enough. Right? Well, then what do we-- how do we handle it? So, it's whatever ideas come out of that group of people, in that room, working on the problem of data and processes that will better inform stock assessment and EBFM initiatives. So, it can be all of those things. I mean, we've talked about outreach and education as well as what kind of surveys do we need. So, it's all over the map, but it is aimed at the problem of stock assessment and EBFM.

And the great advantage of having a lot of different perspectives is you have a lot of different perspectives. And that's, you know-- I know what I think, but I'm not going to think of everything. And also, it becomes a very-- there's this synergy that happens. You know, we're bouncing ideas around and new ideas come out of that. So, it's a good process and we had a good experience last spring.

RICHARD APPELDOORN: Okay. I'm sorry. Todd.

TODD GEDAMKE: Not that I want to juggle things here, but this is very high level, very important and I won't have to argue with anyone promoting their own research. So, if there is a way of keeping me in this mix, I absolutely would like to be in this mix. But my comment with Richard was before, he had just asked me when I'm going sailing, and I plan on going sailing in March. So, this to me, you know, these are all my buzzwords. This is all my baby. This is something I start, so I would really love to contribute to this. And you know, please put me on that list and I will keep you informed as things go. This is also something that if I can rearrange to be part of this, I would love to do that.

KEVIN MCCARTHY: So, we're, we're looking at May and the first week of June. We can send an email to this distribution list and

give you the weeks that we've got. And we've got them prioritized. So yeah, the way it will work is-- and we're kind of gaming the system a little bit.

So, the way it would work is we'd have sort of the active group, the people who are, you know, putting post-it notes on the walls and that's how these kinds of things often operate. And we convinced them that we need 20 people and that's more than they normally take. But I also convinced them to have another 15 people who are sort of in the gallery. And on breaks they're going to come in like a lobbyist and say, "Hey, you guys have forgotten about this, or what about that other thing?"

So, we're kind of gaming the system in that we have a heck of a lot more people than the convener. And there will be somebody who is neutral. We've hired a consultant who's going to come in and run the meeting. So, it's not going to be the Science Center saying, do it this way, or anything like that. So, we are, you know, trying to juggle that. But we will have 20 people kind of sitting like this and having that discussion being involved in the process. And then another 15 or so in the gallery who can add in there, not in real time, but at the breaks and stuff like that. So, we'll get you the dates.

RICHARD APPELDOORN: Tarsila.

TARSILA SEARA: So, Kevin, I would very much like to, if possible, give my perspective as a social scientist. I don't necessarily need to be filling one of those slots if that doesn't work out. But if there are other ways, I would be very interested in participating.

KEVIN MCCARTHY: That's great. Yeah, I think we've got some sort of-- we put in some slots specifically for SSC, but much like the J.J. example, we've got ways of, you know, sort of double dipping, so that'd be great. And for Rachel that was Tarsila. I'm sure she's busily taking notes.

RICHARD APPELDOORN: Uh, Julie's asking whether the meeting would be open to the public or would be the public only as observer, or how might that work?

KEVIN MCCARTHY: Yeah, I don't think we can do that. It's not that kind of a meeting. It's not really a public meeting. It's a workshop. The results can be made public, but the actual process, I don't think. the way these things are run it's not really a public forum.

RICHARD APPELDOORN: Yeah. Rachel's reiterating that point, that you could provide a report afterwards.

So where are we on a calculating plan frame?

SEDAR 80 QT for Puerto Rico (continuation)

SHANNON CASS-CALAY: So, I think it's ready. I'm having Nathan review it as we speak, but I expect it's correct and if it's not, he will be with us, forthwith, to tell us that I've made an error in calculation. But I think it's all set, and we can look at it now.

NATHAN VAUGHAN: I think it is too, unless I find something in the next 10 seconds.

SHANNON CASS-CALAY: Alright, so I'll share my screen. Okay. So, I want to kind of just situate you to what has been done.

So, now this is the base case that we just reviewed, with the initial catch at 74 metric tons and the steepness at 0.75 using an SPR30 reference value. So, we projected OFL using a projection of, well, basically using the reference SPR30.

RICHARD APPELDOORN: Shannon, I'm going to ask you to actually read what the graphs are because I can't read what the actions are. So just let us know whatever you're doing.

SHANNON CASS-CALAY: Alright, I'm going to-- Spot on plot first because I just want to kind of make a point. This is the catch that is either been observed or forecast. So, in the red here is the recent landings from-- 2020 is probably the-- this is the recent landings and the assumed landings that we are putting into the projection.

Can you see? Uhoh, wow, how weird is that? Thank you. I'm getting help and I don't even know how it's happening, It's magic.

So most recently you've caught about, according to the data, we have about 60,000 pounds. The OFL that is forecast from this base model in 2023 would be considerably higher. And now I cannot move my mouse, but it's roughly 130,000 pounds and it declines somewhat through time as the stock is fished towards the management reference of SPR30. So basically, this base model says that you are not overfished, you are not experiencing overfishing. And in fact, we can increase the landings. And the spawning stock biomass

RICHARD APPELDOORN: Sorry. Can you go back?

SHANNON CASS-CALAY: Yeah. I go too fast, my apologies. Oh, you're going to have to center that.

RICHARD APPELDOORN: That's okay. So, 60,000 is where we are. 130 represents what point?

SHANNON CASS-CALAY: So that would be the catch that corresponds to a 50% probability of overfishing. So, it is the overfishing limit. If you exceeded that catch, there would be a declaration potentially of overfishing.

RICHARD APPELDOORN: Right. Okay. Thank you. And we're coming off of that to get down to--

SHANNON CASS-CALAY: Right, to ABC.

RICHARD APPELDOORN: ABC. Okay.

SHANNON CASS-CALAY: So, your Tier 3 control rule, presuming that's what you wanted to use, it asks you to establish a Sigma_min, which is the width of that PDF you're applying, to buffer between OFL and ABC. The Sigma_min you used for Spiny Lobster was 0.5 and Tier 3 applies two times that Sigma_min. So, if you do that, then these are the reductions depending on what P* value you select.

So, I've shown here in these colored lines, P* values from 0.4 to 0.45. And so, the highest one is the OFL, right? Without reduction. The first black line you see here is the ABC calculated using Tier 3, two times Sigma_min, P* of 0.45. And then you get larger reductions, larger buffers between OFL ABC, if you want to apply a P* that is less-- well, that gives you a 40% probability of overfishing, risk of overfishing. Right?

So, I will remind you that what the Science Center has generally tried to separate these two issues of scientific uncertainty, which we apply through the Sigma_min calculation and the risk of overfishing, which we have recommended that Council decide, because that is more of a Council prerogative, to determine their risk of overfishing, as long as they agree to use a range that the SSC feels comfortable with, which in the past was 0.4 to 0.45. A 40% probability of overfishing to a 45% probability of overfishing.

And those values are here in the table, and they can be recalculated if you want to change your Sigma_min or your P* value. But that's what I've done. So, these are in thousands, they're not in metric tons, they're in thousands of pounds. Let me fix that.

So basically, this is saying that if you apply, say, a P* of 0.4 Sigma_min of 0.5, your ABC or acceptable biological catch in 2023 is 103.67 thousand pounds, roughly 104,000 pounds.

And you can also, as you did with Spiny Lobster, apply averages if you want to. So, we just have to determine which range of years you want to apply a longer term average.

And just as a reminder, current catches weigh down here around 60,000 pounds. So, all of these ABCs represent an increase over the current landings, and that's according to this model, sustainable.

RICHARD APPELDOORN: And, Shannon, I don't, but can you recall what the P* value was that the Council used for lobster?

SHANNON CASS-CALAY: Is it 0.45? 0.45, we believe. Yep. Sarah confirms. Thank you, Sarah.

So, 0.45 is here. It would give you an ABC of roughly 118,000 pounds in 2023, declining to 97,000 pounds in 2027. But again, you could apply an average.

SSC Recommendations to CFMC

RICHARD APPELDOORN: Okay. Committee, we need to make a recommendation to the Council to accept this scenario pending their decision on a P*. What we did for lobster is we said we were okay with an ABC that would come out of the range of P* values that have been looked at here. And that's how we handled that decision to move along without having them to do P* and then having it come back to us for proofing an ABC, which would be automatically calculated.

So, do we want to handle this in the same way that we did with, with spiny lobster? So that's the question. I think I would be comfortable doing that, but that's just me.

TODD GEDAMKE: Could you repeat that, Richard?

RICHARD APPELDOORN: When we were faced with the same decision for spiny lobster, because the decision on ABC comes from us, but the P* value comes from the Council. We are looking at this array of potential values of ABC, pending what the Council would do. And if we are okay with any of these ABCs based on their feeling of the risk from management uncertainty, we are basically accepting whatever ABC comes out of whatever P* value they choose.

And again, as Shannon said, this is all way above current catch. So, Todd.

TODD GEDAMKE: Now that I asked for clarification, I thought I'd spit that question out in a slightly different way because I missed it. I got it now. This would be the point where if anyone has real angst about looking at these values, you would say, "I don't trust these values. I think we need to be more conservative than this." That's where the P* would come into play. So, I think the question is, is there anything in here that people are hesitant with where this falls out or anything that's been done to allow for a different value and I'm comfortable with letting them do it.

RICHARD APPELDOORN: Yeah, the only thing I would say would probably be, I wouldn't go with the ABC of-- you wouldn't go with a P* of 0.45. I think that was chosen by lobster because there was a feeling that there was less risk there. I think here we're dealing with a much more fuzzy situation. You know, it's not a directed fishery in Puerto Rico and whatnot but that's their call. And so, if we are going to be okay with them making that call at 0.45, for example. Then we leave it as it is, it's not our prerogative. If we said, okay, it has to be, you know, less than 0.45 and they come back and we want to 0.45, then we have to come back and revisit ABC again.

But as I said, I think I'm okay with looking at these scenarios and saying-- you know, and if they're doing this next week, then in my report I can point out that when we were looking at this, you know, this is not Spiny Lobster, maybe the Council might want to consider what the impacts might be of a lower P*, but it's still their call. Erik.

ERIK H. WILLIAMS: Yeah, thanks Rich. This is Erik Williams. I will say again, this is me being new to the region and of course I agree with everything you said, that ultimately the final risk decision is up to the Council. But, you know, I hope they fully understand, this is on the risky side. If you look across the nation, if you look at other regions, pushing up against 0.45 is really, I mean, you're getting close to a 50/50 chance that you're going to be overfishing and the next step stock assessment is going to tell you, you are overfishing and then you have to do something more. And that's probably all I'll say other than.

You know, the history of this when P* was first sort of created, you know, the thinking was somewhere in the range of 30 to 35 was a good spot to land for most stocks. I think a lot of regions have pushed a little to higher P*s. But yeah, 0.45 is getting up there. But again, as you said, and as you pointed out, this is entirely

the Council's risk choice. Just want to make sure they're clear on that and they understand sort of where they lie with respect to other regions, maybe might help.

RICHARD APPELDOORN: Let me, Todd, wait a sec so I can write. Okay. Todd, thank you.

TODD GEDAMKE: Sure. I just want a second what Erik said. I think that it is important to recognize both from a P* standpoint and also from an overall modeling standpoint. And we've had some concerns just about setup on this. So, this is not only just the P* in there, or the SSC has the option of looking at this in terms of are we comfortable with everything that was done? So, you're looking at a value here, saying that, are you going to go, like Erik said, closer to 50/50, or are you going to go lower?

Overall, I think what I've heard in a lot of the discussions are things like our problem with that run. We're really looking at one run. We did some sensitivities in it. So, I have a little hesitation on the overall process, and I've been debating how I land on this for management in the final. And I'm not positive, but Erik's comment just kind of put it back in my brain that even though we were coming up on the number, we really need to consider kind of what goes into it. Thank you.

RICHARD APPELDOORN: Yeah, I would, I'm just looking at that graph. If we wanted to, we could extend the range of values that are represented in that table down to 0.3. It looks like the way the graph's behaving it would probably be around 70,000, at that level and that gives the Council a greater range. Because if we leave it at 0.4 to 0.5, we're basically saying, "yeah, we're okay with that level of risk and you don't need to go lower." But so, if we expand the table somewhat, we're not bias, we're not nudging them up to that higher level just because that's what we present.

Uh, Jason, you were asking about is this a short-term thing for five years or shorter, is that right?

JASON COPE: Yeah, this is Jason. I see five years here. Is the intent just to show that for kind of a trend or is the intent to fix these values for five years? We were talking before how this should be a very short-term projection with the hope of making some improvements in understanding the biology and other things for next time.

SHANNON CASS-CALAY: So, the projections are run out to equilibrium, but the Science Center only really supports short-term projections, usually in the range of three to five years. And

the intention is that we would reevaluate this information before it expires, essentially. So yes, we support the short-term projection, so no more than five years.

JASON COPE: Great. May I also just point out, we're talking about uncertainty here and this is so important and that's two times Sigma. So, we have basically a CV on this of one, which is enormous. But I think the way that we've been talking through this, there's two parts to that uncertainty. There's the part that comes out of the assessment, which we've talked a lot about. The equilibrium catch and the steepness and recruitment and all sorts of things that come up with this ultimate estimate of something that we were trying to wrap a Sigma around. But we also talked about the fact that even though we set the steepness and FMSY to be internally consistent, which is good, right? There is that additional uncertainty in the FMSY side of things, which I think we can, at least, talk about the fact that there are uncertainties in the assessment, in addition to the effect that the current proxy for FMSY is also highly uncertain. And so, I'm not sure if that would tip the Council to consider that, when choosing a P*. But maybe words to not forgetting that we have that uncertainty in that proxy beyond just what our exploitable biomass coming out of the assessment is.

RICHARD APPELDOORN: And something else to consider is, with lobster, they were not happy with a constantly changing target and so asked for averages to be calculated. And I think we used geometric mean. Is that right? Yeah, I don't remember.

SHANNON CASS-CALAY: I don't recall, and Adyan isn't here.

RICHARD APPELDOORN: I think we did.

SHANNON CASS-CALAY: I thought you used a straight average, but--

RICHARD APPELDOORN: Okay. Alright, and anyway that was in a scenario, I think, where we were ramping up in most cases. So, it actually raised the initial amount, but lowered the floor. In this case it would lower the initial amount but raised the floor. So that would have to be considered. Now they'll come back and ask about, can you then do an average on that? And so, it's a separate issue, but we should be prepared for it to come down. Todd.

TODD GEDAMKE: I was just going to say that I don't have an answer for you, but my response in some way is related directly with what Jason was getting at. Your five-year projection out is less reliable than your first year out. So, you're incorporating uncertainty on your five-year projection that you're averaging

into a one-year projection. And I also just want to say, Jason, thank you for rephrasing what I was trying to say. Much clearer than I did myself.

RICHARD APPELDOORN: Okay. We have Doug and then Jason again.

DOUGLAS GREGORY: Thank you. This is Doug Gregory. I think we should probably send to the Council both a constant average and the annual differences and let them choose because they are equivalent and that way, we save a step. They don't have to come back to us unless we don't want to do a constant catch and we just recommend against it. That would be the only reason not to send both scenarios to them. Thank you.

TODD GEDAMKE: I just want the mic to put Shannon on the spot. Shannon, because what's your take on this? Because this is sort of a procedure that is also going to be very important as we move forward. So, the Center, I wanted you to weigh in. I don't have a—

SHANNON CASS-CALAY: Well, definitely, I will go ahead and add to the table, lower P* values. I think that's a very valuable conversation. So, we'll take it all the way down to 0.3. The three-year average at this point doesn't concern me because, essentially, you'll leave some fish in the water in the first year that will have a chance to reproduce. And so, we've done some simulation testing and found this to be a relatively conservative or relatively safe thing to do as long as you don't, you wouldn't want to take a 10-year average. So, a three-year average doesn't concern us.

So, you know, I'm happy with the conversations I'm hearing. I'm happy that this SSC might remind the Council that P*s as high as a 0.45 have a substantial 45% probability of overfishing, and that there's a lot of uncertainty that they should consider and perhaps they should consider a P* with a lower probability of overfishing. So, I like what I hear.

RICHARD APPELDOORN: I have Jason and Todd. Jason.

JASON COPE: Yeah. Jason here, thanks. Todd said something really, really important about the fact that, right, as we move from the first projected or forecasted catch, we basically are accumulating these simplifying assumptions and the farther we get out, the more uncertainty there is. And there is a way in stock synthesis, we do this now routinely, where we actually have our Sigmas deteriorate over time, or they change, they get bigger. So essentially, you're getting a bigger buffer as you move away from the first forecast. So, you can put in, in the forecast file of stock synthesis, this

option of a deteriorating or widening of the uncertainty. So, you can build in that directly and then do the forecast that way.

So, there is this quantitative option of building in that. And there's a newer paper from last two years that explains how it's done. And again, this is routinely being used on the West coast.

RICHARD APPELDOORN: So, Jason, if you could provide that paper to the committee, that would be great.

JASON COPE: Will do.

RICHARD APPELDOORN: Todd?

TODD GEDAMKE: Yeah. Thanks Jason. That's exactly what I was thinking and although the only point I'm going to make right now is that taking a three- or five-year average on this, Shannon, you said that leaves fish in the water. What I'm hoping to do is allow you a procedure that can be used in any situation, because if this was trending the other direction on this, you'd actually be going the other direction. So, you would be taking a three-year average that suddenly is now above, and that's less, that's risk grown in some ways.

So, the procedure here, I think Jason's dead on it. And I think that's important because we don't want to have someone look at these and go, "no, take the three-years average this time, take the five-year average this time, or take one this time." But if there's a procedure, we could look at incorporating, that'd be great.

RICHARD APPELDOORN: So, is there a procedure-- I mean because the other thing you could do is say, "okay, the more certain you are, the longer you could do the average." Would that be another way of doing it? and I was going to ask Sarah, what's the time period they did for lobster? Was that five year or three years? Three years?

SARAH STEPHENSON: Yes. This is Sarah. We did a three-year average.

RICHARD APPELDOORN: Okay. So that's, I don't want to say that's preceding setting, but if you're really concerned about something that's really uncertain and you're not comfortable with going out five years, you do the three-year average. And are people comfortable with providing that to the Council so they have it in front of them? Shannon.

SHANNON CASS-CALAY: I was just going to confirm what Todd said,

that if this had been an increasing trend, you know, you can't apply the three-year average in any situation. In this situation, The Science Center is comfortable with it. But there are also more sophisticated ways to do this that would apply in certain situations.

It was just a caveat, we're comfortable with the three-year average in this situation where the stock is not overfished, not overfishing, and we're moving towards the management reference. We're fishing the stock down towards the management reference.

RICHARD APPELDOORN: Point well taken, thank you. Todd.

TODD GEDAMKE: If you take a three-year average, you're not going to be looking at dramatic changes here, so I'm just making the point again that I'm just doing a procedural thing and I think Shannon, you know, hit it on the head there.

RICHARD APPELDOORN: So, I'm thinking our recommendation is going to be that the table go down to a P* of 0.3, and that for each of these scenarios, that you will also calculate the three-year average. And so those will be available to the to the Council for their deliberations, and that we would be on record of being comfortable with any P* value they choose on the ABC. Coming out of that subject, it will be pointed out to the Council, you know, with the degree of simplicities and the models and assumptions and the uncertainties that they probably don't want to be up at the higher end of that, but it is their call. Sarah.

SARAH STEPHENSON: This is Sarah. I just wanted to point out too, that for Spiny Lobster with the average catch scenario, you did recommend that after those three years, if a new amendment or update hadn't been completed yet, you were comfortable with the recommendation for ABC since you were using the average. Did you want it to be that average continued or something else? So, you did pick kind of an emergency ABC in case new rulemaking hasn't occurred.

RICHARD APPELDOORN: Well, also, good point. I'm wondering how far we can pun that down the road. I have a question for you. Let's just say next week they make these decisions. When could they actually be implemented in a legal sense?

SARAH STEPHENSON: They would have to request the formation of an IPT and then that IPT would then review your recommendation, the Council's recommendation, the assessment, and then start working on an amendment. And that would probably take, since we can use the Spiny Lobster as a template, kind of, it probably wouldn't

take that long to develop the amendment. So, the Council could probably be going final on that amendment at their August meeting. And then, rulemaking, it would take probably another four to six months to get it in the regulations.

RICHARD APPELDOORN: So, it's really 2024 that something would go in and since our projection is in three years, we go to '25, it's in place for two years or something.

SARAH STEPHENSON: Right. So, if you could start it with 2024, that would probably be better.

RICHARD APPELDOORN: Yeah, Shannon.

SHANNON CASS-CALAY: Did I understand that you would want to compute the three or average starting in 2024? Okay.

SARAH STEPHENSON: This is Sarah. Just for the record, the answer was yes.

RICHARD APPELDOORN: Yeah, everybody agrees with that rationale and action? Okay. So, what I'm seeing is that, yes, the three-year average to be calculated would be starting in 2024. And I'll point out to the Council that that shifts us one more year toward even more uncertainty when there's deliberating P*.

So technically we have 45 minutes left. This is somewhat shorter than the all day we were hoping to have to look at research recommendations. And my feeling is, because of that, I really don't want to even open the subject because I don't think we would make any progress. So, we could go to some of the other items that were put under other business, or do we have the review of the status of the island-based something that María—

GRACIELA GARCÍA-MOLINER: Do you want to present the update of the island-based FMP amendment. Oops, Graciela here. Sorry. So Sarah—

RICHARD APPELDOORN: Sarah, you're going to do the presentation?

Island-Based Fishery Management Plans and Amendments Update

SARAH STEPHENSON: Yes. This is Sarah. Maria sent a slide that is very similar to the one that you saw at the October meeting, which just has a list of the amendments that we're working on. So, your October meeting was the fourth and the fifth and about a week later, on October 13th, the island-based FMPs were effective. So that's good news. Thanks to everybody for working on that for so long.

And then we have two amendments that the Council has submitted to the secretary. That's the Spiny Lobster amendment that we've been talking about. That one's actually with headquarters for final approval on the regulations. So, I'm hoping that maybe at next week's Council meeting, I'll get to announce when the date of the proposed rule period may be. If not, it's going to be coming very soon. So that one's a little bit farther along.

And then the buoy gear amendment, I don't know if you remember, but it's increasing the number of hooks that are allowed for buoy gear for reef fish harvest. That one has been submitted by the Council, and we're in the process of drafting the proposal. So that will probably be sometime early next year that that comment period for that will be open.

And then there's two amendments that the Council has requested that we start working on. And one of those is to prohibit trawl and gillnet gear in federal waters. And then to also require that descending devices be on the vessel. So that one, the IPT is working on that. The Council is going to receive a presentation on it next week and potentially choose their preferred alternatives for that one. So that's next week. That's the trawl net gear and descending devices amendment, the third one in the list.

And then we're also working on an amendment for pelagic management measures. And that's just at either commercial trip limits, recreational bag limits and size limits for both recreational and commercial, for select pelagic species that are managed under the island-based FMP. So that's dolphin and wahoo for the U.S.V.I. FMPs and then dolphin, wahoo, the tunas and the mackerel for Puerto Rico. So, we're developing that. We had an IPT meeting. That IPT had a list of questions and information that they still would like to know before they were comfortable putting numbers to those types of limits. So, I'll be presenting a presentation next week to the Council with some of those questions and hopefully we can get that on the record, some of the answers. Some of the answers we've already started populating, like the seasonality of the species. We can do that through the data. But some of the other questions that the IPT had, we'd like to just get through discussion at the Council meeting. So that's the pelagic one.

And then we also have started an IPT to develop a federal permit system. We haven't actually started an amendment for that. We started talking about what type of permits are available and what options might be. So that one will probably be presented at the April Council meeting. Uh, or yeah, I think it's in April.

And then there was a request for a compatible trap reduction in the federal waters to match the U.S.V.I. and there's going to be a presentation next week on the possibility of that and where we are with that. And then we've had requests at Council meetings for other actions to be developed, but they haven't officially gone anywhere because the other ones have taken a higher priority. And that's to look at the timing of the seasonal area closures for Red Hind. I believe Michelle presented to this group about that, maybe last year. And then similarly modification to the Red Hinds seasonal closure. And that's to allow for potential gear to collect pelagic species during that closure, assuming they don't impact the habitat. So that's what we've been working on in our office. So, anybody have any questions?

Questions

RICHARD APPELDOORN: Yeah, so I have a question on the seasonal closure. And this may be just because there was a point of confusion, I think, when María presented something on that. That was, when we're talking about changing the seasonal closure for Red Hind, this is just a seasonal closure for the whole EEZ, or this is talking about the closed areas, specifically?

SARAH STEPHENSON: This is Sarah. It was specific to the closed areas.

RICHARD APPELDOORN: Right. So, in that context, what is actually being, I think, suggested, from Michelle's work was that that closed season be shifted, not just Red Hind, in that closed season be shifted. So, it's not confusing, well, you could do the species, but not this one. It's the whole suite. Thank you. Graciela.

GRACIELA GARCÍA-MOLINER: So, Sarah, please explain what the IPT is in terms of, you know, all the people that are involved in discussing these issues. Because it's not, you know, in isolation or the Council and the regional office. It's a whole bunch of people from the Science Center, etcetera.

SARAH STEPHENSON: Sure. So, for each IPT request there is staff from SERO Sustainable Fisheries Division. So, for most of the Caribbean actions, that's Maria and I, we just are on all of them. But then we also have staff from some of our other branches, like the data management branch and the reg writing branch, the regulation writing branch. We have people from our social sciences. So, we have an economist, we have an anthropologist. And then similarly we have a lot of those same types of scientists from the Science Center. So, we'll have an economist or an anthropologist from the Science Center and biologist, depending on who the

director for the Science Center decides needs to be on that IPT. So, we make a request, they decide, they tell us who's on the IPT.

And then we also from the Southeast Regional office we'll have General Counsel. So that's been Jocelyn, today Kate is taking her spot in the meantime. We'll have someone usually from protected resources and then also Habitat and Conservation, so those other divisions. And then we'll have Council staff. So again, since there's very limited, it's usually always Graciela and Liajay. And then we'll have law enforcement. And so, they get assigned also, depending on the specific actions that we're thinking of developing. I'm trying to think if there's anybody else. I think that's about it.

Every once in a while, we'll ask other people to sit in on our IPT, but they won't really be responsible for the development of the amendment. For example, with the pelagic, we've pulled in the HMS, the Highly Migratory Species group, just since they do stuff in the Caribbean as well, we want to make sure that they're aware of what we're doing and if they have any input or suggest.

And then likewise with the permit we've pulled in people from the permits division and all sorts of other, you know, things that we usually don't work with, to try to get the best advice from as many people as we can. So that's who comprises the IPT and if you're ever interested. And then, you know, Walter has been functioning as our economist too, from the Council perspective. And if you're ever interested in who is on the IPT, each amendment that we put out at the back will have a list of the IPT members, just so you can see

RICHARD APPELDOORN: Any other questions or comments on what Sarah's presented. Okay. Thank you very much, Sarah.

SARAH STEPHENSON: This is Sarah. The briefing with the headquarters is occurring right now for next week's meeting. So, some of those players might be in there, especially since Queen Conch is on the agenda.

GRACIELA GARCÍA-MOLINER: So very briefly, I mean, the Queen Conch, it's been listed, or it is proposed to be listed as threatened under the Endangered Species Act. They had a public hearing that included people from all of the Caribbean because it really impacts everyone who's involved in the fishery. They have extended the deadline for comments until December 13th, this year. And then the Council will be receiving a presentation from the group on Wednesday next week. Anyone have the agenda? Tuesday or Wednesday?

RICHARD APPELDOORN: Tuesday.

GRACIELA GARCÍA-MOLINER: Tuesday. Okay. So, the Council will be hearing, you know, the outcomes of the public hearing and most likely receiving additional public comment because we've been receiving emails about people who will come to the Council meeting to express themselves on the issue.

RICHARD APPELDOORN: Yes. And that would include myself. Vance.

VANCE VICENTE: Yeah. Just one comment. I prepared my presentation. But in brief, if you examine the criteria that was used to list in a sub grouper back in June 2016, if it's perfectly for the conch to be listed as threatened, which is one, a species that has held its historical geographic range, but whose population has been diminished to a point that it makes it threatened, in other words, candidate for an endangered species. In short, that's what I-- yeah, I have other information, but I'm not going to mention it.

RICHARD APPELDOORN: Yes, Sarah.

SARAH STEPHENSON: Hi, this is Sarah. I just wanted to point out too, that next week's presentation for Queen Conch is not going to be an official comment period. If you have a comment, they're going to ask that you submit them through regulations.gov, but it will be a forum to hear any kind of questions related to the listing or I think the status report. But if you have data input or additional thoughts that you want to relay, they're going to ask that you do that through regulations.gov. So, I just wanted to put that out there.

VANCE VICENTE: Yeah, I was asked by one of the DA members to repeat what I said. Essentially, in short, my own personal observations and monitoring for the last 30, 40 years and communications with local fishermen, which I use as part of my consulting work is that, definitely, in my opinion, the population has declined significantly.

And secondly, I have seen enough habitat loss, nearshore habitat loss, and no longer these populations are found in any significant amounts. But in addition to that, what I wanted to state is that if we use the same criteria that was used for the Nassau Grouper to become listed as threatened under the Endangered Species Act, it applies to the conch, which is a species referring to the Nassau Grouper has held its historical distribution, but whose population has decreased to a point where the reproductive potential may not be enough to maintain itself and which eventually would lead to become listed as endangered. That's in general what I wanted to

say.

RICHARD APPELDOORN: Yes, go ahead, Gerson.

GERSON MARTÍNEZ: Gerson Martínez, for the record. As a diver in the Virgin Islands, I cannot agree with your comment, but I have to ask a question. If you have a timeframe where you believe this can happen. But due to my observations as a diver, I have seen, especially this year when they just opened, and we have done a lot to protect that resource in the Virgin Islands, we have extended the seasonal closures to five months. We bring down the number of conches that you can have in a boat per day. Just doing our homework to protect the futures, our population, and we have seen when the season opened, that they are there.

And it is not just seeing them, but the sizes. When we catch our conches, you know, the very thin, thin, thin shells, we don't see those. We see the very thick shells. And Virginia did a study and she asked me to bring some shells for her. I brought her some shells and she called me back this year and told me those shells were from 50 to 60 years old. So, we have been doing our homework to protect our resource, and we will like to be considered for us doing that.

And I understand that we have to protect the future of all the species, but when an island does something proactive to protect a species, I don't think we should be penalized like other people. Because around the world, I understand they don't have the regulations or the harsh regulations that we have in the Virgin Islands.

VANCE VICENTE: That was Reni’s point in the last meeting when this topic came up, that what has happened or how effective previous regulations have been regarding the protection and the repopulation of the species, and everybody has their own experience with their own locality. I mean that you have your experience in the Virgin Islands. I have my experience in Puerto Rico and areas that I have been monitoring for more than 30 years, and those are my observations. Your observations are valid too. So, it's a matter of opinion.

But in general, if you look at the review that was done before to propose these speeches as listed, I mean, if you look at the wide range, the historical range, they're still there but overall, there has been records of a reduction in the population. But I think that Richard can, he's the expert, so he might be able to expand on this.

RICHARD APPELDOORN: Yeah, go ahead. And then I'll comment.

GERSON MARTÍNEZ: I like to keep track of the studies that are down there because it's not just seeing them, but as scientists can prove and I always speak a little bit of what I've learned. Couple years back, I don't know, what was the young girl's name? Shanel Gordon did a study, and she did hectare observation and they found 2,500 conch per hectare.

Last year I was fishing-- I normally fish to the East of the island. Last year I was fishing in the South side island, the panorama of our shelf and how our shelf is built with the sand, the grass beds, that's in abundance. More than [inaudible] can say. And that's the perfect habitat for conches.

And if you want to do studies that I can take you, I can take you and jump and I will not exaggerate when I tell you this. Last year, when the season opened, we were diving in areas where baby conches were coming, the new generations, and every four inches, as far as you can look, in all the directions, where every six inches was a baby conch coming, in those grass beds. So, where I fish is in the sand where we find the big ones. But in Saint Croix we call them four-wheel drivers because they are even on top of the reefs. We have seen them on top of Elkhorn coral. They find a way to do that. They go inside my flip-flops.

RICHARD APPELDOORN: So, I have a question. What is the boat limit that you said you've implemented?

GERSON MARTÍNEZ: Gerson Martínez, for the record, if I might elaborate. We used to catch 150 conch per licenses. When all the process started that we wanted to make sure that we didn't lose the ability to catch conch, we extended a month in front and a month in the back in our seasonal closures. So, from three months to five months.

Then we only permit two hundred conches per boat. You can have 10 fishermen in a boat, and you can only catch 200 counts per boat. So that took out two months addition to the seasonal closure and the stopping of five fishermen going in a boat and catching 150 each, that was changed to only 200 shells per boat.

RICHARD APPELDOORN: Okay. Thank you. So, my comment is, the way the team that's evaluating this is going to look at this is, they're going to want to see data and what you just said is extremely valuable. But I think if you can get this into a context where this looks like data collected by fisherman it ends up being a lot more powerful than something that looks like a perception.

And, well the reality is they might be very similar.

Your perceptions actually constitute data. If you can say, "okay, back in this time, this is what we are doing at this time here and this is what we're," so the more you can get that kind of information into the context of the comments, the more powerful that's going to be.

The point you made about the age of the conch. You know, I'm going to roll my eyes a little bit on that one until I see the analysis, but so you have to be very careful about that. If you say conch lives 60 years, that's going to effectively say they're more threatened than we thought. And so, you have to come back and say, and we have a lot of them, which means they're living that long, and therefore the fishing pressure in Saint Croix is not as high as people were thinking. And to the degree that you can say something about the abundance of these large individuals, either, as a percentage of the catch or whatever, the more powerful that statement comes.

I like what you-- I haven't seen the work that Shanel did, but you know, I'm involved with the SEAMAP surveys that are done, and there hasn't been one for quite some time, but they're now working on doing the calibrations for a new study. And that might be where that number comes out of. But even from the last study, which was done in the 2012-'13 range, there was a study done by Jennifer Doerr and Ron Hill, both who were on that status review team, where they came up with much higher densities. And Saint Croix has always been considered a place where the fishing intensity for conch is high.

So, if you're saying the fishing intensity of conch is high, and whatever the population is, it was sufficient to allow an increase that was done by the study, by NOAA, that means your populations in fact have sufficient adult reproduction and adult densities going on, that are not being accounted for in the current thinking. And so, I think you have a lot of valuable insight. The more that can be put into a context, if Virginia can actually give a little something about the age that couples with the fact that you're seeing ones that old routinely, that would be a much more powerful statement than just kind of giving your impressions. Because you know what you're talking about, but you have to convince the others that you know what you're talking about. So that's the trick. And so, I encourage you to do that because I actually agree with what you're saying.

GERSON MARTÍNEZ: May I elaborate?

RICHARD APPELDOORN: Yes, go ahead.

GERSON MARTÍNEZ: Gerson Martínez for the record. I quote, I did say that the abundance of adults and-- every time we go out and we catch this amount of conch and the size that they are permits us to catch X amount of pounds because they are so big. And that's why I said, we don't have the 10 lifts. All our conches are greater than nine inches long and thicker than an inch, lip thickness. And that's not just one or two, all of them. And that's why I fish them in the sand into the East end of the of the island because that's where the biggest sand beds are and to the South of the island.

And right now, as we have this surge, they have been coming off from underneath the sand. And all you see is little conch lips taking off on the water. I'm not talking about-- I can see in one dive up to 140 other conchs.

RICHARD APPELDOORN: Right. So, a couple points there. First of all, I encourage you to submit this, formally, as a public comment. The chat has the address there, but you can also get it online.

You mentioned a couple of really important things. One is you didn't say thick lip, you said an inch. Okay, that gives a much more quantitative, you know, that's 25 millimeters. That's, you know, by anybody's standard, that's an old conch. And now you're saying that's what you're fishing. There's plenty of them there.

The other side of the equation, you're comment about, "I'm in a grass bed and the conch are emerging," which they do, and you're seeing one every six inches, you know, that's your best estimate. That means whatever your adult population was, you're getting tremendous recruitment coming in, at least at that site. And therefore, again, your population density is not an impediment to reproduction and recruitment.

And so, you know, if you can make these points, it's very hard for them to rebut what is coming across as real observations and data. So, I encourage you to get that in as an official public comment because making it here or making it at the Council meeting is not going to have that same impact as it does if it's something that goes into the public comment avenue. And they have to be able to respond to it. So, I thank you for your comments and please submit those because I think they're really valuable. Todd.

TODD GEDAMKE: I'll second Nicky's anecdotal on this. I have pictures of more conch juveniles in the Saint John and in Saint Croix than I've seen anywhere else. It raised my eyes to it. In

Saint Croix in particular because the shelf in Saint Croix is limited, they've got deep drop offs. I know Ron Hill did some of his work down in that deep crevasse and that to me, and I talk with Nelson about this too, that to me, those deep populations are also something that is really, really important.

So, my recommendation to both Nelson and Nicky, you, is photographs. You know, if you have any ability when you say you've got a conch with a one-inch lip thickness, photograph it with a ruler next to it, knock it, keep it, just to take that picture and send it to someone else or send it to verify it out.

The other one is, carry an underwater camera with you. You or your crew are out there and you're diving in an area at 110 and you're, I know you can't push it, but someone else is down and you could actually drop cam at 150 feet. I think that the idea that conch is only harvested by one type of gear, and that gear is maxed out at 110 feet, 150 in feet.

So, if you can document any deep-water preserves, that will also do a good one. So, picture can be worth a thousand words, and it's an easy way for you to document very quickly.

RICHARD APPELDOORN: Marcos.

MARCOS HANKE: Thanks for the opportunity. I am really happy that Nicky from Saint Croix brought all those valid points. But at the same time, I would like to see a way that scientists can support Nicky on the written, not the points to make the points, but how to use the right vocabulary and the approaches on his comments. Uh, there is any way that any of you or the SSC can revise and help with vocabularies and the best way to present ideas. Because one way, one thing is to do verbally, the other thing is to put it in writing or put it on a paper. Maybe you guys can help Nicky on that. Any comment?

RICHARD APPELDOORN: I'll say that's possible. As I said, I thought his comments were quite valuable. Julian.

JULIAN MAGRAS: Julian Magras for the record. Just a quick comment. I know presently and if Sennai is still on, I think Fish and Wildlife has a preliminary conch study that's taking place right now. Now, I know when Shanel Gordon did her study a few years back, I've been trying to contact her for two days, but I haven't been able to get her yet. So, I can get that study. But she did the same hectare. She did the same hectares that were done previous in Saint Thomas and Saint Croix. So, she didn't pick new hectares for her to study.

Now, I don't know presently with the study that Fish and Wildlife is doing, if they're copying off of those hectares or if they're actually doing different sites. But I know there is a study that's going on presently.

RICHARD APPELDOORN: Okay. Julian, I think I can answer some of those. Traditionally Virgin Islands has done a repeat, station repeats, so they're revisiting the same sites every year. As they have gotten more funding, they've been able to expand the number of sites and islands. Cause initially, as you know, it's the same time as Saint John and they were able then to get into Saint Croix. So, they do repeated surveys, but they expand, and I think they have gone to a mix now of repeated and random to balance that out a little bit.

The survey that's going on now is a pilot study for changing the way the SEAMAP surveys are being conducted. And so, for those, what they should be doing, as this is being done in Puerto Rico, going to places that in the past have been really good places to get conch. Because the purpose of the pilot study is not to estimate the abundance of conch, it is to be able to have some data, if they find, conch to compare two different methods and be able to then work out statistics to see how the new method would work and how the samples would be allocated. And also, how to convert that data or how convert the old data into the new data format. So, it's not a random survey at all. But if you're going to an area and you're getting high densities, that automatically says that if you think our average density was low and therefore there's no recruitment going on, but if we go to the hotspots, we're getting these really high densities where recruitment obviously can take place, it refutes that argument.

So, I don't know whether they're planning on, if Fish and Wild is planning to submit something based on that or not, but that would be, if they've got the data, you know, that would be a valid point to make. Again, I reiterate that Saint Croix has traditionally been thought to be a heavily fished area and it may be, but not relative, perhaps, to the size of the conch population. Reni and then Nicky.

JORGE R. GARCÍA-SAIS: So, in areas where recruitment has been shown to be missing or that there is data suggesting that there has been a drop, significant drop, in recruitment. Can this committee or Councils or anywhere suggest or suggest to the government seedling programs based on mariculture farms? Instead of the concept of cutting on the harvest, why don't we suggest that artificially we restock with seedlings from mariculture

farms, the places where are well known to be recruitment areas for conch.

I believe that the same concepts should be done for Nassau Grouper in Puerto Rico and maybe down the line for other species. You know, just thinking a little bit out of the box of constraining and putting limits to harvest. Can we do something else? Enhance recruitment by artificial method. Just an idea, you know, not very informed about this. But I believe that, I know that it is possible to farm juvenile conch. I know if this projects, down in the future, maybe a possibility.

RICHARD APPELDOORN: You want the hypothetical answer or the practical answer.

JORGE R. GARCÍA-SAIS: Whatever.

RICHARD APPELDOORN: So yeah, it's possible to raise conch. As you know, Megan Davis has a hatchery over in Naguabo working with the fishery there, and they're all very happy about how things are presenting. But hatcheries have been put in place in Belize, Florida, Turks and Caicos, it's either Bonaire or Curaçao, I can't remember which one, with the intention of trying to augment the stock and none of those has been successful in doing that, because it's really difficult to grow conch. They're really fastidious about water conditions and you have to keep them a long time before you expose them to predator. So, you're have pumping costs and things like that.

So, there's new technology that's being applied, you know, like solar powered pumps and things like that, which are helping to bring the cost way down. The project in Naguabo is actually sold as an education project, but it allows for that opportunity to push the envelope toward trying to see, you know, can we get this to the point where we can start enhancing stuff?

And so maybe that's something for the future if people like Megan can keep working on it. But we're not there yet in terms of looking at this listing or not.

JORGE R. GARCÍA-SAIS: Thanks.

RICHARD APPELDOORN: Graciela.

GRACIELA GARCÍA-MOLINER: So, two things. We've been talking about actually cooperative research with the fishers, and one of the things that I discussed with Megan was to actually get them out on the field to look for the nursery grounds for Queen Conch. The

problem in most of the nursery grounds for Queen Conch right now is that they're close to shore and they're impacted by most of everything that runs off from mountains and any other building that it's around it.

So, you know we need to increase the number of people, fishers, who are involved in research and who might find the opportunity to go through the cooperative research that comes up every so often.

The second thing that we need to also find out is the viability of the deep-water conch populations, you know, the mesophotic conch that you have found at those depth, whether they're really viable or not. Are they reproducing at that depth?

The education part of this effort, in Naguabo, has been that they are increasing the amount of time that they're not fishing for conch. So, they are not disturbing the actual reproductive activity of the conch. So, they are very aware of the fishers that they didn't know how many conches could come out of one of those egg masses and things like that. So, they have become a real part of the effort to get the conch, the area, which is one of their main resources, back in track. So, it's a viable effort and I think that looking into the future for using the knowledge of the fishers to find out where, you know, they could recede some of the areas and track it because, you know, they do go diving every day, etcetera.

So, these are things that, you know-- but then again, they also need the help of the scientists to set up the research that needs to be done. So, it's a two-way street.

RICHARD APPELDOORN: Okay, let me comment on that. You know, if it does get listed, of course they'll actually have to do that stuff, is identify key habitats and you mentioned nursery areas and you're talking kind of like shallow areas like Nicky has been talking about. But they also do settle deep and so identifying those.

But the other thing that they're doing actually even more so, currently, is they have to find the egg masses, which means they're identifying the spawning aggregation locations. And that's perhaps even more-- well, just as valuable, shall we say. So, it's a Ying and Yang here because that probably won't happen if it doesn't get listed. But we don't want it to get listed if we don't think it's that way. So anyway. Vance, did you have a comment or-- no? Okay. So, Nicky and then--

GERSON MARTÍNEZ: Gerson Martínez for the record. Virginia has put a proposal for cooperative research in Saint Croix. They're waiting

for permission from Fish and Wildlife. They asked me to participate in that. The egg sack that you guys have been talking about, has been seen by us in the Virgin Islands from 55 feet of water. I don't dive deeper than 80 no more, but when I used to do those crazy things, we used to see it up to 110. But 55 feet water, that's how shallow—

Naguabo guys, the ones that are doing the mariculture, that's what you call it, they came over to Saint Croix and we went. I carried them in my boat, and they decided that they want to move to Saint Croix because of the amount of conches that they saw. So, they told me, "We have never seen such big conches in our life." They tell me, "Just, let me stay in your house for a little bit."

So, take and elaborate. And Virginia's going to help me write that letter that you asked me for, and we're going to submit that before this Council meeting.

RICHARD APPELDOORN: Alright, and I'll just take Reni's thunder. When he was looking at the conch down at hundred, 150-160 feet they were also reproducing down there. Tarsila.

TARSILA SEARA: This is Tarsila. So I would like to express a concern, but I will phrase it as a question following up on what Graciela and Rich were just saying. So, I think it's really important that, you know, we think about and consider the importance of the collaborative efforts that Graciela was mentioning. And I think my question is and, you know, the concern, the listing, would that hinder, or would that potentially motivate it, create more opportunities for what you are describing? Because my initial concern is that it would hinder. So, that was my thinking, right? That my main concern with the listing is that the process itself will create barriers for us to work with the fishermen, to work with the stakeholders to address this problem in, potentially, a different way. In a better way. Right.

But I am not familiar enough with the process to really necessarily phrase this as a major concern. So my question, I don't know if anyone here could answer. Maybe Graciela, I'm looking at you because you're probably the one who would have the expertise, if you would see this as creating opportunities or hindering opportunities to work with the fishermen to develop better solutions?

RICHARD APPELDOORN: Yeah, I actually would throw that toward Michelle, but I think you had your hand up anyway. But Nassau Grouper would be a good analogy about what happened, or no?

MICHELLE SCHÄRER-UMPIERRE: This is Michelle, for the record. I think the big difference is that Nassau Grouper was already prohibited when it got listed, for a long time before. And this is not the case for conch.

RICHARD APPELDOORN: No, but did research opportunities open up after the listing?

MICHELLE SCHÄRER-UMPIERRE: Even when they're candidates, you're open for section six funds, before it gets listed.

GRACIELA GARCÍA-MOLINER: So, if I may, I was looking to see if I could find a quote, because, you know, the problem with the listing is not that it happens relative to a geographic range, is that the regulations will come down under commercial fishers in the U.S., meaning Puerto Rico and the Virgin Islands. That's how it's perceived. I believe that it could open opportunities. And Richard said, you know, it's a Ying and Yang it can go either way. But if you are forced to find critical habit that now, if you're forced to go into more collaborative research, that might be one way of going at it. But it has to be, I mean, the way I see it, it has to be done now. It cannot wait. And there are things that are already in place, many regulations that we have in place, we need evaluation of all those regulations for the local, Queen Conch. And then we have to go into the WECAFC and the international arena because these affects everyone around.

And it's interesting because Queen Conch is already in the appendix two of the FAO. It's already, you know, CITES, it already has all these regulations that are international, happening. So, you know, I don't know exactly how that's going to play out, but the public hearing was very well attended. Very well attended.

RICHARD APPELDOORN: Well, a couple comments. I understand why those fishermen would be concerned that it's going to come down on them. And considering past histories, I understand, you know, that's probably a viable thought.

But when you're talking about conch populations in the region, it's Turks and Caicos, The Bahamas, Cuba, Jamaica, maybe Belize Colombia, Nicaragua, Honduras. 95% of the conch is in those countries, everybody else is a small player. So, if they really are serious about wanting to protect the species, regionwide, that's where they have to get their enforcement targeted. And I had conversation with Orian Tzadik about this, because he's involved with some of the questioning there. And you know, what can they do about that? Well, most of those fisheries are oriented toward export. And, you know, CITES has a procedure where you have

to document that your conches are coming from a healthy population.

But that decision is made by the in-country CITES authority. Some of those committees are really rigorous. Some of them, let's just say they're at the other end. And so, you know, what the U.S. could do is say, "okay, you want to import into us. I want to see the full study that you did that justifies this. Not just a decision by your committee that says it's okay." So, you know, if they could say, "I want to see the full—" you know, if you did a survey, "I want to see the raw data, the analysis and everything like that before we're going to--" and so that would go a long way for forcing those countries to really up their game in terms of, collecting data and assessing it and, you know, having a good stock determination without having to impact anybody here or, you know, a lot of other places.

It's not my call, but that was the recommendation that I had made to them. But this is, you know, presupposing, something happens. So, Todd and then Nick.

TODD GEDAMKE: Yeah, mine is very short. Tarsila the Goliath Grouper is good one to look at in Florida. I mean, it got listed, we've spent, I don't know, 30 years trying to be able to get an otolith out of them, to be able to get an age growth relationship. So, it's hindered research in the long run. The population is absolutely a hundred percent recovered and benefited from it, but at the same time, it's impossible now to get it back into the system. So, I think that's somewhere some of your barriers come in as with going to be with paperwork and this and that, so it gets more complicated.

And then it also gets more complicated to work with the commercial fishermen and that's exactly where, where you start getting in it. So cooperative projects are great, but you can't harvest. You know, so you're going to get into a situation where you take out removals, which is your productivity measure on populations. So it's, it Goliath is a good one to look at.

RICHARD APPELDOORN: Okay. Nick we were asking for you before, but you were off, so glad to see you back.

NICHOLAS FARMER: Hey, can everyone hear me? Hope so. Yeah, so wanted to apologize, I was out earlier on the pre-brief for the Council meeting with NOAA leadership, jump back since I could. But a couple of comments based on the line of discussion so far of which I've, you know, I came in about halfway through it, seems like. Wanted to respond quickly to Todd's most recent comment.

I would actually pretty strongly disagree that Goliath Grouper is a good one to look at. And that's because Goliath Grouper was not listed under the ESA. It's a closed fishery with an ACL of zero for the Councils. And so, it's a different beast. It's not an ESA permitting issue. So, it's more of a MSA and state permitting concern.

Under the ESA, I just want to provide some clarification that we provided in our FAQs and the public hearing, the proposed rule to list, which is what's out right now and subject to public comment, establishes no new regulations. It's a proposed rule. The final rule, if it were to become a final rule to list Queen Conch as a threatened species, would similarly not establish any new regulations other than federal requirements to do Section seven consultations under the ESA for actions that are conducted, permitted, or funded by federal action agencies.

So, a threatened species does not automatically get any fishing regulations assigned to it. So even if this were going to a final listing as threatened, there would not immediately be any regulations on any fishermen either in the U.S. Caribbean, Florida, or internationally. A threatened species can receive regulations under Section 4D of the Endangered Species Act, which is an additional rulemaking process that's subject to public comment.

So, subsequent to a final rule, if NOAA Fisheries and the U.S. government were to decide that in order to promote the recovery of Queen Conch, additional regulations were necessary, we could then advance a proposed rule under Section 4D, which would be subject to public comment, and then that could go final, and that might establish some additional regulations for a threatened species. That would be a fairly lengthy process that could be very well thought out and involve a lot of discussions with many of the people that we're hearing from today, both SSC members and the public that know a lot about what's going on with the species. And I also think just from a perspective concept, it's important to note that the U.S. Caribbean, as a whole, represents around 4% of the estimated conch habitat throughout the range of the species. And according to the status review report less than 1% of the total population abundance for the species.

So just some things to kind of keep in mind when we're talking, you know, U.S. Caribbean centric concepts for the species that, you know, it's part of a much larger picture for the recovery of that species.

RICHARD APPELDOORN: Thank you, Nick.

TODD GEDAMKE: Yeah, Nick, thanks for pointing that out. You're definitely right. That's a state closure and that is a slight difference. But I imagine that disentangling from the feds, it's going to be a whole lot more complicated than disentangling from the state.

RICHARD APPELDOORN: Nick.

NICHOLAS FARMER: Follow on that, if I may. So, one of the things that's unique about a 4D rule under the Endangered Species Act is you can customize the rule. So, if a species is listed as endangered under the Endangered Species Act, basically everything is prohibited, that involves take of this species. And in order to do anything with the species at all, you require a Section 10 permit, which is a fairly arduous process.

Under a 4D rule, you can be very specific about what is and is not allowable. So, for example, for our threatened coral species, we, very specifically, allowed, with minimal permitting requirements, any action that require or that would lead to research restoration or recovery. And so, a similar approach could potentially be taken with conch to avoid some of those administrative bureaucratic hurdles that have hindered some of the Goliath Groupers.

RICHARD APPELDOORN: Okay. Is after five. Any other comments on this issue? I'm not seeing any hands pop up. So, I have one last thing and that's an announcement. So, I'm letting you all know, and Marcos is online, so I'm letting him know that I'm going to be, resigning as Chair of this committee, effective at the end of the Council meeting next week.

Um, there are a lot of reasons for that. But overall, it's getting a little stressful as I get older. And you know, I've been in this thing for I think about 10. The Council rotates a lot shorter than that. I just think it's time for somebody else to sit in this chair. I still like to be on the committee.

You know, one of the things I don't like is in having kind of the drive discussion. I don't get to reflect as much on what's being done or be able to look at the data that I have to do something because I'm directing traffic as much as anything else. And I'd like to be able to contribute in different ways.

So, with that, I want to thank the committee both past and present. It's been great to, I hesitate to say, lead, but serve as your Chair and hope to keep working with you as a member of the committee. I'd like to thank Shannon and her staff for all the work they've done over the years. It's been a real pleasure working

with them as well. And of course, the Council staff as well. So that's my announcement. And Marcos, you can start thinking about who's going to sit in his chair real soon.

Okay. And with that, meeting closed.

DOUGLAS GREGORY: Well, thank you Richard. You've done a great job.

RICHARD APPELDOORN: Thank you, Doug.

(Whereupon, the meeting adjourned on December 1, 2021.)