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**CARIBBEAN FISHERY MANAGEMENT COUNCIL
ECOSYSTEM-BASED FISHERY MANAGEMENT
TECHNICAL ADVISORY PANEL
HYBRID MEETING
COURTYARD MARRIOTT
ISLA VERDE, PUERTO RICO**

March 16-17, 2022

The CFMC Ecosystem-Based Fishery Management Technical Advisory Panel convened on Wednesday morning, March 16, 2022, and was called to order at 9:14 a.m. by Chairman Marcos Hanke.

GRACIELA GARCÍA-MOLINER: Hey. Anyone who's listening please will be starting the meeting very soon. We are still waiting for Cristina to set it up. So, Sennai will give you all the housekeeping items, but make sure that we use the microphone they are very important.

Call to Order

SENNAI HABTES: Good morning, everybody. Welcome to the Ecosystem-Based Fisheries Management Technical Advisory Panel meeting for the Caribbean Fishery Management Council it is 09:14AM on March 16, 2022. We're going to go ahead and call this meeting to order.

I will begin by just going over some basic housekeeping rules for all of us. For those of us in a room, because we are in person, although the mask mandates and rules have changed for Puerto Rico, as part of the CFMC meeting, when you are in this room, we will ask you to keep your masks on. Also, just be conscious of the fact that we're using this new owl system and it does pick up a lot of sounds.

So, 2 things to remember. If you are going to be speaking, please use the microphones. Otherwise, it will be difficult for the members that are online to hear you. And second, if you're going to be carrying on any secondary conversations, I do ask you take that outside because the microphone for the owl system is very sensitive. So please do try to keep outside noise moving around, clinking of glasses, things of that nature, if possible, to a minimum, or do you take those outside.

In addition, we will be having both the sessions recorded on Zoom, as well as transcripts will be taken from that recording and those will be presented back to us at the end of this

meeting after transcription has been completed.

Am I missing anything, Graciela?

GRACIELA GARCÍA-MOLINER: So, I just heard. Please, put all your laptops if you're joining via Zoom in the room on mute because they're picking up some noise, but in general, they can hear us very well. So, they'll be testing us.

There is going to be a second recording [inaudible]. So that's why it's so important that you use your microphones every time but turn them off after your turn. Turn off your cell phone with also.

And thank you very much for you being our guinea pigs with the owl setup and the hybrid meeting too. Thank you.

SENNAI HABTES: Just for more housekeeping note, for those of us that are joining online on Zoom, we do ask that you please put your name and affiliation, edit your name, on Zoom so we know who you are, when you're speaking. And if you have comments to make, please make a note of that into chat, then I will be notified, and we will call you in order in which those requests are received.

We ask that while you're online, please do keep all your mics on mute so that there are no interruptions when we're having the meeting. When you're called on, go ahead and unmute your mic to make your comment.

I think with that, we can go ahead and get started with the regular meeting. So, yeah, if you could-- Look at that, the presentation's already up. I didn't even have to ask.

So, for the record, I'm Sennai Habtes. I'm the Bureau Chief of Fisheries in the Department of Planning and Natural Resources Division of fishing wildlife based in Saint Thomas U.S. Virgin Islands. Some of you may have known me for my previous position. I was a Professor of Oceanography at the University of the Virgin Islands. I am currently the Chair of the Ecosystem-Based Fisheries Management Technical Advisory Panel. And we can start by going through quick introduction and get this meeting off to a good start.

So, again, for the record, this is the CFMC Ecosystem-Based Fisheries Management Technical Advisory Panel Meeting from March 16 through 17, it will run all day today and tomorrow. And so, let's go ahead and get started.

Liajay can move to the next slide or Cristina, I'm sorry, move to the next slide.

Alright. So first off, why don't we go ahead and take the role? Cristina or Liajay I am not on Zoom yet so you guys could read off the members with our first EBFM chat members and add them to chart on the PowerPoint. And then after the EBFM chat members are ready, you can read off the guest and have them in there. So just have a list that everyone that's here.

LIAJAY RIVERA GARCÍA: Sorry. You want us to meet up first EBFM TAP list on Zoom or the present here?

SENNAI HABTES: So, we can go through the room with the present members first, and then if one of you can read them off on Zoom and add them to that list that's on the PowerPoint, and then read off the members that are on Zoom to the list as well. And after we do all the EBFM TAP members, we're going to read off additional guests. Does that work?

GRACIELA GARCÍA-MOLINER: So, each of you that is in the room can introduce yourself. If you want to, we can also have them introduce themselves via zoom or we can just read the names.

Roll Call

SENNAI HABTES: Let's have them introduce via Zoom. I think that'll work.

So, I've already mentioned that Sennai Habtes I'm the EBFM Chair. I will have J.J. go next.

JUAN J. CRUZ MOTTA: J.J. Cruz. I'm EBMTAP member. I work at the Department of Marine Sciences at the University of Puerto Rico.

STACEY WILLIAMS: Good morning. Stacy Williams. EBFM TAP member, and I'm from the Institute for Socio-Ecological Research.

ORIAN TZADIK: Morning, everyone. Orian Tzadik, EBFM TAP member, PEW Charitable Trusts.

GRACIELA GARCÍA-MOLINER: And then online, Alida, can you hear us?

ALIDA ORTIZ SOTOMAYOR: Good morning. This is Alida Ortiz. I am from the Outreach and Education Advisory panel and a member of this TAP meeting.

GRACIELA GARCÍA-MOLINER: Kevin, are you online? Kevin McCarthy.

KEVIN MCCARTHY: I am, good morning. Kevin McCarthy, EBFM TAP member, Southeast Fisheries Science Center.

GRACIELA GARCÍA-MOLINER: And, Edwin, were you able to join us this morning? Edwin will be joining us on and off. He did send us an email that he does have classes to attend to so he'll come in as he can. Tarsila are you online? She also said--

TARSILA SEARA: Yes, I'm here. Can you hear me? Alright. So, this is Tarsila Seara, EBFM TAP Member, University of New Haven, Connecticut.

GRACIELA GARCÍA-MOLINER: So, Mr. Chair, those are your TAP members.

Everyone present Edwin Cruz has been excused but he will join us as he can. Do you want us to allow for people to, you know, call them. We have the list, and we can call them.

LIAJAY RIVERA GARCÍA: We have the list on some, but I can--

GRACIELA GARCÍA-MOLINER: In the room, you have 2, 3 guests and 3 staff members.

SENNAI HABTES: So, let's start by having guest and staff members introduce themselves. Let's begin with the CFMC staff and then we'll move to the guest.

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

LIAJAY RIVERA GARCÍA: Liajay Rivera García, Council Staff. Buen día.

CRISTINA OLÁN MARTÍNEZ: Cristina Olán Martínez, Council Staff.

KELLY MONTENERO: This is Kelly Montenero, NOAA Southeast Fisheries Science Center.

SEANN REGAN: This is Seann Regan, contractor for NOAA and NCCOS

MARCOS HANKE: Marcos Hanke CFMC Chair.

SENNAI HABTES: If you want to read off the guests online or just go through the list [inaudible].

LIAJAY RIVERA GARCÍA: I'll do the roll call for the people on Zoom. Starting with Adyan Ríos. Alida Ortiz. Adyan, please present yourself.

ADYAN RÍOS: Good morning, everyone. Adyan Ríos, Fisheries Science Center.

LIAJAY RIVERA GARCÍA: Okay. Following Alida Ortiz. Ali-

GRACIELA GARCÍA-MOLINER: Ya lo hicimos, ya.

LIAJAY RIVERA GARCÍA: Okay. Áurea Rodríguez.

ÁUREA E. RODRÍGUEZ-SANTIAGO: Good morning. Áurea Rodríguez. I'm from Taller Ecologico de Puerto Rico but in the afternoon, I will be presenting as part of a project with CariCOOS, the Caribbean Integrated Ocean Observing System. So, I will see you in the afternoon.

LIAJAY RIVERA GARCÍA: Thank you. Calling Guillermo Cordero.

GRACIELA GARCÍA-MOLINER: Guillermo Cordero is our [inaudible]

LIAJAY RIVERA GARCÍA: Helena Antoun.

HELENA ANTOUN: Morning, everyone. Helena Antoun, Fishery Liaison.

LIAJAY RIVERA GARCÍA: Katie Latanich.

KATIE LATANICH: Hi. Good morning, everybody. My name is Katie Latanich. I work as a consultant. I'm based in Beaufort, North Carolina, and I'm here to talk about my work with the Net Gain Alliance later this afternoon.

LIAJAY RIVERA GARCÍA: Thank you. Okay. Ken Hamel.

KEN HAMEL: Ken Hamell, University of Rhode Island. That is on Thursday.

LIAJAY RIVERA GARCÍA: Kevin McCarthy. Mandy Karnauskas.

MANDY KARNAUSKAS: Hi, Mandy Karnauskas, Southeast Fisheries Science Center.

LIAJAY RIVERA GARCÍA: María López.

MARÍA LÓPEZ-MERCER: Good morning. This is María López, NOAA

Fisheries, SERO.

LIAJAY RIVERA GARCÍA: Martha Prada

MARTHA PRADA: Yes, good morning. I'm a biologist, and I will work with the testing in GIS.

LIAJAY RIVERA GARCÍA: Michelle Duval

MICHELLE DUVAL: Good morning, everyone. Michelle Duval, Mellivora Consulting.

LIAJAY RIVERA GARCÍA: Rachel Eckley.

RACHEL ECKLEY: Good morning. Rachel Eckley. I'm A NOAA Affiliate at the Southeast Fisheries Science Center.

LIAJAY RIVERA GARCÍA: Thank you. Rafik Orhun.

RAFIK ORHUN: Good morning. Rafik Orhun, Southeast Fisheries Science Center.

LIAJAY RIVERA GARCÍA: Sarah Stephenson.

SARAH STEPHENSON: Good morning, Sarah Stephenson. NOAA Fisheries SERO.

LIAJAY RIVERA GARCÍA: Steven Canty

STEVEN CANTY: Morning, everyone. Steven Canty with the Smithsonian institution.

LIAJAY RIVERA GARCÍA: Susan Kotikot.

SUSAN MALASO KOTIKOT: Morning, everyone. I'm Susan Kotikot, a PhD student at Penn State. Geography.

LIAJAY RIVERA GARCÍA: Tauna Rankin.

TAUNA RANKIN: Good morning, all. Tauna Rankin here with NOAA Fisheries Office of Habitat Conservation.

LIAJAY RIVERA GARCÍA: Thank you. And last, William Hernández. William, can you hear us? [inaudible]

Adoption of Agenda

SENNAI HABTES: Thank you, Graciela. With that why don't we go

on with the next a couple of steps, if you bring back up the presentation. Go ahead and go to the next slide when you get a chance. One more. Okay. So, first step after calling the names we are going to approve the agenda. Before we do that, is there any discussion on items that are going to be removed, changed, or added to the agenda from any of the TAP members.

So, Graciela, do you know the afternoon presenters, have all of them confirmed?

GRACIELA GARCÍA-MOLINER: Yes. They have. We're having problems with William, but we'll make sure that we contact him by this afternoon.

SENNAI HABTES: Okay.

GRACIELA GARCÍA-MOLINER: They said that they—at least Áurea Rodríguez and [inaudible] will be here, in person, this afternoon.

SENNAI HABTES: Excellent. Any other comments from TAP members? Alright. Seeing none in the chat.

GRACIELA GARCÍA-MOLINER: Anything that the TAP members would like to change in the agenda, I mean, you will have to let us know.

SENNAI HABTES: Seeing none. Can I have one of the TAP members motion to approve the agenda as it stands? And we'll need a second.

ORIAN TZADIK: Motion to approve the agenda as it stands.

GRACIELA GARCÍA-MOLINER: Please state your name when you when you talk because there will be a verbatim transcription of the meeting.

ORIAN TZADIK: Orian Tzadik. Motion to approve the agenda as it stands.

STACEY WILLIAMS: Stacy Williams. I second this.

Approval of Minutes and TAP Chair Introduction

SENNAI HABTES: Okay. If I can then, can anyone who would vote no to approving the agenda as it stands either say so now or make it in the chat? Hearing no objections. We will approve the agenda as it stands.

Okay. So, moving on to the next side. The second thing, business, that we need to take care of is the approval of the previous minutes. Again, sorry for the record, this is Chair Sennai Habtes speaking. Again, I will need a motion from a TAP member and a second. Please, remember that you need to state your name when you speak into the mic.

ORIAN TZADIK: Alright. Motion to approve the minutes as they stand.

JUAN J. CRUZ MOTTA: Second.

TAP Chair Introduction-Sennai Habtes

SENNAI HABTES: With that, if there are any objections to the approval of the previous minutes, please state them now? So, hearing no objections. We will approve the previous minutes as they stand.

Alright. Next slide, Liajay. Alright. So, we'll just do a quick introduction. For all of you that are on the EBFM TAP, you've seen most of this already. So, you know, apologies for the repetition, but this is to help some of our guests as well as public members that are in the room get a short, quick understanding of what we're trying to do within the EBFM TAP.

So, I'm not going to read this, but on the page is the EBFM policy statement from NOAA. The purpose is trying to adopt ecosystem-based approach throughout its broad ocean and coastal stewardship, science and service programs. In 2018, there was a published Ecosystem-Based Fisheries Management policy that included roadmaps for EBFM implementation around the country. This time, several of the regional Councils have decided to implement and develop fishery ecosystem plans at the Council level.

Next slide, Liajay.

The history of this Technical Advisory Panel was on October 23, 2019. A EBFM Technical Advisory Panel was formally established with Bill Arnold as the former chair. This was organized and created through a lot of work behind the scenes by some of the current members of the EBFM TAP and some who are no longer on the EBFM TAP.

On December 10th and 11th of 2019 formal membership was set up by the Council for the current EBFM TAP members. And the charter

was created governing what this Technical Advisory Panel wants to do. And that is to assist in the development collection evaluation and peer review of such statistical, biological, economic, social, and other scientific information relevant to the Council's development of the Fisheries Ecosystems Plans and necessary amendments.

EBFM TAP is composed of individuals engaged in ecosystems research or knowledgeable and interest in the conservation and management of ecosystems and managed fisheries. The EBFM TAP shall reflect the expertise and interest from the standpoint of scientific need for advice of the Council within the Council geographical area of concern. Which is the U.S. Caribbean.

EBFM TAP provides expert scientific and technical advice to Council on the development of, on the preparation of fishery ecosystem plan, and on the effectiveness of such a plan once in operation. The TAP aids the Council in identifying scientific resources available for the development of plans, establishing the objectives of plans, and establishing criteria for judging plan effectiveness and in the review of plans.

So that was the charter under which the TAP was established. Liajay, next slide.

And what the TAP has come up with in terms of overall charter objectives that we kind of use as governing principles within the TAP is that we're to provide the Council with ongoing scientific advice on ecosystem-based fishery management for fisheries management decisions, including recommendations for habitat status, social and economic impacts of management measures, and ecosystem-based impacts or stressors on the sustainability of fishing practice.

Perfect. So along with what we're doing within the EBFM TAP, there are a couple of other ongoing projects within the U.S. Caribbean. Many of the people that are running these projects are either EBFM TAP members or frequent contributors at EBFM TAP meetings. So, probably one of the larger ones is the Lenfest work that J.J., EBFM TAP member, and Tarsila Seara, EBFM TAP member, are conducting-- And, sorry, Stacy Williams. My apologies. --are conducting.

And so, they will give us an update on that a little bit later in the afternoon, but feel free to read off the goals and objectives of the project. I think the presentation later will be more in terms of ecosystem indicators and the data sets provided and what they've done so far with the process.

Then there was also a funded project by Bill Arnold and Mandy Karnauskas, on looking at quantitative indicators by compiling a lot of the ecosystem—

GRACIELA GARCÍA-MOLINER: Kelly.

SENNAI HABTES: Oh, Kelly Montenero. I'm sorry, just going by what's on the slide and I forget all of the partners and people that are working on these projects. And so, Kelly will be giving us a presentation on our ecosystem status report, which has a lot of the data that was used in that project to create that report. This afte-- tomorrow. Is it this afternoon or tomorrow?

KELLY MONTENERO: This afternoon.

SENNAI HABTES: This afternoon. Thanks. This afternoon. So, with that, we'll move on to the next slide.

Alright. So, for all of us that are on the EBFM TAP, this is a little bit of action items for things that we want to keep on our minds and try to complete during this meeting.

First, a large portion of this meeting will be focused on updating participants on all current efforts underway. Meaning, projects that are being done outside of the EBFM TAP process that we can use to implement aspects of the FEP as well as the scientific information necessary for us to provide to the Council in developing and managing an FEP.

Second, identifying incomplete products and creating plan on how to complete them. Meaning, looking at the conceptual model, process, looking at Tauna's presentation for risk assessment and seeing if that's something we can implement and use in coalescing all the conceptual models that were done for the U.S. Caribbean. Looking at ecosystem indicators that are available, seeing what's not available, looking at data sets and understanding what of those can be used for us to develop ecosystem status support, that we need to put into the FEP and use them as monitoring indicators that can be put into an FEP. Identifying which of those are important, what are [inaudible], how do we create a plan that allows us to implement and use all of that information in developing this?

Which brings me to the next point, agreeing on a plan-- Oh, no. back to the last slide. Sorry. I'm still on the outlines I'm being a little verbose, so I apologize. You know, if you could go back one slide-- Agreeing on a plan on how to complete the

outstanding work. Meaning, what have we done? Where are we now? What stage of a loop we're on towards the final FEP development and have a very candid discussion on what we need to meet the strategic objectives of the TAP and how do we do that.

And finally, create a plan to develop the strategic objectives for the FEP by the next EBFM TAP meeting. And have another discussion on how to develop the operational objectives so we can propose to the Council that they will allow us to move forward with developing the FEP.

Alright? Next slide.

So, keep all those in your head as we're going forward. If you missed any of them, I know it's a lot, let me know. As those come up in presentations or other discussions, please point that out so we can keep running track of it and use that when have time in the [inaudible] for the sessions.

So, you guys mostly have all seen the Lenfest loop towards FEP development. It is the process by which we're trying to follow for implementing an FEP for the U.S. Caribbean.

Next slide, Liajay.

As such, we can kind of talk a little bit about what we've done. So, where we are in this process is we have all the conceptual models for the different stakeholder entities conducted. Those were done through the SSC, as well as the DAPs, eNGOs (environmental NGOs). And then specific ones for coastal businesses, academics, fisheries managers, other managers in the territory and other fishers that were not incorporated into the DAPs and SSC. Thanks to work through Lenfest and the systems report that Kelly has done, and the project that Bill, Mandy and Kelly had, we have some idea of indicators from the conceptual models that we need to use and what indicators may be available for us to put into an FEP.

And then we have this beginning of an inventory of environmental ecosystems data that we can use towards building ecosystems models within the U.S. framework. What we do not have is the infrastructure and understanding of the data management plan for how we can use that. So that needs to be a large part of the discussion we have during this meeting.

Next slide, Liajay.

So, in our last meeting, we had come up with a draft outline for

the FEP. I will not go back through that again, but we are going to have to revisit this at some point to identify both, who's going to be doing the writing and what parts we can all take and what data gaps exist for filling in the information.

Next slide.

These were a couple of things that we had brought up about concluding. I don't think we're decided on that. So again, keep those in mind. What risk assessment process do we want to look at with the conceptual models? We really need to identify a way that the Council can make decisions based on the FEP events is extremely important. And so, we have to come up with a process in coordination with the Council for creating a way that will work to do this FEP [inaudible].

Next slide.

Alright. So, these were the draft goals and objectives that we had come up with. So, the draft FEP goals and objectives, meaning the overarching goal of the FEP that we're trying to develop to promote ecosystem-based approaches to ensure healthy resilience and productive marine ecosystems and the fisheries resources dependent upon those ecosystems, within the context of the unique biological, ecological, economic, social and cultural characteristics of those fishery resources and the communities they depend on. We also created, I believe it was 14, sub-goals for that larger overarching goal. We decided that we weren't going to use the term objectives for this since these were sub-goals. So, I'm speaking with that definition.

These were, increase human community resilience within the context of changing ecosystems. Promote ecosystems resilience within the context of changing ecosystems. Define present ecosystem status and functionality. Understand dynamics of fisheries and ecosystem services. Describe key ecosystem linkages. Identify research priorities. Identify additional ecosystem-essential species in need of conservation and management. Understand the risks to the fisheries ecosystem and tradeoffs from different management strategies. Improve the data and information needed to support marine ecosystem management. To prevent overfishing and/or ecosystem overfishing. To achieve optimum yield. To incorporate ecosystem considerations into stock assessments. And to bring ecosystem considerations into decision making process. Finally, to promote adaptive management policies by revising the necessary national standards, SSC, CCC.

Alright. Next slide.

So, apologies for all of that history and background, but I think it's important to bring all of that up when we get into these meetings, so we all have good understanding of where we are, the things that we still need to do, and identify all of the work that's already been done.

All Right. Where are we going? What do we need to do during these meeting and future meetings? We need to articulate the vision. So, start a discussion that builds on previous efforts for creating the vision for the FEP as well as identifying the management strategies that are necessary in the education components that you need to put out there to make it successful in its use for U.S. Caribbean.

We have goals and subgoals, but what we haven't identified and gotten approved by the Council are the strategic objectives for the use of the FEP. I think that becomes a large component of designing the strategy for which the CFMC will use the FEP in its management decision.

We have the assessment of risk. That pathway for building conceptual models was chosen not to be use by the SSC, but I think it's important that we understand how to use it in building our conceptual model and identify if it's possible for us to include that in our process. Tauna will be giving us a presentation on that. So, thank you, Tauna for willing to do that. We can all listen, pay attention, ask relevant questions, and decide whether it's something that we can implement during the FEP development process.

Next, we have to prioritize strategic objectives. So, it's not just identifying a laundry list of objectives we want to use. We need to understand which are the most important ones, the ones that are most feasible, and the things that we need to prioritize on the management level within [inaudible].

And third, create the operational objectives. Again, this is the plan we need to present to the Council within the FEP for how this information gets used and management decisions. That is critical.

Alright. Next slide.

So, we've all seen the timeline. We are right now around April 2022 phase, which is when we're supposed to be using the conceptual model and additional products to create island-specific risk assessments for consideration by the SSC.

We have all the conceptual models and we have identified a process for how those will be built but I think we still have some decisions to make before we can turn those into information and expertise to inform how that data can be used.

I'm not going to go over the rest is the timeline; you guys have seen it before. We all know what to do. If you haven't, those of us that are TAP members, you can access it on the Google Drive that we set up. Or you can always email me if you need any information and I'll be happy to provide.

Alright, Next slide.

While we're on this page, just remember we are shooting for an end deadline of a draft of the FEP that can be submitted to the Council by December 2023. So that means everything that we had done to find in these meetings today and going forward, we want to have finished by December of 2023. Okay?

Alright. So, where we are is identifying what we need to do to get the FPP done. Create a vision and strategy that guides that entire document and identify the actions needed to implement the strategies that we identify.

Next slide.

So, with that, what I'd like to do now is present an example of an operational checklist that we think could be included within the FEPs. This was developed after conversations with the Council chair, Marcos, who has been gracious enough to join us today at the time we present this and answering questions about it. So, this is an example of an initial challenge that we've seen in working with ecosystem-based fisheries management in U.S. Caribbean and identifying a practical operational objective that the Council can take to revenue.

Right? So, the islands of the U.S. Caribbean are small. Non fishery related actions occurring on land and water affect marine environment disproportionately to other regions. Stakeholders that are concerned about these actions and their repercussions on the marine environment often lack, or are unaware of, a formal avenue to voice their concerns.

An example of this is how land-based actions affect their fishery, and other coastal marine resource. And how fishers may effectively inform the pertinent agencies and start a positive action of change.

Next slide.

What we are recommending through this is identifying the background from, stakeholders voicing concerns over anthropogenic stressors to the CFMC instead of the governing federal or territorial agencies. We all hear this pretty frequently at council meetings. There are large concerns about the anthropogenic impacts that are affecting fishery resources. And unfortunately, it's fisheries managers, most of that sit on the council [inaudible] are working with. We do not have control over management and regulations associated with a lot of these [inaudible]. And we are the ones who are hearing a lot of the feedback related to how they impact the resource.

So, the next step in the process would be articulating the vision. Right? What could the CFMC do to help with this problem from [inaudible]. Well, the CFMC could create a pathway for stakeholders to voice their concerns to the appropriate agencies and formally inform them of these issues and stakeholder concerns.

At this point, I'm going to ask Marcos to join me and to maybe complete the rest because the strategy and the risk identified are things that he, you know, voiced to me personally and very clear on it. So, I think his information on this will help elucidate the point a lot better than me just reading it of the slide.

MARCOS HANKE: Yes. Thank you very much, Sennai. Thank you everyone for inviting me to be here. Since this process is part of EBFM, I'm a big believer of it. And there is always one main concern that it brought to the table like Sennai explain to us. And also, based on meetings with other Councils around the nation I have identified this and put some thoughts about it, how to fix it, or how to start to address it.

Basically, what I think is a path for this is annually create an informative letter, not a request, not anything with legal mandates to any agency. Just an informative letter from the Council to the pertinent agencies that have something to do with our environment, our fishery resource. And based on all the issues and concerned that the fishermen bring to the Council and establish on record. Like this, every year we're going to have, let's say on that August meeting, this letter being produced. And after three, four, five, six years, it will be very hard for the agencies to say that they've never heard about it.

This is a way to present the idea in an organized way that

[inaudible] right now don't have on his hand. And I think it can be a pathway that other Councils around the nation can use as an example. It's simple. It's not complicated. And from my experience, what I heard from the fishermen and in the Caribbean, this is something that we would like to see. Thank you.

SENNAI HABTES: Thank you, Marcos. And so, you know, just to finish up on the slide, right. In strategy we need to create that letter and also identify ways for fishermen to express and voice their concerns directly to both the territorial and federal agencies that manage these resources.

The large risk is that stakeholders may rely on the CFMC to speak for them instead of utilizing open platforms supplied by the government agencies. Often, there's a lack of knowledge and a lack of effective communication from these agencies on where people can voice their concerns. And so, as we're going forward, it will be important to implement outreach and education materials that prevent this risk from, you know, keeping people from voicing their concerns at the right agencies, at the right [inaudible].

With that, we'll move on to the next slide.

Again, thank you, Marcos, for joining us today to discuss this important issue and to provide us an example of an operational framework and objectives for how we implement and get some strategies effective within the US.

So, what does that look like? The operational objective will be to allocate time at the CFMC meetings, at least annually, to document stakeholders concern about the ecosystem to Council staff and then follow-up with an informative letter from the CFMC that outlines stakeholder concerns to state or federal agencies as relevant. And in doing that, we can create a document and outreach materials to provide stakeholders with the information on how to directly communicate with these territorial and federal agencies regarding the anthropogenic stressors that are damaging the resources.

Okay, moving on.

Alright. There we go. So, I believe this is the last slide and then you guys won't have to hear my voice for at least a little while, which I'm sure you'll be thankful for.

The action items that we need to focus on during the meeting. I

put them on the slide so we can kind of come back to this as the meeting goes forward so we all remember what we need to do.

Update. Update all participants on current efforts underway. So, anything ongoing within the U.S. Caribbean they can aid in the development of the FEP. We need to make pathways for that information to reach us on the EBFM TAP. So, if there are people that know about other efforts that we're not talking about today, please contact me, I guess, because I'm the chair or the CFMC staff regarding those efforts so we can find a way to bring them into this process.

Next, we need to identify incomplete products and plan how to complete them. Meaning, looking at the conceptual models and identifying the pathway by which we're going to build them or we're not going to build them or are we going to use risk assessment to identify the ecosystem indicators from the conception models? How do we prioritize it? We currently do not have a process for that, and that's something we need to identify and develop.

Third, we need to agree on a plan to complete outstanding work in the "where are we now" stage of the Lenfest loop towards FEP development. This is developing strategic objectives. Prioritizing identifying ecosystem indicators from the conceptual models. To get to that point, we need to finish developing conceptual models to identify how we're going to use that information. We need to identify how and who will be doing the work of writing the FEP either we're going to create subgroups, or we'll find alternative means of solving it. And looking at what information has already been done, that we can incorporate it into the text. And we need to agree on that as the EBFM TAP. Alright? So, it has to be done through this process.

Fourth, we need to create a plan to develop strategic objectives by the next EBFM TAP meeting. We have a list of goals and subgoals; within that, we need to identify the objectives that we, as the TAP, are going to complete [inaudible] right here.

Last but not least, we need to initiate a discussion on how to develop operational objectives to propose to the Council. Because the process by which we've done it previously is not working. We need to find a better way to explain what the things are that we're going to do within the EBFM TAP and what information we need for the Council to guide those decisions. You know, it's on us to come up with that kind of plan. And, you know, I will then present to the Council to get them to approve.

Alright? So that's what we need to do. It's a lot, but it's manageable. If we create plans and understand everything that is ongoing and that has been done already for our system. With that, I will be quiet.

GRACIELA GARCÍA-MOLINER: So, Mr. Chair, following the agenda we have the Smithsonian Mangrove Project for the US Caribbean. So, Susan Kotikot will be-- or if you want to do the intro or [inaudible]. So, moving on, Susan, are you online?

SUSAN MALASO KOTIKOT: Yes, I am. Alright. I'm going to share my screen now. Can everyone see my shared screen?

ALIDA ORTIZ SOTOMAYOR: Yes. We can.

Smithsonian Mangrove Project US Caribbean

SUSAN MALASO KOTIKOT: Alright. So, I would like to thank you very much for this opportunity to talk about some of the work that we did for the mangrove mapping in Puerto Rico and the U.S. Virgin Islands.

So, I'm Susan Kotikot. And this work was completed under the supervision of Steven Canty, Jordan Cissell, and other colleagues and local stakeholders who are very helpful in consultation and providing additional data.

So just to give a brief introduction about myself, just you know who I am. I am a PhD candidate in geography and climate science at Penn State. And I have an undergraduate in environmental studies and a Masters in Earth system science. My research mainly revolves around landscape ecology and dynamics. So, I try to use remote sensing and GIS tools and data sets to understand the collective impacts of climate change and human activities on socioecological systems. And so, I tried to integrate the different tools and data sets and methodologies with the main goal of identifying how landscapes or ecosystems can be managed better and to improve their resilience as well as regenerative capacity.

So, the mapping, what our [inaudible] was completed as part of an internship that I completed with the Smithsonian institution. And the main idea was to create up to date maps that are high in accuracy and high resolution, and as well as complete mangrove maps to better support conservation and management decisions. Because most of the existing layers are either not up to date or not complete or the accuracies or resolutions are really low.

And just to highlight some of the important aspects of this mapping effort was the stakeholder involvement and community validation that helped to improve the accuracy of the maps because we had direct information from the ground on mangroves are and as well as validation information to be able to correct and continuously improve the maps.

So specifically, what we would like to recognize the University of the Virgin Islands Center for Marine and Environmental Studies, Dr. Kristin Grimes, Heather Stewart and Allie as well as the Pew Charitable trusts, Doctor Orian for all the support and consultation.

So, the mapping approach was completed in Google earth engine platform and utilizing high resolution Sentinel-2 satellite imagery. Google earth engine is a special processing service that runs on Google Supercomputers, and it provides access to a large set of global and regional data sets, including satellite imagery and spatial data sets, and it also provides planetary scale analysis capabilities that allows people to handle large data sets without the need of having to download them into their limited computers and laptops. And so, all you have to do is develop your algorithms and utilize that database of data that's available within Google Earth Engine. And at the end of it, you have real world application outputs.

And then, the use of Sentinel-2 satellite imagery was very useful in this case because the high spatial resolution at 10 meters allowed us to capture very small mangrove areas that could not otherwise be captured using other data sets, like [inaudible] a spatial resolution. And the high temporal resolution as well as 10 days revisit allowed us to make sure that we have a good composite of imagery to begin with for creating the maps.

So just to give a brief overview of the processing steps that are involved in generating these maps, we utilized Sentinel-2 multispectral imagery and created a cloud free composite with data that was collected between January 1st and May 31st for the year 2020. And then the rest of the processing steps, I'll just highlight some of the important ones. In addition to masking out areas that were not likely to be mangrove such as high elevation areas or really dry areas using vegetation indices, we included additional bands that, you know, in addition to the native Sentinel-2 imaging bands that allowed us to delineate where different mangrove categories are. And then these were fed into a random forest classifier and in an alternative classification

process where we generated training samples identifying what are mangroves and what are not mangroves, and then run that through a classification process involving an assessment. And then when whenever we identify issues with it, then we included more training samples, editing of the training samples until we had an acceptable map. And then at the end, we performed an accuracy assessment to identify to see how accurate the maps were.

So, the output is a map that shows where mangroves are within Puerto Rico and the surrounding islands in the U. S. Virgin Islands and the British Virgin Islands. And These are available in different formats, shapefiles, KML, as well as an interactive map within Google earth engine where you can browse through and see and zoom in to see where these mangroves are.

So, the mangrove classification accuracies are assumed on the table here. And you can see that most of them have accuracies above 85 percent which is really good for all the islands. We still do not have accuracy results for the British Virgin Islands, but our visual assessment showed that it was a really good map.

So, the other thing that we did was compare our map with an existing layer from the global mangrove watch and calculating the difference in areas to see whether or not we had identified additional mangroves or lost mangroves in other areas. And what we found was that in all these islands that we have mapped additional mangroves as part of our effort, at least as compared to the global mangrove watch layer that was created in 2016. Looking at it, especially, you can see that the mangroves that we identified as newly marked mangroves compared to the global mangrove watch, were mainly around the already existing layer on the global mangroves map layer, but we also have large patches of mangroves that had been omitted from the global mangroves watch. So, we see the additional utility in in applying our approach and mapping effort to identify these left out mangrove areas.

And so, by examining these gained mangrove areas, we identify that most of these were mainly because the high-resolution data was able to capture the small patches of mangroves that could not be mapped using [inaudible] data set at 30 meters spatial resolution. And our mapping approach also could have been very accurate in capturing most of the mangroves. And stakeholder validation also assisted a lot to identify areas that were not easily identified as mangroves just looking at the satellite imagery. So, at the end, we had an improved map that was able to capture most of those mangroves.

So, in addition to that, we also looked at, you know, the areas where we might have lost mangroves from our maps compared to the global mangrove watch map layer. These are just screenshots of some of the areas within Puerto Rico and some of the U.S. Virgin Islands showing areas where we had lost mangroves. On our map we identified less mangroves than what the global mangroves watched had marked.

So, looking at this specific area, for example, you can see that the green area which we identify here as Lost Mangroves has a brown pigment here on this high-resolution satellite imaging showing defoliated or dead mangroves. So, within that period between 2016 and 2020 when we develop this map some of those mangroves had been lost.

We also see another section here in Southeast and Puerto Rico showing, you know, that stripe along that coastline where you have that same brown pigment showing dead or defoliated mangroves. And then in other areas, it appeared like the initial global mangroves watch layer had mapped a water area as a mangrove while it was supposed to be water. So, most of these areas we see that they are either defoliated they were defoliated between 2016 and 2020, or they were just misclassifications that we were able to capture data and or meet some of those that were not really mangroves at that time.

So, the mapping had a few challenges, especially within the smaller U.S. Virgin Islands like Saint John, where the mangrove areas are really narrow fringes that are hard to capture. And so, Sentinel data set allowed us to capture those tiny fringes of mangroves and that's how we were able to get those additional mangrove areas that had not been mapped before.

So, in summary, in addition to the mangroves layers that we were able to map and show here, there's potential to include other ecosystem services as part of these layers like new carbon assessments. And also, that stakeholder participation allows us for continuous validation and improvement of map accuracy because as time goes, we can develop additional layers over time that we can continue to improve as validation data becomes available from the different stakeholders.

And also, the current algorithm that we are using can easily be implemented to generate maps at those regular time intervals like 2021 and 2022, and that allows for easier monitoring of mangrove conditions and mangrove areas. And as I mentioned earlier, the maps are available in various formats as ESR

Shapefiles, as gridded rasters at 10-meter spatial resolution as KML layers as well as interactive maps within Google Earth Engine. And currently, further analysis is underway to assess the extent of dead or defoliated mangroves that we identified was responsible for most of the lost my gross between 2016 and 2020.

So that's all I have. I'll take any questions that you have.

Questions

ALIDA ORTIZ SOTOMAYOR: This is Alida. I have a question, and I-- Okay. Susan--

SENNAI HABTES: No. Wait. Wait one second. What I'm going to do is I'm going to have all [crosstalk] as you raise your hands.

ALIDA ORTIZ SOTOMAYOR: Okay. Okay. Great.

SENNAI HABTES: So, let me just thank Susan for her for a great presentation. And, you know, say, Susan, if you can, please do stay in touch. I also want to apologize for when you needed some data validation, I was unable to get out and do a lot of that work because I was transitioning from my position at U.V.I. and that had a lot of complications that I didn't anticipate to [inaudible]. But thank you for all of your work.

And with that, I will open a few more questions, and I'll turn it over to Alida first. I'll just make a reminder. For those of you online, please either raise your hand or put it in the chat and I will call on you and have you jump on and ask your questions.

ALIDA ORTIZ SOTOMAYOR: Thank you so much. Susan, excellent presentation. From the outreach and education aspect, what level of stakeholder participation do you have in your research? Were they the people who live near the mangrove or was it the government officials; people that work with that environment. Can I get a little bit of details on that?

SUSAN MALASO KOTIKOT: So, it was mainly from institutions or agencies that work on mangrove work, that do restoration efforts that were able to provide, like, restoration layers where they are dealing with mangrove loss or providing coordinates of areas where mangroves are or are not.

So based on our initial assessment of the satellite imagery and meeting information or verification of whether or not what we

identify as mangrove, who are actually mangrove, who are able to go there and check if or confirm that, and we are able to use that information to correct the maps.

ALIDA ORTIZ SOTOMAYOR: Thank you so much, Susan.

STEVEN CANTY: I'd also just like to follow-up on that. Part of the reason that we're using Google Earth engines is to allow more people to have access to it. So, Google Earth engine is a free software and we're putting together training materials. So, it can be open; it is open access, and it can be utilized by anybody. So, what Susan's done a really good job is setting a baseline that anyone can now go in and sort of check to see what's happened in 6 months or a year's time, so they'll be able to use that equipment themselves or software themselves.

SENNAI HABTES: Steven was, I believe--If you guys can maybe go back, like, 2 or 3 sentences we kind of lost audio in the room just before you started speaking.

STEVEN CANTY: Sure. So, I just wanted to say what a good job Susan had done with these, but the reason that we as well not-- So the reason we look to do this in Google Earth Engine and using Sentinel-2 is that both of them are free. And so, what we're currently doing is putting together some training materials so that it would allow any stakeholder to be able to go in and use it. And it's part of what we're trying to do. So, these maps that we've produced, we've produced them for Belize, Mexico, Guatemala, Honduras, Costa Rica, and we're looking to expand that. And it's always at the request of a stakeholder and then to sort of make sure that then they're usable by it can be communities, managers, or government officials.

SENNAI HABTES: Great. Thank you. I see William. And then [inaudible] up. So, William, if you want to go ahead.

WILLIAM HERNÁNDEZ: Yes. Good morning, everyone, and a very nice presentation and work. Very interested to see the data and potentially use that information. In regard to our project, we currently have a project for sargassum inundation impacts in coastal areas and mainly mangrove areas. We have documented using very high-resolution information, especially in Southwest Puerto Rico of impacts of that accumulation effects. But it would be good to see and reproduce these maps on a yearly basis. At least to kind of kind of quantify those impacts. So, I would be, yeah, I would I got your contact info, and I will probably be sending you more information on this, but it would be really good to kind of collaborate on this future projects. Thank you.

SUSAN MALASO KOTIKOT: Thank you. That would be great.

SENNAI HABTES: We have one question in the room.

SEANN REGAN: Great. Thanks. Seann Regan, NCCOS. Yes. This is a great presentation. I just had to questions. One, I think we're really interested in the data as well. So, I'll follow-up to see, it sounds like the data is shareable now, if there's any way to access that, that would be great.

And then I was curious, you mentioned the data is from 2020, but what sort of [years?] of input, certain days to years? And did you do any analysis with previous years of Sentinel data. Thanks.

SUSAN MALASO KOTIKOT: So, the input imageries were those that were collected between January 1st and 31st May 2020 to generate a map of mangrove layers in 2020. So, they were collected within the same year. And we had started some efforts to generate some maps for 2017 and 2018, but those are not complete yet. So, we do not have those maps yet, but that's part of the future work.

ORIAN TZADIK: Susan, fantastic presentation. Thanks so much. So cool to see this all coming together, and the products you guys produced are absolutely fantastic. I had a question regarding the brown hue you were talking about, the defoliated mangroves.

Is there a potential to develop a sort of indicator that we're not quite at the brown hue, but we're not at the same color as live mangrove, and that it would be kind of an intermediate that would lead to document and track.

SUSAN MALASO KOTIKOT: Can you ask that again? Sorry. I didn't hear you.

ORIAN TZADIK: I'm wondering if there is kind of a spectrum colors that we could look out between live and dead mangrove and develop some sort some of [inaudible] or some sort of just, you know, notification through this process.

SUSAN MALASO KOTIKOT: So, between, like, completely dead mangroves and green and healthy mangroves, I believe it's possible to, you know, generate a layer showing other conditions that are not completely dead, and are not neither, like, green or healthy. But to create an accurate map of such a layer would need additional ground trooping information that actually tells us that, you know, it's actually within that transition period

between dead and healthy mangroves. But I believe that's a possibility.

STEVEN CANTY: I'll also add to that. Some of that change was due to hurricane damage. So those were fully defoliated, so there wouldn't necessarily be that change. But picking up some nascent leaves, as long as we just focus it in, you'd have to sort of disaggregate that mangrove layer and know that layer and then just track that so that you would then change your spectral analysis just for that area so that it wouldn't confuse with any other foliage around.

It's doable, but it would depend on the stress and like Susan said you're going to then-- what you need to do is train that model through a dieback period or a stress event. So, it wouldn't necessarily be that easy just to go out and do it. It would have to be at an unfortunate event when we know that a mangrove is stressed.

SENNAI HABTES: Okay. So, I don't see any other in the chat or in here, but I have a couple questions and comments if that's okay. Susan. So, Thanks again for all your work on this presentation it is really quite an amazing product. I think our interest from the EBFM TAP is, I think, Orian mentioned we'd be looking at kind of indicators. So, one, we could be looking at that [inaudible] and another could be looking at percent change. In that instance, you know, that question of comparing that ground water to the dead leaves isn't so much of the issue if we're just looking at all the [inaudible]. Right? So, you kind of want to understand after kind of like an event like a hurricane, are you seeing a rather large change in [inaudible] the dead mangrove areas compared to what we had before. And so, kind of, you know, that may be food for thought going forward and looking at developing indicators that could, you know, may be useful for managers in the region.

A question is, where you were you able to compare, like, further back using imagery that doesn't have the spatial resolution of the Sentinel. Maybe comparing, like, [inaudible] longer back in time with, like, a Landsat or MODIS that have much lower spatial resolution. Is it feasible to do comparisons between this higher resolution data product with analysis back to something like Landsat or the MODIS image if it's not as good resolution?

SUSAN MALASO KOTIKOT: Well, it is possible to compare between, like, all the data sets that are not as high resolution like Landsat or MODIS with the Sentinel, you know, but that would be more appropriate for areas where we have large extent of

mangrove areas that can be captured using both data sets. So, we haven't been able to do that. I haven't been able to do that to compare between the data sets. But you would work for just those areas. For example, we've been in Puerto Rico where we have large areas of mangroves, but not for the smaller areas that cannot be captured using the not so high-resolution data sets.

SENNAI HABTES: Sennai for the record. Thanks. That makes a lot of sense then. One more, just a comment. I'm not sure if you guys had seen this, but from U.S. Forest Service, Geospatial Technology and Application Center, has put out some new tools they are calling Landscape Change Monitoring System and you can download a lot of the data that they've created for all of the U.S., including the U.S. territories. And they looked at land use change land cover change, things like that. But it's highly focused on the terrestrial forest environments because they don't have people with mangrove experience creating their spatial data process.

I think, you know, they would be really interested probably in the data that you've developed and the classification that you've developed. And they might be a group that has resources that could help you build this into something largely with ground trooping that will allow to be part of, you know, one of the LCMS outputs that they're creating.

So, you know, reach out to me if you need their information and want to connect with them to talk about, you know, developing future products or [inaudible] what they've done with the LCMS.

SUSAN MALASO KOTIKOT: Thank you. That'll be a great follow-up.

SENNAI HABTES: Okay. So, I'll make one more call for questions. Are there any in the room or online? Yeah, Stacey has a question.

STACEY WILLIAMS: Great presentation. I just have one question. Did you [Part of Ms. Williams comments are inaudible on the audio recording.]

STEVEN CANTY: You've just gone to mute. So, we can't hear you the question.

STACEY WILLIAMS: Hi. This is Stacy Williams. Great presentation. I just wanted to know, did you compare your data or your maps with other habitat maps that were created for Puerto Rico, especially, like with NOAA. I know NOAA has a habitat map in the Southwest and now in the Northeast and they

have mapped mangroves. Did you compare what they covered to what have you produced?

SUSAN MALASO KOTIKOT: Yeah. We did use some of the some of the layers for, I think, Northeast Puerto Rico and parts of the of the surrounding islands. But this was helpful for, you know, guiding us generally where the mangroves are, as well as seeing how our maps compare with what they created. So, yeah, we did that, but not quantitatively in a way that if we can provide, like, you know, statistics on how they both compare, but we have that layer comparing with ours.

STACEY WILLIAMS: Okay. Thank you. Yeah. Because in La Parguera, I mean, we've seen a lot of the mangroves, especially in the cayos and reefs getting out. And I've been approached by stakeholders, people that have use these areas for recreational purposes, even noticing the changes in the mangroves. So, it'd be interesting to see if those maps are accurate because they are before the hurricane compared to your maps that the change in cover or, as Sennai mentioned. So, if we could find a way to use MODIS or the Landsat to look at the changes before the hurricanes because I feel that I've seen the change since I arrived in Puerto Rico in 2004 up until now. So, yeah. Several things that have major impacts in cover, but there are changes before then and to kind of figure out the indicators or the stressors on this microbe. Thank you.

SUSAN MALASO KOTIKOT: Thank you.

SENNAI HABTES: Okay. Again, Susan and Steven thank you so much for presenting the work on this important data product. I think, you know, the U.S. Caribbean could get a lot [inaudible].

So, with that, I don't see more questions. So, I think we are at-- it's now 10:30 and so we are right on time for our 10-minute break. So, we are going to take that 10-minute break from 10:30 to 10:40AM. Actually, it's 10:31 now.

Our start time 10:41. So we'll see guys all back here in 10 minutes, and we'll start at 10:41.

(Whereupon a brief recess was taken.)

SENNAI HABTES: Let's get this thing in gear. I'm going to keep us one time if it's the last thing I do.

Okay. Good morning again, everyone. It is 10:43AM on March 16th of 2022. This is the Caribbean Fisheries Management Council

Ecosystems-Based Fishery Management or EBFM Technical Advisory Panel meeting, and we're back from our 10-minute break. A little late, but we'll try and catch up as we go along. Next on the agenda, we'll be Michelle Duval who's going to be giving us an overview of-- Oh, I'm sorry. Yeah. she's going to be giving us an overview of the conceptual models that were done in the U.S. Caribbean. And so, she's going to talk to us a little bit about the stakeholder engagement workshops and how that information was used and how we can use it towards the fishery ecosystem plan that we're trying to develop. So, with that, Michelle, I'm going to turn it over to you. Thank you again for joining us, and we appreciate your time.

Mellivora Consulting Conceptual Models

MICHELLE DUVAL: Thank you, Mr. Chair. Can you hear me, okay?

SENNAI HABTES: Yes, we can.

MICHELLE DUVAL: Great. So, I'm just going to make this bigger so you all can see my screen a little bit better. How's that? Okay.

ALIDA ORTIZ SOTOMAYOR: That's great.

MICHELLE DUVAL: Okay. Great. Thank you. So, thank you, Mr. Chair, and members of the of the EBFM Technical Advisory Panel for the opportunity to brief you on these stakeholder engagement workshops, as the Chairman noted, took place last year sometime. I apologize, there might be some pieces of this that are a repetition of some of the things you've already covered here this morning. I've had to do double duty on two different webinars already this morning. So, while I was logged into this one, I was having to participate in another one, so I apologize for that.

For folks who don't know me, again, my name is Michelle Duval. I've had privilege of working with the Council for the last couple of years on the development of a strategic plan. And at the same time, I was fortunate to be able to work on this project as well to support this very important effort.

So, this is just a quick overview of what I'll be covering this morning, just a brief refresher on the project background and purpose. Then I'll talk a little bit about the methods and outreach that were used before getting into the conceptual models that were developed. And then, you know, ending with some highlighting of common themes across those conceptual models.

So the driver for this product was really, as everyone is familiar with here, the fishery ecosystem plan best practices as highlighted by the effort present illustration here from the Lenfest task force or the FEP loop, which you know, obviously, as you all talked about earlier, starts with an assessment of where are we now and specifically, you know, co creation of a conceptual model to help identify an inventory ecosystem components and how they interact with one another. And, you know, while I know that everyone sitting here is very familiar with the central tenant that stakeholder input is central to fishery system planning, I do always think it bears repeating because not all stakeholders or members of the public may necessarily be familiar with what constitutes good governance with respect to building a fishery ecosystem plan and that this broad stakeholder involvement is really critical to identifying tradeoffs that policymakers and scientists may not be aware of.

And so, this project was really part of a much larger coordinated effort that I think most of you are familiar with by the Council and others to try to reach as many stakeholder groups as possible in support of those FEP best practices. And so not only fishers and fishing communities, but also, you know, scientists, coastal marine experts, managers and, you know, in particular, other non-fishing stakeholder groups so that there would be lots of conceptual models for you all as members of the technical advisory panel to bring together into the Council's overall model.

So as part of that, the PEW charitable trust offered to support a subset of stakeholder engagement workshops that we're focused on local businesses and environmental, non-governmental organizations and I was hired to support that effort, and I was fortunate to be able to coordinate with Tarsila and J.J. and Stacey as the Lenfest grantees with respect to the methods to ensure that we were all using consistent methods with respect to building these conceptual models. And I just note that this project started in late August of 2020 and wrapped up in August of last year.

And so really, you know, the purpose was not only to support these FEP best practices by ensuring that a variety of stakeholder viewpoints are incorporated into the Council's overall conceptual model and specifically doing that by engaging a subset of stakeholder groups that may not be frequently involved in Council's work or may not even be aware at all of the Council's existence. And so, as I mentioned, before these were coastal businesses, including, you know, dive shops, surf

shops, sailing charters, restaurants, outdoor guides, hotels, you know, a number of different local businesses, as well as local, environmental, non-governmental organizations that were based in each island district. And so, the goal was to develop conceptual models for each stakeholder group in each island district.

So, this project started with the development of outreach materials so that we could ensure that once we started reaching out to stakeholders to let them to participate, that we would have background information available for them. So, we started with two-page information briefs in both Spanish and English. The first was focused on fishery ecosystem plan and what those are. And the second was focused on conceptual models and how they're developed. And so those were distributed to all stakeholders who accepted the invitation to participate.

And with respect to stakeholder contact, so there was an extensive list that was developed in coordination with Dr. Ortiz as the Chair of the Council's Outreach and Education Advisory panel with support from Sea Grant staff. So that was not something that I developed, but that was provided to me. I think, you know, the thing that I want to highlight is that we really cast a very broad net with respect to stakeholder participation in the range of coastal businesses and NGOs that were targeted for invitation. You know, we did employ a small group approach to these workshops because we wanted to make sure that all participants had the opportunity to be heard and that there was time for thorough discussions of all ideas. So, we had a target size of 8 to 12 participants for each workshop and, you know, across all of the island platforms, we invited over 40 environmental, non-governmental organizations and over 80 coastal businesses.

And, you know, we sent -- recognizing that people's schedules busy, especially during COVID-- email invitations were sent about 4 weeks in advance of each workshop. And then after about a week, outreach to follow-up with non-respondents by both emails as well phone call and once someone accepted the invitation, we sent them an agenda and outreach materials. And, you know, this definitely took some time, you know, I think anyone who's been involved in something like this can appreciate that, that a reminder email with the agenda and materials was sent again two to three days in advance of each workshop, and then participants also received reminder phone calls, either a day in advance or in many cases, the day of in the case of the evening workshops that we use. And then all workshops were conducted beginning with the third week of April and running

through the end of May 2021.

And so, the workshops themselves were, of course, they were virtual due to the pandemic. We targeted a two-hour time slot. We wanted to be sensitive to people's home lives and the time that they were taking away from that for it. All workshops were recorded so that we could ensure the accuracy of the models afterwards. Again, we targeted evening workshops for the businesses in order to maximize participation. And for the workshops that were conducted for Puerto Rico stakeholders, we had simultaneous translation -- Thank you, Guillermo -- and Spanish materials. So, all the workshops started with just a round of introductions, a little bit of orientation to the Zoom platform. And then there was just a brief presentation highlighting the background information that participants had been provided previously, you know, including an example conceptual model using a forest ecosystem. And then from there, we went into a couple of rounds of individual brainstorming. And the first was focused on identification of biological, social, and economic components of the marine fisher ecosystem and then the second round of brainstorming was focused on identification of the linkages or relationships between components.

And so, after each workshop, we followed up with a thank you email to all the participants, and that email included the link to a Google document that actually contained a picture of the conceptual model that participants had developed. We let folks take a couple weeks to look at that and see if there was any additional feedback that they had with respect to the linkages between components. So, this was sort of a model validation exercise. We only had 3 participants who provided additional feedback in that regard. So that feedback was incorporated into the final conceptual models and then all of the workshop recordings, again, were reviewed to ensure the accuracy of both the components and the linkages among components.

So now I'm going to shift gears and we'll review the results and take a look at the conceptual models. And I'm going to start with Saint Croix. This is the model developed by the environmental, non-governmental community in Saint Croix. And I'll just take a couple of minutes to orient you to this. So, you see some components with pink circles around them and some components with green circles around them.

And so, the pink circles represent what I'm calling driver components and the green circles represent what I'm calling receiver components. And I'm using these terms in a slightly different fashion than the mental model or software does. So,

the driver components are components that affected the most other components. In other words, they had the highest number of linkages going from them to other components. Whereas the receiver components are those that were affected by the most other component. So, those receivers are the ones that had the highest numbers of linkages coming into them from other components.

So, for Saint Croix, for the NGO community, you can see that two of the driver components were anthropogenic influences and regulatory agencies, whereas two of the receiver components were water quality and coral. Just to highlight some of the discussion that this group had, they were very focused on issues that were localized to specific geographic areas on the island. So, for example, a loss of mangrove and polluted runoff that specifically around Frederiksted.

So, moving on to the Saint Croix coastal business community. The driver components in this model were restoration of nursery habitats for fishes and coral species protection. And the receiver components were water quality, reef fish, and coral reefs. And the discussion that this group had was focused on the impacts of tourism, industrial activities as well as specific entities such as the Limetree Refinery similar to the conversation that the NGOs had, but this group also acknowledged the opportunities that the economic benefit that these specific facilities had with respect to employment. And this group also talked a lot about the impacts of a lack of education on the condition of the environment.

So, moving on to Saint Thomas/Saint John, starting again with the environmental NGO community. Two of the driver components in this model were run off and land-based sources of pollution. And two of the receiver components were water quality and coral. And the discussion that this group had was focused also on cultural history and heritage as well as the impacts of capitalism and gentrification on their fishery ecosystem environment. And they noted connections between development, pollution, and water quality.

So, moving on to the Saint Thomas/Saint John coastal business community. Two of the driver components here were lack of environmental education and government agencies. Whereas two of the receiver components were coral reefs and sea turtles. And so, the discussion in this group was focused on impacts of ineffective government as well as the influence of politics on the ecosystem, but they also noted the importance of environmental education in addressing many of the issues that

they brought up are reflected in the different conceptual model components.

So now move on to Puerto Rico. This is the model developed by the environmental, non-governmental community here. So, two of the driver components in this model were climate change and public education. Whereas two of the receiver components were reef fish and water quality. And so, the discussion here noted the importance of community participation in environmental actions and legislation, focusing on use of publicly available data sets and making sure people in the community were familiar with how to use these data sets as well as the importance of things like marine spatial planning, as well as marine temporal planning.

And so then moving on to the coast of Puerto Rico coastal business community. So, the two of the driver components of this conceptual model were lack of management and education. And a few of the receiver components were coral reefs, reef fish and lionfish. And so, this group noted what they consider to be sort of the heavy influence of historic cultural norms as well as the role of community leaders in affecting positive change. And they also discussed the lack of management and how that had negative impacts on the environment.

And so, you know, as we've walked through these models very briefly. I'm sure you all have noticed that there's a number of overlapping themes among the different models. And so, I just wanted to highlight a few of these things. And, you know, across all of the models, the components that were common to all of the models were education, that was a specifically named component, enforcement, all of the models had either fishing activities or fishing gear as components of the models. All of them noted specifically either pollution or waste management. For example, components dealing with waste management such as run off, erosion, you know, point source and non-point source pollution. All of the models had components dealing with ocean, climate, and/or weather conditions. And all of them either just named, you know, specific marine habitats or habitat as components.

Now the last two bullets I have on here in italics, *tourism*. All of the models included tourism as a component with the exception of the Saint Croix non-governmental organization community model. However, that that conceptual model did include components such as non-extractive human use of the ocean, non-commercial spear phishing on scuba and recreational fishing. So, while it didn't specifically name tourism, it included components, which all are elements of tourism to some degree.

And similarly, water quality was a component common to all of the models with the exception of the Saint Thomas/Saint John coastal business model. But, you know, similar to what I just mentioned, that model also contained several components that were related to water quality in some regards, such as contaminated aquifers, that was one, model components, and then runoff in that point source pollution, you know, are also elements of water quality.

Now, just a couple more slides. I did also want to highlight, I think, some common themes with respect to receiver components and driver components in the model. So, you know, again, the receiver components, these are things that were affected by the most other components. So, you know, water quality was a receiver component that was common to both of the Saint Croix conceptual models, the Saint Thomas/Saint John NGO model and the Puerto Rico NGO model. Coral and/or coral reefs were receiver component in, again, both of the Saint Croix models, both of the Saint Thomas/Saint John models, as well as the Puerto Rico business model. And then reef fish was a receiver component across both of the Puerto Rico models.

Now there's less commonality or overlap among the driver components. So, these, again, were things that affected the most other components. So, education was one of the driver components where there was some overlap and that was noted in both of for the Puerto Rico models as well as the Saint Thomas/Saint John business conceptual model. And then, you either government, regulatory agencies or management this was a common driver component for the Puerto Rico businesses, the Saint Thomas/Saint John businesses, and then the Saint Croix non-governmental organizations.

And so, this is my last slide, Mr. Chairman. So, I just I'll just note that the Council received a very similar briefing to this in July of 2021. The report was completed in August and provided to the Council and so really the next steps are for, I think, this body, for you all to consider incorporation of these into the Council's overall conceptual model that you're working on. And I believe you talked a little bit about sort of a pathway to move that forward earlier this morning.

So, with that, Mr. Chair, I am finished. So hopefully, I have saved a little bit of time for you all, and I'm happy to take any questions that folks might have.

Questions

SENNAI HABTES: Michelle, would you-- as it turned out.

CRISTINA OLÁN MARTÍNEZ: Ahora. Now.

SENNAI HABTES: Oh, okay. Thanks, Liajay. My apologies about that. Thank you, Michelle, for that great presentation. I apologize. I can't see you guys when I'm, like, looking up there I just hear the voice, and I keep forgetting which voice. Thank you, Christina.

Michelle, thank you for the presentation, and I will open up the floor to questions. Looks like we have about 10 minutes. Before we have to move on. So, there's ample time. So, first question-- I'm going to open it up. Let me start by doing the people in the room because that's a little easier. And then I'll move on to people that on online. So, J.J., you have your hand up. Go ahead.

JUAN J. CRUZ MOTTA: Thank you. Alright. J.J. Cruz. Thanks for that Michelle, that's an amazing work that you did.

You presented 6 models, and is that product of 6 workshops or you did more workshops and more of those?

MICHELLE DUVAL: No. That was-- that's a great question, J.J., and there were just 6 workshops, and so there was one model that came out of each workshop. So, one model for each stakeholder group on each island platform.

JUAN J. CRUZ MOTTA: Thank you. The second question Michelle. Did you use any the type of quantitative analysis to actually compare the different models, or it was just like visual comparison.

MICHELLE DUVAL: No. So that's another great question, J.J. So, it's really more of a comparison. I mean, I have not done the type of detailed analysis that I think probably you and Stacey and Tarsila are doing. So, this was noting, like I said, which of the components and the models were drivers. In other words, which were those components that had the highest number of linkages coming out from them to other model components, which were receivers. So again, those components that had the highest number of linkages coming into them, affecting them from other components. And then looking at also the highest numbers of linkages that any single component had and just looking again across, you know, what were the overlaps in those, you know, with respect to just looking at components that appeared across all of the different models. So, you know, not any statistical

analysis really more of qualitative.

JUAN J. CRUZ MOTTA: Okay. and the last question, you produced a report on this work with the [inaudible] information numbers of people that assisted to each one of the workshops.

MICHELLE DUVAL: So, a report was finalized in August, and it was sent to the Council. And I guess I was under the assumption that you all had received that and had been provided that? Is that not the case?

JUAN J. CRUZ MOTTA: Well, I don't know, I haven't--

SENNAI HABTES: That's a good question. This is Sennai Habtes for the record. I will find out. I think we were provided it, but I don't think it's on the drive. And so, I will fix that, and I will send an email out to all the TAP members so that we have access to it going forward.

MICHELLE DUVAL: And I'm certainly happy to send that report to you directly, Mr. Chairman. I do think, you know, that Council staff has it and I'm happy to send that out to anybody again as well.

SENNAI HABTES: Yes, Michelle, if you don't mind just sending it to me.

MICHELLE DUVAL: Okay. Great.

SENNAI HABTES: Okay. Next, we're going to go to Tauna. I believe you have a question.

TAUNA RANKIN: Yeah. Thanks, Sennai. This is Tauna Rankin with NOAA Fisheries Office of Habitat Conservation. Thanks for the presentation, Michelle.

You mentioned that the stakeholders discussed the sort of direction of the relationships. I'm wondering if they also discussed the strengths of those relationships and if that was captured in any way in the conceptual models?

MICHELLE DUVAL: So, we did not capture the strength of the relationship, you know, that is something that can be done. But we -- for the for the sake of simplicity and I think consistency with how some of the other models have been developed -- we didn't actually, you know, assign a strength of that linkage. You know, we were really focused more on ensuring that participants understood what a positive linkage was compared to

what a negative linkage was and sort of the relationship that is, you know, one component increased or decreased in, you know, quantity or quality. If that caused an increase or decrease in the quality or quantity of another component that they were understanding that relationship.

So, we didn't capture strength. We didn't ask them specifically for that information. I think, you know, qualitatively, you could go back and listen to some of the recordings and probably apply something like that, but that wasn't something that we that we specifically focused on.

TAUNA RANKIN: Okay. That's helpful. Just one quick follow-up. Does that mean that direction was captured in the models? So positive or negative?

MICHELLE DUVAL: Yes. So positive and negative was captured just not how positive or how negative. Yes.

TAUNA RANKIN: Okay. Thank you. That's helpful.

MICHELLE DUVAL: Yep.

SENNAI HABTES: Okay, J.J. had a quick follow-up, and then I'll go to Alida.

JUAN J. CRUZ MOTTA: Thank you. A follow-up just to answer your question. These are the only 6 out of between 40 and 50 models that we will have. And then when we start combining or comparing them, we will have an estimation of the strength based on the frequency that different groups mentioned at given relationship. Thank you.

TAUNA RANKIN: Oh, thanks for clarifying that, J.J.

SENNAI HABTES: Okay, Alida.

ALIDA ORTIZ SOTOMAYOR: Yes. Thank you, Michelle, for an excellent presentation. When your models take place, environmental education, are they referring of content in this formal education, are they referring to the environmental education from NGOs or from the government, what are they meaning?

MICHELLE DUVAL: That's a great question, Alida. And the conversation was different depending on which group. I think, J.J. and Tarsila and Stacey can appreciate this. We didn't try to steer what the components were called. So, if environmental

education was one of those components or education in general was one of those components, we didn't try to increase the specificity of that. But I think for some participants, noting that if there was some form of education in school that would create a foundation of understanding for how different things affect the environment either positively or negatively, for others it was more along the lines of information that could be obtained from just public outreach or other organizations such as Sea Grant that provide materials to improve people's knowledge and understanding of what those different impacts or stressors in the environment might be.

ALIDA ORTIZ SOTOMAYOR: Okay. Thank you so much, Michelle.

SENNAI HABTES: Okay. Are there any other questions either in the room or online. I'm not seeing other hands. Okay. And with that, I will thank you again Michelle for an excellent presentation. We appreciate your time as always and send me a copy of that report when you get a chance.

We will move on to our next presentation. Which will be a presentation on the Southeast Fishery Science Center or SCFSC inventory update by think just Kevin McCarthy, I don't think Rachel is available. Is that correct, Kevin?

KEVIN MCCARTHY: No. Rachel's going to help with this presentation and the following one.

SENNAI HABTES: Alright. Let's go ahead with the presentation on the SEFSC inventory update with Kevin McCarty. Give us one second to get the PowerPoint up. If not, we will turn over. Kevin, did you send them the presentation or anything?

KEVIN MCCARTHY: We did.

SENNAI HABTES: Okay. So, yep, we got that up, and then--

RACHEL ECKLEY: Okay. So, can everyone hear me alright?

SENNAI HABTES: Yes. We can.

Southeast Fishery Science Center (SEFSC) Inventory Update

RACHEL ECKLEY: Okay. Great. Thank you. Okay. So, hi, everyone. My name is Rachel Eckley. And today, I just wanted to give you guys a little bit of an update on the Caribbean projects inventory that I've been working on.

I first shared this with you all at the Council meeting, I believe it was in December. And I wanted to thank the Council and the panel for being interested in this effort and for asking me to present an update on it today. We've made some great progress on it since December, so I'm excited to share it with you.

Next slide, please.

Okay. So, I wanted to first start by reiterating why this effort was initiated in the first place. And if you were at the last few Council meetings, this may be a review for you. In order for a successful stock assessment that is able to provide management advice, assessment biologists need many species-specific data. We refer to these data as the ABCs of abundance, biology, and catch.

We obtained these data from commercial fishers, recreational fishers, and researchers performing fishery independent surveys. And the assessment biologists will compare the historical data to recent or current data in order to determine the stock status which then can provide management advice to the Council.

Next slide, please.

Okay. Oftentimes these data are not readily accessible or in a format able to be used in the stock assessment process. Now there are a few ongoing efforts from other organizations to improve the availability of data in the U.S. Caribbean, and then in a little bit, we'll share with you one of the efforts from the Southeast Fishery Science Center that we're calling the Caribbean strategic planning project. But again, this inventory is an effort to inventory the currently available data, investigate where data gaps are occurring and then direct future efforts to fill those gaps in order to ensure that we have all the necessary ABC data for the stock assessment model.

So, we're compiling a searchable database of past and ongoing projects and any associated reports, publications, DCs, dissertations that provide the data necessary for the stock assessment process. Right now, we're focused on compiling NOAA funded work, and we're opportunistically documenting projects from outside funding as well.

Next slide, please.

Are you guys seeing the next slide? I'm not seeing it on my end. Yeah. Perfect. Okay. Thank you.

So, in the last presentation to the Council in December, I briefly mentioned how this inventory can be queried. Today, I wanted to go into a little bit more detail on its searchability. So, the inventory is searchable by a few fields, one of which being the year in which a report was published or the year in which a project was ongoing. It is also searchable by target species and at the moment we focused on documenting research on the species that are managed by the Council in the Caribbean FMPs for example, Caribbean Spiny Lobster, Red Hind and Nassau Grouper.

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The inventory can also be searched by where the research took place. Right now, this is set up as location, sub location, and zone. Depending on the level of detail that was available in the publication or on the project website.

So, because this inventory is focused on the available data of the U.S. Caribbean. We wanted to make sure that the U.S. Caribbean islands were the main searchable fields, which is why we have Puerto Rico, Saint Thomas, Saint John and Saint Croix as the main location fields. And we've also included studies in nearby locations, including the wider Caribbean, the Atlantic Ocean and the Gulf of Mexico. So those locations are also searchable.

And as an example, if a research project took place and Buck Island Reef National Monument. It would be listed in the inventory as location, Saint Croix, sub location, Buck Island, and specific zone of Buck Island Reef National Monument.

The goal with this is to have it searchable in a hierarchical format, so you could search any or all of these fields. For example, you could search all research in Puerto Rico, only the research in Mayagüez, or even specifically the research at Tourmaline Reef.

We're still working with the developers to work out the formatting of this, but we do believe that the hierarchical format will be something that will be achieved in the search engine.

Next slide, please.

So, the inventory is also searchable by the author and type of document that the data are contained in, whether that is a book,

a cruise report, a NOAA professional paper, a publication, SEDAR document, or thesis. So, for example, if you were looking for a specific researcher's PhD dissertation but couldn't quite remember the title or the year it was published, you could search their last name and dissertation and find the paper that way.

Next slide.

The last area that it's searchable by is the data categories. So, in previous presentations to the Council by the Southeast Fishery Science Center, we've discussed how the stock assessment process is kind of like the backbone of fisheries management. But as I mentioned previously, the data necessary in the U.S. Caribbean are not always accessible or easily located. So, because this inventory stems from the need to better assess the availability of data to inform stock assessment, we first focused on inventorying the research related to the ABCs of abundance, biology and catch. These include age and sized composition data, indices of abundance, which can be from fisheries data or fisheries independent sources. These data also include take or fisheries landings, and life history information, including maturity, fecundity, and age and growth.

Next slide.

But we realized that this inventory really could house all sorts of data for fisheries management, not only those related to the ABCs, so we included other categories that relate to feeding or reproductive behavior, social sciences, MPA monitoring, habitat, as well as ecosystem-based fisheries management, which is the topic of today's meeting.

So, these are all of the data categories that the inventory could be searched by. And if in the future, we decide that we need to expand on this list. We'll be able to add more search terms.

Next slide.

Okay. Moving on to the current status of the inventory. It has been uploaded to ODM or the online database manager, where it will live and will be able to edit, maintain, and add new projects or papers.

ODM was created as a dynamic online data warehouse to store a variety of data sets for the Southeast Fishery Science Center, including management history, morphometric conversions and HMS

pelagic logbook history. And now it houses the Caribbean projects inventory. And at this point, the inventory is under limited access available to necessary personnel at the Southeast Fisheries Science Center.

Right now, I am working with the developers to format the inventory data set, create the searchable fields, and design the output table after a search has been performed. And because these research projects were so large and all-encompassing in terms of what the research objectives were, we had to get a bit creative with the formatting to allow for multiple selection options for fields such as target species, data categories, and location.

I think we've gotten most of the formatting figured out now, and we're happy with how the database is shaping up. And once it's at the place that we've envisioned it to be, we'll ask for testers to come in and try searching for papers to provide us with any feedback or suggestions to improve the interface or searchability. And some things that are a little bit further into the future will be to expand the inventory to also include non-NOAA funded work. I mentioned we've opportunistically collected some of this research already, but in the future, we'll be performing more targeted literature searches to ensure that we have a variety of data sources and funding sources.

And then finally, in working groups established at the Caribbean strategic planning workshop, which Kevin and I will be sharing with you all in a moment. We will be assessing the project data sets to determine their usability in providing data necessary to the stock assessment process.

Alright. Moving on to the last slide, please.

So that was all of the update that I had on this today, so I'd be happy to take any questions if there are any.

Questions

SENNAI HABTES: Great. Thank you, Rachel. I'm going to ask again that if you have questions online and raise your hand or put it in the chat so that I can see it and then call on you. We can start by seeing if there are any questions in the room. Yes, Graciela.

GRACIELA GARCÍA-MOLINER: Thank you, Mr. Chair. Rachel does the online database manager is it only for the records or will we have a storage capacity for the PDFs or the reports or the data

in the future. What's actual storage capacity for the purpose of this inventory.

RACHEL ECKLEY: Yeah. That's a great question. Thank you, Graciela. So, at the moment, we've sort of envisioned this to be more of a repository of just the papers and the details of the project. So, the data themselves will not be stored in here. Perhaps that's something we look into in the future. But at the moment, we're mainly just capturing the sources in which you can find the data with links to the papers or links to where the data sets are housed.

SENNAI HABTES: Seann?

SEANN REGAN: Thank you, Mr. Chair. Yeah. Just two quick questions. Sorry if I missed it, but I was curious-- first of all, it was actually a great presentation-- about how far back in time and then also what the long-term maintenance of this product is. Thanks.

RACHEL ECKLEY: Yeah. So, in terms of how far back in time, I'm collecting everything I can find. I have some papers in there from the early 1900's. And then as far back as I can go with NOAA funded projects, anything I can find online I've captured.

In terms of the maintenance for this, there'll be an upload form in the ODM, the online database manager that me or whoever else continues this project, we'll be able to add new projects and new papers, anything from 2022 on. At the moment, I think it's I think it's something that I'm going to be handling, but we haven't talked far enough in the future, I guess, to figure out where it goes from there.

SEANN REGAN: Okay. Thank you.

SENNAI HABTES: Any other questions? Let me see. Miguel?

MIGUEL A. ROLÓN: Rachel, do you have an idea how much is the cost of this project? And second, how do you plan to engage the Council? In this case, the Caribbean Council with this database. For example, we have a bunch of [inaudible] at our office. Do you just want to link the Council with those papers, or the repository of the papers will be the Council.

RACHEL ECKLEY: I think I'm understanding that correctly. So, I know the Council has a large repository of papers on the website, and I've been individually inputting those papers and those project details into the database. So that's how I've

involved your repository that the Council has. In terms of the first part, Kevin, I don't know if you wanted to jump in regarding the cost and upkeep of this?

KEVIN MCCARTHY: Yeah. Hi, Miguel. This all started as sort of an ancillary side project as part of our Southeast Fisheries Science Center, Caribbean strategic planning exercise. And what happened was it kind of took on a life of its own as we had some delays in getting the main project underway. And Rachel has really taken it and just run with it. So, the cost right now is entirely Rachel's salary, which is paid for by the FIS money. So that's federal dollars. And so, we've got 3 years of that money and the structure and moving into database itself is taken on by staff at the Science Center. So, the IT staff at the Science Center. So that's a cost-- that's sort of an operating cost of the Science Center. I don't know if that answers your question, but we've got Rachel's salary for 3 years. And she's the driver behind all of it.

MIGUEL A. ROLÓN: Thank you. That covers the question. It's just I was thinking ahead and secure at this database-- because it's very [inaudible] this this is something that we need. So, in the future, if moneys are needed for maintenance or whatever, our Council is ready and available to contribute. Thank you.

KEVIN MCCARTHY: That sounds great. We should definitely have that conversation because I think what it'll-- you know, I don't see it as a, and Rachel can correct me here, but I think once it's established, the maintenance will not be nearly as heavy a lift. You know, we'll have the database built. The database will be functioning. The data entry will be very clear. With the database, there's always hiccups to run into and things that have to be resolved. But I think the actual amount of time that a person would need to spend is not going to be anywhere near what Rachel has put into it so far since she's building it from scratch. So, year to year maintenance, I think, would be some fraction of a person's time for the year.

MIGUEL A. ROLÓN: Yeah. Thank you.

SENNAI HABTES: Okay, I have one question for you, Rachel. I don't see any others. I was wondering if you were able to look at, you know, [inaudible] has a running list of all the permits that have ever been applied for and a lot of that is, like, by federal funding through NOAA. And so, we don't often get final reports, but you can always go there to see when pretty much any project that's ever been permitted within DFW, and that could help you identify those projects that you may have missed.

RACHEL ECKLEY: That's great. Thank you. Yeah. I was unaware that the engineer had the list of permits. So, I'll look for that, and I'll compare that to the inventory I have, and I'll add anything that I may have missed. So, thank you for that.

SENNAI HABTES: Great. No problem. And with that, I will thank--unless, last time, going once, going twice, any other questions? Hearing and seeing none, I think we can move on to the next presentation. I think it's Kevin again with the stock assessment matrix for SEDAR. So, I'll turn it over to you, Kevin.

SEDAR-Stock Assessment Matrix

KEVIN MCCARTHY: Sure. We had a-- I mean, we can take this in any way you want. There was another presentation as well, but maybe we'll do that last. So that's okay.

So good morning, everybody. Thanks for the opportunity to present this. This is some information that those of you who have been participating in the Council meetings will have seen a lot of this already. But it never hurts to see some things again to make it stick in your mind or at least that's what works for me.

So, what I'm going to talk about is our efforts in the Caribbean fisheries branch of the Southeast Fisheries Science Center, our efforts to get a handle on the available data for stock assessment by species. And in order to identify those species that are most likely to be ready for a stock assessment that have all the data components that are needed for stock assessment. We don't want to set ourselves up on a stock assessment, spend a lot of time and a lot of resources, and then find that we're missing some vital component that's needed for a stock assessment.

So, the other thing this can do is identify those species that are missing a data piece or two. And therefore, we should put some money towards research in those areas for that species or group of species. So, what we're trying to do is prioritize where to go with our resources, with our stock assessment resources, and with our research resources. So, that's the gist of these talks today.

So next slide, please.

Okay. So, this is sort of a broad overview. I'm not going to

talk about every little box here, but this is kind of a broad overview of the stock assessment and management process. And so, in the big square box is what the Caribbean fisheries branch does. We don't necessarily do all the data collection, but we do some of it. And we're reliant on data collection in order to inform the second phase, which is modeling.

I have my cursor going over this, but I realize you can't see that. So, at the top of the of the of the of the black box, you see data collection modeling and advice, and those are the things that we can do. And then there is under management there's stock status circled. So that's what a stock assessment will get you to. So, the Caribbean branch relies on data collection that that we do as well as many other folks, both inside the Southeast Fisheries Science Center and outside. Territorial staff, academic folks, lots of people getting data.

Then those data are compiled and come back to us for the modeling part of the process. And then, the final results go through a peer review. Sometimes that's through the SSC only. Sometimes it's through the independent experts. And then the SSC, the SSC always sees it and it's also reviewed along the way through the SEDAR process. So, there's a peer review of the data collection. There's a peer review of the analyses. There's a peer review of the stock assessment modeling procedure.

And then we go we provide a stock status if the stock assessment is successful. And then the Council takes over under the management. The Council and the SSC, that that becomes their role then to take the management advice coming out of the stock assessment.

And then off to the right, you see this this bar that goes from red to green. And those are the various limits that that come out of the management process. We get an overfishing limit coming out of a stock assessment. And then, there's a variety of other levels at which the SSC and the Council arrive at limits like the acceptable biological catch and the annual catch limit, the ACL.

So that's the overall process. But where we need to be concerned initially is in the data collection. Do we have the right kinds of data to move forward with the stock assessment?

So, next slide, please.

So, this is that whole slide in words. So, I won't bore you with too much repetition, I hope. But we need things like the

landings. And we need things like how many dead discards were there? We need a size composition of the landings, and we need that in very specific ways. We want to know the size composition of the landings from the recreational fishery. We want to know them from the commercial fishery. We want to know them from the commercial fishery that uses traps. So, we need very specific size composition and landings as well.

We also need life history information. This is often where the stock assessment process hits a dead end. If there's not life history information available for a particular species, then the stock assessment can't move forward. But we're getting, Virginia Shervette in particular, is doing a heck of a lot of work on a number of species, number of Caribbean species getting life history information. So that particular stumbling block is becoming less problematic as time goes on.

And the last thing that we need is what's called an index of abundance. This is generally a catch per unit effort over time. All of these things except perhaps some of the life history information are time series of data. So, we can't just do a single year study and solve the index of abundance issue or the landings issue. We need a time series of these data. So, a lot of this data we have in the Caribbean. But there is very little information of this kind for many of the managed species.

So next slide, please.

So, the first step in this process of what do we have is to run sort of what we're calling a data triage. And at the end of this, I'll show you what that looks like, sort of a schematic of it. But basically, we go through-- and this is an ongoing process. We go through and we figure out, do we have landings? Do we have landings by gears? Do we have landings by the various fishing sectors? Commercial, recreational, for hire. Do we have life history information? That's the process for that data triage.

The second bullet point, Rachel already talked about, so I won't spend time on that, but that compilation of federally funded research, that's the project Rachel just led you through.

And another issue, because life history information is so critical, we formed a working group Stephanie Martínez Rivera who's in the Caribbean fisheries branch staff sort of leads this sort of informal group and what they're trying to do is coordinate their projects, you know, there's never enough money to do to do work. Right? Research, that can be expensive. And

so, coordinating among various groups to help each other, to not duplicate effort, is pretty critical. So, we've got that working group up and running.

Next slide.

And so, we've done some of the initial data triage, and the idea then is to prioritize. If you've got a species that checks all the boxes for data and data availability, then that's a good candidate for future stock assessment. If you've got a species that's maybe missing one element, well, that now becomes something that you want to put research dollars towards. And then you've got some other species that are really lacking. Maybe there are landings, but there's no size composition, no life history, that's going to be a longer-term project to get the data necessary for a future stock assessment.

But we can also design, as we identify these things, we'll we will design new or expand existing surveys. We want to improve survey designs so that we're collecting the data in a statistically robust and valid way. We want to build collaborative research with fishers. It is not particularly cost effective to drive the NOAA white ship down to put over a hook and do a fishery independent survey. But it makes a lot of sense to work with the with the fishers who are already there and who know how to do this stuff. So, collaborative research with the fishers is going to be critical in the future, and I'll have more to say on that later.

We've already talked about the federally funded research database and the life history working group.

So next slide, please. Yeah. That one. Perfect.

So let me just walk you through some of the some of the projects that we've got going on, and I'll show you the triage at the end of this. Those things in italics are ongoing.

So, we've got in Puerto Rico and the Virgin Islands, port sampling projects. The goal there is to come up with a really strong survey design so that in future, we can have the best port sampling surveys that we're able to come up with. And what we want to be able to do is to sample not only landings, but size composition, not only the commercial fishery, but the recreational fishery. So, in the Virgin Islands, we're developing a program that does all of that. In Puerto Rico, we've completed-- well, it's still ongoing-- a project where we're looking at the commercial sector, but Puerto Rico DNER has

their own project that's just now up and running to do similar work with the recreational fisheries. So, at the Science Center, we're providing a little bit of support for that project, but it's absolutely Puerto Rico DNER's project. We're providing a little bit of support.

And there's another project. This last one. This information systems or Fishery Information Systems. That's FIS. That's a funding source to improve the efficiency of sampling using automation and machine learning. So, this is a project that we had hoped to get going last year. Ran into some issues with contracting process and that should be up and running this year. The idea there is to sample as quickly and efficiently as possible so that, particularly with, well, with anybody, commercial fishers, recreational fishers, for higher fishers when they come into the dock or to the boat ramp, we want to sample them quickly. Get all the data and not delay them for any longer than is absolutely necessary. So doing this in some sort of automated way, taking pictures of the catch and then having the computer figure out what species it was-- after we get the system working --what species it was, how big the fish were, that's the plan with that.

Next slide.

So, I mentioned how critical life history is. So, we've got a number of projects designed to collect life history information. One of the projects that Stephanie is leading is this first one Puerto Rico Shallow Water Sampling. The idea there is-- it may or may not end up being wholly shallow water --but the idea is, for life history, you want to have samples of the whole size range of the species. Often, it's very difficult to get the smallest individuals. Those are not landed, typically, and they may be in very different habitats than the adults. So, this we're calling it the Shallow Water Sampling, but the idea is to find those areas where there are the small fish. So that we can get the samples, so we can have the whole size range for the life history work.

Kate Overly and Andy David at the Science Center Panama City Lab along with Virginia Shervette at the University of South Carolina have been working in Western Puerto Rico on deep-water snapper sampling and the associated life history work. That is ongoing.

We've got, as I already mentioned, this working group to coordinate among life history researchers. That's happening, so it's not in italics. It will be ongoing, but it's established

and making progress, I think.

We've also provided support for the DNER life history laboratory. We've provided some data analysis support and purchased some equipment and supplies to help build their capacity a little bit. We hope to continue that collaborative work.

Next slide.

So, abundance indices are also important. SEDAR 80, you'll see that in the first two. For the first time we've developed a standardized index using the commercial fisher logbook data, in Puerto Rico as well as the Virgin Islands. We hadn't been able to do that before but now that we have a dedicated staff who are focused on the Caribbean, we've got some time to work on these kinds of projects. Those were developed for SEDAR 80 and will be used in the stock assessment.

Also, for the first time, the Reef Visual Census, the RVC survey, this is a diver survey that is conducted, I believe every other year, an index of abundance was also constructed using those data for the first time. That's a project that Jay Grove and others at the Science Center conduct.

We've got an ongoing project in Puerto Rico looking at lobster recruits. These are not the larvae coming in. Not the pueruli coming in but animals that are just below legal size that on the next molt or over the course of the next year will grow into the fisheries. So, it's very, very close to moving to a size that moves them into the fishery.

We've got some sort of pop-up window I'm seeing. Thank you.

And then I mentioned Kate's work in the deep-water snapper fishery and that's ongoing. That's a camera to look at abundance as well as a vertical hook and line gear that they're using to collect samples, but they can also combine the results of those 2 gears to get up to get an even better estimate of abundance.

So next slide.

So, I mentioned that we need landings, we need life history. We need size composition. We need indices. But, you know, nothing's ever easy. That's not enough. We needed some additional information. There's always a complexity or two that that comes your way when you're trying to do a stock assessment. One of those things is with gear selectivity. This is a critical

component, and it came up as an issue or a question rather, a research question, coming out of the last spiny lobster stock assessment.

The question there is, what sizes of animals are being caught by the fishery? So, what gets caught in in the traps? For example. And is that reflective of the size composition of the animals in the population as a whole. So, we've got a couple of trap studies. One in the Virgin Islands, and one in Puerto Rico. That Puerto Rico trap study is ramping up. The Virgin Islands trap study is well underway. We're working with Virgin Islands' DFW there.

Complimentary to that Virgin Islands study is a diver survey. So, the trap study will tell us what size animals are in the traps. The diver survey will tell us what size animals are seen by divers out in the population. Are there larger animals than what we see in the traps? And that is in partnership with the University of Virgin Islands. They're doing a Saint Thomas survey, and the U.S. Park Service is doing a diver survey in Saint John and Saint Croix.

Next slide.

And there are some additional projects we have going on that will be helpful to the stock assessment process. Although they're sort of in support of it rather than directly supplying data, at least at this point. So, we talked about the strategic planning project, or we soon will. I think that's coming up in a future talk. And we've also got, in Puerto Rico, because there's a correction factor that is applied to the landings, we're trying to automate the process of calculating that correction factor.

So, this involves DNER staff going out and conducting a survey, entering those data, comparing the data they see on their survey versus the landings reports that comes in from the fishers. That's a very time-consuming burdensome task for DNER staff. We're trying to automate as much of that process as possible. So that's underway now.

And we also have some Science Center staff working with SEAMAP-C researchers with the video data for some QA/QC work.

Next slide.

Not all of the work in the Caribbean by a long shot is being conducted by the Southeast Fisheries Science Center. NOAA has

funded over six and a half million dollars from 2015 to 2020. Those are the latest numbers I have for non-NOAA researchers to conduct work in the U.S. Caribbean. And that research has included life history, genetics, survey design, aquaculture, spawning aggregation work, and a number of researchers. I don't think this is-- by no means, this is a comprehensive list, but a number of researchers have been funded. Researchers from the region. You may recognize a few names in there. They're not all from the U.S. Caribbean, but the work has all been focused on U.S. Caribbean.

Next slide.

So, this slide is really just to prompt me to not so much talk you through the SEDAR 80 process, but while we're doing all this, SEDAR's and stock assessments are still ongoing. So, the Caribbean Fishery branch staff is very busy and very busy right now working on SEDAR 80, that's queen triggerfish, on all of the islands. That is now fully, I think all of the data are in hand or are nearly so. So, Nancy Cummings is the lead analyst. The data contact there is Adyan Ríos. And Nancy is fully engaged in the modeling portion of the stock assessment.

So, while we're trying to get the stock assessment process improved, that doesn't mean we get to take a pause on stock assessments. So, this year, we'll have the SEDAR 80 finishing up. That report should be to the Council in July. And we also have an update later in the year on the Spiny Lobster Stock Assessment. So that, I think, we're shooting for the December Council meeting, when it should be available. Well, we'll get it to the SSC before then. But the fall early winter SSC meeting is our goal for that stock assessment.

So next slide.

So, this is what the data triage looks like. After all this preamble, this is what we're getting at. So, you could see on the left, under data collection, again, those ABCs that Rachel talked about, where we're looking for indices of abundance under A. We're looking for information on growth rates and natural mortality and all the life history information as well as the size composition. And under C, we're looking at the removals or the landings as well as dead discards if we can get them.

And so, what we've done here is you'll see across the top right a number of species. This is just an example. And then you see these boxes, whether they're sort of yellow, green, red, and it's got a check or an x. So, as you might imagine, green is

good. And green means that we have that data, are adequate, they're good quality. We can use them in a stock assessment. Yellow is something that may require some more investigation. We're not quite sure; it's worth a try, but it may not be adequate. And the red, of course, is it's either inadequate or lacking.

So, what this does for us it says, "Okay. The queen triggerfish looks like we're in reasonably good shape." It turns out we have investigated this yellow one, this A, the top line, and we were able to get together not only an index using the catch rates reported by fishermen, so a fishery dependent index, but if but we have a fishery independent survey using that diver survey that RVC survey.

Yellowtail snapper is being recommended for future stock assessment next year, 2023. So, we'll see. Are we successful with getting the A and the B? Right now, we think we can do it, but we haven't done it yet. So that's why they're in yellow. And then something like blue runner has a couple of data gaps. That if in the future, the Council is interested in a blue runner stock assessment-- this is just an example, not suggesting that it would be --we can put some research dollars towards the A and the B category. You know, the index of abundance and then the life history information. Perhaps better is red hind where we need to focus on getting an index because we may have some life history, but we could put some research dollars into improving life history information. Same with coney.

So, this serves not only to tell us where we might put our stock assessment effort in the next few years. But also, where can we best put our research dollars so that in the future, we will have a better chance at having information to do a stock assessment. And there are lots of ways to do this. Right? You know, you could look at red hind and coney and white grunt and spiny lobster are in better shape than blue runner when it comes to data availability. On the other hand, and again, this is just an example, maybe the money is best spent, given that we have limited research dollars, on getting better data for spiny lobster because that's a higher priority species than say white grunt. But that's a conversation that needs to be had when we want to look at prioritizing our research dollars and our stock assessment dollars.

So, I think that's the last slide. So that's all I've got. Again, if you've been at the Council meetings recently, you've seen a lot of this already, but for those of you who haven't, I hope this was helpful and let you know where we're trying to

head with this data triage.

We want to have the stock assessment process be data driven, and we want to have the research dollars spend in the most useful and strategic way possible. So, thank you.

Questions

SENNAI HABTES: Great. Thank you, Kevin. I'm now opening up the floor for some questions. As a reminder, if you have questions and you're on Zoom, you can raise your hand, or you can put it in the chat. If you're in the room just raise your hand. I'll identify you, and then you are free to ask your question. Let's start with J.J.

JUAN J. CRUZ MOTTA: Thank you. Thank you, Kevin. Question. This is more to start the discussion on the EBFM approach, the FEP. How do you envision that the FEP or more generally speaking, the EMF approach will inform or be incorporated in the SEDAR assessments.

KEVIN MCCARTHY: Okay. Yeah. So, the best example I have for that actually comes out of the Gulf of Mexico. So, what they've done there is they often have issues with red tides. Which, you know, create these massive mortality events on a lot of species, on a lot of the species that are managed as well. So, it's certainly been used as an index in stock assessments for some of the groupers and I think the red snapper. There have been a couple of paper too that's come out of this work that was done by John Walter and others at the at the Science Center. I know John at least started the work. So, I can see some aspects of the EBFM being used in that kind of way where it might inform. You could see maybe if, say, sargassum, you know. I don't know that red tide is a particular big issue in the U.S. Caribbean, but the sargassum is certainly of concern. And so, it's possible that we could do something similar with that kind of event.

So, I could see it sort of gradually informing more and more as the data become more and more available. That's my initial take on it.

SENNAI HABTES: Great. Thank you, Kevin. I see Tauna has her hand up. Tauna, do you want to go ahead?

TAUNA RANKIN: Sure. Thank you. Tauna Rankin, NOAA Fisheries Office of Habitat Conservation.

I really have more of a comment for everyone's awareness about a

couple of NOAA Coral Reef Conservation Program projects that are taking place and could contribute to this effort.

The first is a partnership with Tyler Smith's group at UVI to extend the depth of the Reef Visual Census surveys that are done through the National Coral Reef Monitoring program. Currently, those surveys only go to 30 meters. But we're doing a pilot to do surveys around Saint Thomas and Saint John to 60 meters using the same methodology. And then the second is a partnership with Rick Nemeth and Virginia Shervette to fill in some of the life history gaps, again, in U.S.V.I. with a focus on redbtail parrotfish, and Caribbean hogfish.

I expect both of these efforts to wrap up around the 2023-2024 time range. So, hopefully, in a future meeting, we'll see the fruits of this labor and this data triage effort. Thanks.

KEVIN MCCARTHY: Yeah. Thanks, Tauna. Yeah. I'll talk about the dive first. So, we partnered with Tyler to do the lobster survey work, and we did it specifically because they had the technical know-how to do those deeper dives. So, we really wanted to see as wide or as deep a range of depths that were sampled as possible. And the park service had already developed a methodology for doing lobster survey work. So, the Park Service and the UVI folks got together and came up with a single methodology for this lobster survey work that was part of our gear selectivity study.

So yeah, absolutely. I think it's great that they're able to take that skill and that technical ability to do those deep dives and collect some more data. It was really helpful for the lobster work.

And I'm also very excited to hear when people are funding life history projects in the in the Caribbean. I think it's great. It's often the stumbling block that we have with stock assessments because you can't get started without the life history information. So, that's great news.

SENNAI HABTES: Excellent. Thank you, Kevin. I don't see any other hands on my end. Oh. Orian has a question here in the room, so I'll turn it over to Orian.

ORIAN TZADIK: Hey, Kevin. Orian Tzadik here. A couple quick questions for you. One, I'm wondering if have you guys reevaluated any of the methods from SEDAR 46, which was the data limited in the Caribbean? And have you guys' kind of rehashed any of those methods?

KEVIN MCCARTHY: Well, so the data limited stuff I think we've improved those methods. Absolutely. The tricky thing with the data limited stuff is we have to get to an OFL, and the data limited stuff doesn't necessarily get you there. So, that can be problematic.

Now some methods certainly won't, but-- So we've got to be judicious in when we use that as our way forward. And that's part of where this data triage project came up. You know, what do we have that's going to-- which species are out there that have sufficient data to give us sort of a traditional full blown stock assessment that will give us an OFL. Because that's where Magnuson wants us to be.

You know, management under Magnuson wants us to get an OFL. So, I think we have made progress on those data limited methods. But that's always going to be-- our goal is to do a full stock assessment that gets us an OFL because data limited stuff might not get us there. But I do think we're better at it.

ORIAN TZADIK: Got it. Thank you. Second question, I'm not sure if you could necessarily answer this yet. I mean, we could wait till July. [inaudible] indices match each other, for SEDAR 80, with the queen triggers, and as kind of a follow-up, is there any concern about or is there any attempt to address the depths differences between the diver survey and fisher survey.

KEVIN MCCARTHY: Let me take the second one first because I [inaudible] but I think Adyan is on the line and maybe she knows the answer.

So, the idea was, with the with the gear selectivity, is, what's going into the traps versus what's in the population, the size structure of the population. So, if the assumption is that the traps get the biggest lobsters that are out there. You know, that drives the stock assessment in one direction versus if there are larger lobster out there that are not caught by the gear, either they're too big to get in the traps, or they're too big for the drivers to mess with, you know, because the market doesn't want lobsters of that size, let's say.

That was the goal. Right? So, if all the big ones happen to be deep and they don't fish deep, that's okay. We still know that we've got this dome shape selectivity, and there are plenty of big lobsters out there. You know, even if they're deep. So that's why we wanted to go deep. We haven't in the Virgin Islands put the traps out yet. So, you know, that's part of the

design that we'll consider when we actually get the traps in the water.

Right now, we're in the building the trap stage. So, when we're trying-- Oh, I can't remember now. It's 5 or 6 designs that represent those designs that are most commonly used in the fishery. So, we're trying to emulate the fishery in the design and construction of the traps. When we get the traps out there, but we've not yet designed where we're going to put all the traps.

So, it could have that deeper component, but we just completed--well, we're not quite finished. I think they've got a few more dives to do, both the Park Service and the University. But it was important to get them deep with the expectation that maybe there are some big lobsters deep.

And no. Adyan, are you are you listening in? You know the answer to the indices question? Or in the RVC and the logbook, are we seeing similar trends?

ADYAN RÍOS: Hey, Kevin. I am online. With RVC and the logbook indices, those working papers are being written up right now. So, we haven't put them on the same plot, so I'm not going to speculate as to my memory until we kind of plot them together, but that should be available soon.

KEVIN MCCARTHY: Okay. Thank you. That's fair. We don't want to misrepresent the data.

ORIAN TZADIK: That's great. Thank you, guys.

SENNAI HABTES: Okay. I think with that, we're going to hold on for any more questions and go ahead and take lunch break because that is where we're at. And we can follow-up with, Kevin if you're okay and you are available, we can continue with your last presentation after the break, I believe at 01:15. Is that where we are? Yes. So, the launch break would be to come back at 01:15PM. So, Kevin, are you available then?

KEVIN MCCARTHY: Yeah. I think that other presentation is fairly brief.

SENNAI HABTES: Okay. So, yeah, why don't we just go ahead and do that. You give that presentation, and we can have-- I have quite a few more questions for you on this, so we can kind of just start in with those questions after that, and then have you give that last presentation.

So right now, we're going to take a break for lunch. We will reconvene at 01:47PM. So, with that Okay. Sorry.

GRACIELA GARCÍA-MOLINER: 1:15.

SENNAI HABTES: Let's make it 01:17 because it is 12:18 now. I'm just trying to keep going with the time. So, we'll reconvene at 01:17PM. Christina, if you could add that to the messages, so people don't want to sit back down. Thank you, everyone, for your participation this morning if you're not going to be on the afternoon. We'll come back at 01:17 with Kevin's presentation.

Just so everyone knows, to those of us in the room for the meeting, we will be having lunch across the hallway outside. If you don't know what that is, just come see me. Thanks, everyone.

(Whereupon the meeting recessed for lunch on March 16, 2022.)

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MARCH 16, 2022

WEDNESDAY AFTERNOON SESSION

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SENNAI HABTES: Okay everybody, if we could take our seats and kind of wrap up conversations. I'm going to try and go ahead and get started again for the afternoon session.

Okay. Good afternoon, everybody. This is 01:20PM on March 16th, 2022. We will begin our afternoon session, for the Caribbean Fisheries management Council Ecosystems-Based Fisheries Management Technical Advisory Panel meeting, where we left off was with Kevin McCarthy's presentation. We have one more from Kevin. But first, let's just finish up the question-and-answer session. So, Kevin, just give me a heads up if you're back on. Doesn't look that way.

GRACIELA GARCÍA-MOLINER: So, just in case. Kevin, are you there? You might be muted. Okay. He is not muted anymore.

CRISTINA OLÁN MARTÍNEZ: He is. He is muted.

GRACIELA GARCÍA-MOLINER: He might be muted on his end.

KEVIN MCCARTHY: Oh, sorry. I had the I had the meeting muted. My mistake my apologies.

SENNAI HABTES: No worries, Kevin. So, I think what we'd like to do is continue with a couple more questions and then we can move on to your last presentation, which was going to be on the Caribbean Branch Staff, if that's okay.

KEVIN MCCARTHY: Yeah.

Questions cont.

SENNAI HABTES: Okay. Great. So, I have one question, and I want to applaud you guys on all of the data and work that NOAA is currently doing especially withing the Caribbean. One thing I wanted to ask about is that a lot of it is not--

KEVIN MCCARTHY: Sorry, I am not hearing you.

SENNAI HABTES: Can you hear me now?

KEVIN MCCARTHY: Yep.

SENNAI HABTES: Okay. So, one question I had was that a lot of the data you guys are collecting as part of the strategies for your previous presentation seemed very useful, I think, for fisheries management in the U.S. Caribbean. One issue that I'm seeing is that a lot of the data sets are not in a fisheries ready format, meaning they're not accessible and in a format that could be used either for EBFM or for fisheries management within the territory. And there's also no data management system in place so that it makes it easy for people who aren't familiar with those particular processes to find and use of data.

And so, I was wondering if you guys have been thinking of any strategies that we can implement here in the U.S. Caribbean that will help us get to a point where we can centralize all of this data, make sure that it's QA/QC'd and ready for use in other processes, like ecosystems-based fisheries management.

KEVIN MCCARTHY: Yeah. That's always a tough task. And oftentimes, you know, we sort of be kind of-- until this last year, you know, we haven't had a group that was really focused on Caribbean stuff, so we'd always sort of just-- everything was a one off. Right? So, we'd have a database, there wasn't a standard way of dealing with it. Maybe, you know, we'd take some time to try and understand the data to the extent that we could,

given the timeline. So, we don't have a system that is sort of universal. What we've got, particularly by working through the current SEDAR, SEDAR 80, for queen triggerfish we've developed some procedures. I wouldn't say they're final, but they're in really good place for dealing with landings, for dealing with the TIP data. For dealing with this this sort of major inputs to stock assessment. But we often rely on our collaborators who might have data sets that the Science Center has no control over. We rely on those collaborators to provide the data in a useful format.

Now that doesn't mean that there's no work on our end once we get it, but as we start to work with people more frequently, we develop some standard procedures so that the next time we get the data, it's in a format that's not as difficult to work with. But unfortunately, we don't have a magic solution. It's dependent upon each individual data set and where it's coming from and the nature of the data itself.

So, we have some control over some of the data that are housed at the Science Center but not, for example, the RVC dive survey. But we've worked with them and, you know, made a lot of progress on the kinds of data that we'd like to have delivered to the stock assessment process.

So that's a long answer to, we don't have a good way of doing it yet outside of the ones that we always work on for stock assessment. So, I know that's not very helpful. But, you know, we do have some really talented staff in dealing with those sorts of data supply questions. So, the Caribbean branch could be a resource and provide some examples of how we have dealt with data. But I think it's going to be dependent upon the data set and who's supplying it. It requires a lot of back and forth between the data provider and the data user. And I don't know if there's a shortcut until you understand the data.

SENNAI HABTES: Thanks, Kevin. I agree. I think that there's a lot of work that would need to be done to build up that kind of process particularly here in the U.S. Caribbean, but I think it's something important that we need to really think about this EBFM process that we're trying to delve into.

I think there are other data managers in U.S. Caribbean that have built up similar systems and then perhaps we can look to them for help. But it would be, you know, as these discussions go forward. Maybe it would be beneficial if you could mention some of, like, the data management people within NOAA that we can reach out to when we get to that point in the discussion. I

think either later today or tomorrow.

KEVIN MCCARTHY: Okay. Yeah. That makes sense. I think the really critical part is the people who own the data, you know, who are supplying the data, they know it best. And it's really important to understand if there's-- I mean, ideally, there's some sort of metadata file that explains everything to you, but that is the exception rather than the rule, even within the data sets that I produce. So, working with the people who control the data, who collected it. Ideally, who collected the data, is critical to understanding it.

SENNAI HABTES: Yeah. I agree. I would say that it's not that we haven't done this in other areas of research, I just don't think we've gotten to it for fisheries, necessarily, yet. Right? Like, they had a problem with satellite data where they had to create these, like, metadata files that are all the same for all types of data so that people can use it internationally. Right? We went through this process a little bit with oceanography in the late 90's and early 2000's and now we're trying to, I think, we need to really think about doing it for, you know, fisheries as well. Particularly if you want to integrate some of these other data sets, like, from remote sensing and from oceanography into our processes for fisheries.

With that final comment, I will, you know, see if there's any other questions for Kevin before we move on to the next presentation. Okay. Seeing none, we will move on.

So, Kevin, if you want to go ahead, Kevin will now present to us an introduction of the new Southeast Fisheries Science Caribbean branch staff and the strategic planning project for the Caribbean branch, which we are very excited about. Take it away Kevin.

Introduction of NOAA-Fisheries SEFSC Caribbean Branch Staff (Strategic Plan)

KEVIN MCCARTHY: Thanks, Sennai. So yeah. So, I will talk you through a few slides, and then Rachel's going to take over and go through some slides with the strategic planning. But first, the introduction to the Caribbean branch. And many of these folks-- well, maybe not many, but half the staff anyway --should be familiar to many of you. And if you've again sat in on any of the Council meetings recently, you've seen some version of this presentation.

So, next slide, please.

Okay. As I think everybody is familiar. Formerly, we did not have a dedicated U.S. Caribbean branch and we now have, actually, three branches with Caribbean in the name. Two of them were just established. The Gulf and Caribbean Fish Ecology Branch and the Atlantic and Caribbean Fish Ecology Branch. And they join us, the Caribbean Fisheries Branch, as the three branches in the Southeast Fishery Science Center who have Caribbean in the name. So, the good news is the Caribbean is getting a lot more attention and more of a dedicated staff to look at the research and analytical issues that we need to move forward with in the Caribbean.

But prior to a year ago, we didn't have a dedicated Caribbean Branch. There was the Gulf and Caribbean Branch that did stock assessments. But sitting in Florida, the Gulf can make a lot of noise because they're in our backyard and they tended to get the most attention from the assessment branch and the supporting analysts. So, we didn't have, again, that that dedicated group. We would sort of come together to tackle a Caribbean assessment and then everybody would go their separate ways and be pulled in many different directions.

So that's what I mean by this Caribbean work was responsive. There was a stock assessment, and we would respond to that. But now, we have the Caribbean Branch. This came about through a complete reorganization of the Southeast Fisheries Science Center. So, in the past, we had very geographically based organization. By that, I mean, we had a Miami lab and there was a Miami group. And we had a Beaufort, North Carolina group, and there was a Beaufort group. And we had a Panama City, Florida group, and there was a Panama City group.

Now we have people who are in the same branch, but maybe in different laboratories located from anywhere from North Carolina to Texas. So, in the course of all that reorganization, it was recognized that there was a need for a branch or a couple of branches to focus their efforts on the Caribbean.

So, a year ago-- and you can see at the bottom --in January 2021, the Caribbean Fisheries Branch was established to get a group of researchers and analysts that are focused on the U.S. Caribbean. And the whole idea is to foster research and data collection programs to address U.S. Caribbean fisheries issues.

So now we have an opportunity to be proactive in developing solutions to the data and research issues rather than just responsive to an immediate need.

Next slide.

So just to give you all a breakdown of where we stand in the hierarchy, Clay Porch, of course, is the Director of the Science Center. John Walter is the Deputy Director. So, he's in our line of our chain of command. There is two Deputy Directors, we fall under John's watch. Shannon Cass-Calay is the Director of the Sustainable Fisheries Division. So, she is my boss. I'm the Chief of the Caribbean Fisheries Branch, and Nancie Cummings, Adyan Ríos, Refik Orhun, Stephanie Martinez and Rachel Eckley are all in the branch. And I think many of you know most if not all of these folks from previous introductions.

Next slide.

So, this is the group. Nancy is so busy on SEDAR 80. We didn't get a chance to grab a picture. But many of you already know, Nancy. So, I'm going to start on the right.

That's Rachel. She is a NOAA affiliate. She's with us through the cooperative Institute out of the University of Miami, specifically working on strategic planning. And as you know, she presented the Caribbean project's inventory.

Stephanie Martinez does a lot of the life history work I mentioned her earlier. She's also one of our data analysts.

Refik Orhun is a specialist in aquaculture, also a data analyst for stock assessments. He's done a lot of stuff in the Gulf.

Stephanie arrived at the Science Center a few months before COVID. So, we haven't seen much of her, but she's busy working remotely as we all are.

Adyan Ríos has been working in the Caribbean for a while now. I think most all of you probably know her. She does a lot of work with SEDAR's and is one of our lead assessment biologists. She did the spiny lobster work in the past and will be doing an update assessment later this year. She's also involved in the management history project. That's one of the other databases that is in that ODM system that Rachel talked about.

Nancy is the lead assessment biologist on the current SEDAR, SEDAR 80 queen triggerfish. She also does a lot of work with WECAFC. She's our representative for the Science Center with WECFC. She leads a bunch of the committees down there.

And then me, on the end. I'm the Branch Chief. I've done a lot of SEDAR work, and involved in doing more fisheries surveys. But mostly, I do admin stuff now. So once upon a time, I was a field biologist, but no longer. So that's the team.

Next slide.

And I think I'm passing it over to Rachel to take the lead on the next few slides.

RACHEL ECKLEY: Yep. Thanks, Kevin. Okay. So now we wanted to share some more details on the Caribbean Strategic Planning Project that we've been mentioning throughout our talks today.

So, the goal of this project is to develop a strategic plan for data collection, analytical best practices, and outreach and education in the U.S. Caribbean to inform and support stock assessments. And you may recognize some of the PIs of the project, obviously, especially Kevin McCarthy, who we all know is the Caribbean Fisheries Branch Chief.

Skyler Sagarese is in the Gulf of Mexico Fisheries Branch. Formally the Gulf of Mexico and Caribbean fisheries branch. But she's heavily involved in the SEDAR process for the Gulf. Shannon Cass-Calay, again, is the Director of the Sustainable Fisheries Division in which the Caribbean Fisheries Branch is housed. Nancy Cummings, again, who is in the Caribbean Fisheries Branch, involved with WECAFC and SEDAR.

And I should probably note that this is not an exhaustive list of what these PIs do, I just wanted to highlight some of their tasks that directly relate to the Caribbean strategic planning project.

Okay. So, continuing with the list, Christian Jones, is involved with SEAMAP-C sampling project. Vivian Matter is the data analyst and assessment support branch chief. Kate Overly is a NOAA affiliate who Kevin mentioned earlier. She performs life history work of many U.S. Caribbean species, specifically the deep-waters snapper.

Adyan Ríos is, again, in the Caribbean Fisheries branch heavily involved with the SEDAR stock assessment process. And Steve Smith is another NOAA affiliate. He's in the survey design data management and dissemination branch.

And then again, I was hired on as the research associate, NOAA affiliate, to keep the project organized, facilitate the working

groups, and then help develop the strategic plan.

Next slide, please.

Oh, okay, Kevin. I'm going to throw this one back to you, and then I'll come in after.

KEVIN MCCARTHY: Okay. Thanks. So, I put this up here, this long list, to emphasize the point that we can all come up with a list of things that we need in the U.S. Caribbean. But doing that is just a to do list, you know. So, we know things like we need fishery independent surveys. We know that the best way to get to some of that is through cooperative data collection programs with stakeholders.

We know we need size and age composition. We know we need life history. On the other side to improve the process, we need to identify the specific data gaps that I talked about earlier. We know that we need research and development funding and use that more strategically. We know that building capacity within the region is a goal.

But that's just a to do list. That's not a strategic plan. We can all come up with to do lists. But what we're trying to do in this strategic planning project is think more broadly and not just come up with a lengthy to do list. We need to prioritize things.

We need to think about how the interactions and the synergy among projects and that's a better way to approach getting things done than just having these long lists of things we want to do. Without a real plan of how we're going to get them done. The strategic plan will address that. How do we get things funded? Where do we go for funding? How much is it going to cost? Do we think.

So that's kind of the plan. I forgot to mention this earlier but the first thing on my list, here on the left, temporally and spatially extensive fishery independent data collection programs, well, I got the sad news earlier today that congress did not see fit to fund us to expand fishery independent surveys in the U.S. Caribbean. We had made it into the presidential budget for a million dollars to fund fishery independent survey work in the U.S. Caribbean, and Congress did not see fit to give us the money. So not a happy day on the funding side, but we will persevere. Anyway, next slide and back to Rachel.

RACHEL ECKLEY: Okay. Thanks, Kevin.

So, in order to, as Kevin mentioned, address some of these data needs, the PIs started this strategic planning project as more of a collaborative exercise to sort of act as a fundamental step towards improved stock assessments of the U.S. Caribbean. I think he mentioned it as a 3-year project, and we are in the middle of that first year right now.

So, this project is directly linked to the Caribbean projects inventory that I walked you guys through a little bit ago. And through that inventory, we'll be able to identify species specific and location specific data gaps. And then as Kevin mentioned, through the strategic planning process, we'll be able to prioritize, coordinate, and optimize data collection strategies.

We've mentioned it's a collaborative effort and these collaborations have already begun. In the coming years, this project will involve and continue to involve sampling program managers, database managers, stock assessment biologists, fishery managers, territorial and commonwealth scientists, as well as the fishing communities of the islands.

The project is currently underway. And aside from starting the Caribbean project's inventory, the first really big step is to convene a strategic planning workshop using quality management and continuous improvement tools where we will develop the long- and short-term goals of the project and produce a roadmap for accomplishing those goals through established working groups.

This first workshop is primarily for the Southeast Fishery Science Center to identify our in-house goals first. But in years two and three, we will have workshops involving partners like SERO, the Council, territorial scientists, and fishers. So, this first workshop, virtual workshop, is scheduled for mid-May, and we hope to make some really big progress in the working groups this coming summer.

Next slide, please.

We know this was just a brief intro into a very dynamic project. So, Kevin and I are happy to take any questions regarding Caribbean Strategic Planning or the Caribbean Fisheries Branch. But so far, we're happy with the progress that we've made on the Strategic Planning Project, and we're looking forward to seeing it continue and grow.

Questions

SENNAI HABTES: Great. Thank you. Rachel and Kevin. We appreciate the presentation. And at this time, I'll open the floor up to questions either in the room or online. As a reminder, if you need to ask a question online on Zoom, please either put it in the chat or raise your hand and I will call you. In the room, the same rules apply. Just raise your hand, and I will recognize you so you could ask the question.

Okay. Looks like there are no questions. So, Rachel and Kevin, thank you again for the wonderful presentations, and as always, being great partners to collaborate on research here in the U.S. Caribbean.

I think up next, I believe we have the Net Gains Alliance and that I think is Katie Latanich. I'm sorry if I'm mispronouncing it. But if you are there, just kind of give me a heads up. Let me know if you're ready to present. I think maybe what I'll do is I'll have Orian introduce you since he had communicated with you guys first and brought you as guest to the meetings.

ORIAN TZADIK: Sure. Is Katie online with us?

KATIE LATANICH: Yep. I'm here. Can you hear me clearly?

ORIAN TZADIK: Yeah. I can hear you.

KATIE LATANICH: Wonderful.

Net Gain Alliance—Improve Data for Fisheries Data Needs: Digital Modernization Project

ORIAN TZADIK: So, yeah, we got in touch with the Net Gains Alliance originally in July or August of last year. And I'll let them tell you more about their mission, but they're interested in helping fisheries management through data methods. And we thought it might be an interesting fit to hear about them and hear what they do and see how we can collaborate in the future and what kind of role they might be able to help out with this whole process. And with that, I'll turn it over to Katie.

KATIE LATANICH: Great. Thank you, Ori, and thank you Dr. Habtes and members of the Caribbean Council and the Technical Advisory Panel for the invitation to be here. My name is Katie Latanich. I work with the Net Gains Alliance. I think we were invited to share more of an outside perspective as a group that's interested in leading and supporting conversations about modernizing fishery information systems.

I like all of our team members work as a consultant, so my background personally includes other work aimed at facilitating conversation across Council regions. [inaudible] but things like ecosystem-based management approach as an ecosystem change.

So, we've been really excited to learn more about your fishery ecosystem plan data gathering and development process. And it's nice to go give this presentation later in the afternoon and have the chance to hear this morning about all of your action items, the work toward developing conceptual models, the inventory of existing data, the stock assessment triage process, and strategic planning. And of course, that broader call for relevant environmental data that comes from other agencies and research groups.

When we first started this morning, Dr. Habtes noted that one of the priorities for your discussion is to also be thinking about data infrastructure and data management needs. And, of course, right before this talk this afternoon, we had that bit of follow-up discussion around strategies to centralize and ensure data are usable and accessible. And it sounds like there's some things the agency can do, some functions that are carried out by other partners. But doing this requires a lot of dialogue between data collectors, owners, and users.

So anyway, long story short, while we were invited to speak to you, we're also really looking to this group to reflect on all the information you've heard today. Because of course developing solution starts with identifying some clear needs. So, we're interested to learn from you and hear about where you see additional data management opportunities and needs. And kind of from a vision perspective, what you think should be easy and efficient to do.

So, I may end up actually asking you more questions than providing answers for now. But I do hope we can contribute to framing these questions in a useful way to start our work.

And just to be clear about Net Gains, we're all really invited here just to speak with you today. We may be a group that can help facilitate further discussions but for this presentation, we're really just here to get the conversation going.

Could I have that next slide, please? Sorry. I can't see what you're seeing, but do you have that next slide up?

GRACIELA GARCÍA-MOLINER: We are having a bit of technical

difficulty here. Hold on a second.

KATIE LATANICH: That's okay. Just let me know when you are ready.

Okay. If you can go back just one side. They're pretty simple slides. So sorry. This is more trouble than it's worth. So just go to the slide before this one. Oops. No. You had it right. I'm sorry about that.

Okay. Anyway, sorry about that. So, a little bit more about Net Gains. We're an initiative that was formed in 2017 to help accelerate the modernization of Fishery Information Systems. Our focus so far has really been on the Councils and the federal process of kind of everything underneath that Magnuson umbrella.

And like I said, our team is a group of consultants that works across regions. Our day-to-day work is mostly focused on convening, facilitation, policy engagement, and some targeted project support. A lot of our work involved is working as a neutral facilitator and kind of a thought partner, both working with NOAA Fisheries and other agencies and stakeholders and industry groups.

So, when I use the phrase data modernization our focus is at that higher level than what data are collected, exists, and how do we want to put them to work. We also support that bigger picture of how we craft data systems that connect data with people and purpose.

Just want to note that Net Gains hasn't been highly involved in the Caribbean region or followed your FEP process closely so far, but from a big picture, we're interested in supporting data modernization across all of the NOAA fisheries and Council agents in all of those areas. And one of our core values is that in every region, data is that common currency that we all use for science management, and it's an asset worth managing well, so we can make the best use of the data we already have. And also think about how we feed new data streams and the data sets into a system that's going to make sure they're usable and accessible.

Can I have that next slide, please?

A major focus of Net Gains' work so far has been developing a high-level of vision that works across the fishery management regions to really get at what we think are the core components of the modern data driven fisheries information system. What do

we want from it? What do we expect it should do well? And what steps do we need to take to get there?

And so those four main components are around easy recording, trusted and timely data for decision making, technology that performs that is widely available, and improved data literacy capacity and governance. And our vision is on our website. There's much more about specific steps and things we need to happen to advance each of these goals. But the reason I share this is because this big overarching vision is what frames our work and it is what we think about when we're trying to identify and communicate where we think targeted data modernization efforts can be most impactful and help drive progress forward.

Next slide, please.

So, this slide is just to highlight some of that data modernization topics we've been excited to support in the past few years. This is such a wide range. Some of these are projects we've led ourselves and carried out as Net Gains. Some of these are catalyst projects that we funded at our industry or research partners to carry out. And some of these are collaborations with NOAA Fisheries.

Just to note, in 2019 and 2020, we were able to serve in more of a grant making role by directly funding others to carry out small projects. We want to note that we did fund one small project in the Caribbean, working with Raimundo Espinoza at Conservación ConCiencia, to support electronic monitoring and reporting on small boats in the highly migratory species fishery. Both to pilot the technology with that broader goal of supporting data collaboration, across managers, and industry.

So, but now in 2022, Net Gains is no longer in that grant making role, and our work is more focused on facilitation, convenience and kind of project support for being, again, more of a thought partner.

So back to that list of topics. The reason I included this is, again, it's a very wide range of topics. Some very big picture, some very focused, but what they all have in common is tackling one specific need to advance that overall modernization goal of connecting data, people and purpose. And so, every project we've worked on has emerged from an idea for some aspect of a data system that people find frustrating or that they have a vision for being able to work much better.

You'll see a lot of these are focused on fishery dependent data

and electronic monitoring and electronic reporting. Not because that's Net Gains focus area, it's mainly because these, you know, currently happen to be the issues that prompt people to think about their broader data system needs.

So, a few examples of the things we've worked on. We've funded a few industry groups to look at opportunities for making it easier to access their fishery dependent data. This has mostly been in capture managed fisheries for the purpose of monitoring quota and discards and making business decisions. A very different project was looking at regulatory language to provide enough guidance to electronic technology service providers so that we can both allow technology to evolve, but without having to constantly [inaudible] implementing regulations. And [inaudible] still other projects that focus on developing legal and policy framework for data sharing agreements.

So again, this is kind of outside the scope of what we're talking about at this meeting, but this is just to show you that our work on data modernization includes this really wide range of approaches and scale since we work on all of these different pieces of data systems, whether it's technical, policy, regulatory, or legal, or you could just conversational considering how we work together in sharing the data and deciding how we want to put it to work.

Could I have that next slide, please?

So, across all of our different projects, regions and initiatives we've worked on, it kind of boils down to and can be framed by this set of questions. And the way I would describe this is that where we've seen data monetization efforts make progress toward that big aspiration of better connecting people, data and purpose, and, you know, in other words, making data systems better, it's because they've worked on answering these questions. So, we think of this as our framework for how we support work to align data systems with vision and purpose. Understand who's trying to use the data and how, in identifying and pinpointing where there's an opportunity or a need to make things better. And of course, we've heard from the presentation this morning, you're working on many of these questions right now.

Okay. Next slide, please.

So that's really it from my perspective. I hope this is a helpful introduction to Net Gains and our perspective. I'd be happy to answer questions, but I actually think it would be more

valuable to your process if we could have a little discussion about some of the data management and infrastructure and what's you're thinking about this process.

So, the questions I would suggest this group think about and if you have time maybe engage in a little bit discussion, but first, how are you thinking about this group's work fitting into the larger Caribbean data ecosystem? And then, what people and processes can connect useful data with the Council's needs? And then finally, what challenges could be faced in the data gathering process? And what could be done to make existing data more findable, accessible, and interoperable and, you know, reusable?

So, I think that's a good pausing point for me and I'm happy to hand it back to the Chair and address any questions or comments or maybe just offer these questions for further discussion for the rest of today and tomorrow.

So, thanks for your time.

Questions

SENNAI HABTES: Great. Thank you, Katie. We appreciate the presentation. I think we have enough time. Maybe it could put us behind a little bit, but why don't we use the next 15 minutes. We'll start by if there are any questions directly that people want to ask Katie regarding the Net Gains Alliance, and we'll give about 5 minutes for that, and then, like, I'll open it up and we can do kind of discussion based around the questions that Katie posted up there and what I'll ask is that we follow the same rules that we've been following but if you have follow-up questions, that add to someone's point you simply put it into the chat, and I will recognize that and kind of moderate if I can. Okay. So, let's start with 5 minutes for just questions directed at Katie, if anyone has questions you know what to do. Orian?

ORIAN TZADIK: Hi, Katie. Thanks for the presentation. I'm wondering if you could give us, somehow, give us an example of what the community data sharing platforms might look like. I guess, obviously, you know, you don't have to necessarily pull it up on the screen, but maybe just conceptually, what exactly do you mean by that?

KATIE LATANICH: Yes, I'd be happy to give you a quick overview of two projects and maybe if you want more detail, I'd follow-up to put you in touch with the groups that led those projects.

So, one of these projects was carried out by the Cape Cod Commercial Fisherman's Alliance, and they were interested in--well, without getting into the details of how they manage their fishery, they have a capture program that's focused on what they call sectors. So, they have sector managers who can monitor their quota holdings and organize a lot of their information sharing in the group level. And so, they were interested in how they could have a parallel system that would enable them to kind of keep track of their photo holdings in the decision real-time so they can make the business decisions as a group. And so, the work they did was to figure out both logistically how could you create this platform? What would it look like? Where would it be housed? How could you connect it to NOAA Fisheries information system? What are some of the barriers and opportunities to doing that? And then what are the use cases look like? And this is an interesting facet to that project is understanding how a fisherman want to use their own data. And so, they did a lot of work to figure out how people like to interact with technology and how they would find value in being able to see their fishing patterns and past catch.

The other project along these lines has some parallels but have very different fisheries. So, this was a project in the Western Gulf of Alaska the that was a partnership between Aleutians East Borough, which is kind of a county level organization, and service providers including Chordata, including Saltwater -- sorry, service providers including Saltwater, including Chordata, and then the Peninsula Fisherman's Coalition. And so, this was working in the Western Gulf of Alaska pollock fishery to think about how they could integrate data from different sources, logbooks, landing reports, electronic monitoring to keep a better handle on salmon bycatch in pollock fishery.

So as far as kind of the operational details of how they got these platforms to work, a lot of the work they spent was, again, working on user cases and the logistics of kind of creating parallel systems to track data. Sorry. I think I should pause here. I feel like I'm rambling a little bit. I'd be happy to answer specific questions about how that project works. But it might be helpful to understand what about those projects would be interesting to you or perhaps I could follow-up to put you in touch with those projects leads.

ORIAN TZADIK: Yeah, that was helpful. Thank you. I guess maybe I can follow-up with that on discussion, but if there's any more questions maybe we do that first.

SENNAI HABTES: I don't see any other hands.

ORIAN TZADIK: Guess not.

SENNAI HABTES: But I think you can use that as starting point for the discussion and we can just build off of it.

ORIAN TZADIK: Yeah. You know, because that was something we had spoken about originally here when we were still kind of the FEP working group was kind of how to create one of these data sharing platforms. And I don't know if we still had that interest or not. I mean, we did a good job of kind of collecting few data sets, summarizing them and trying to look at trends and everything. And then, I don't know, if we can kind of let it go. So, I don't know if that's still of interest to this group or not.

SENNAI HABTES: I will comment. We didn't let it go. We brought it up to the Council as a possible subgroup that would be designed within the EBFM TAP and was not approved. That is where we are with that. So, I just want to make that clear for the record.

I do think that that is an important aspect to the work that we need to do. To incorporate all of the data sets that are necessary for us to make, you know, clear stepwise management decisions on it. There has to be a system in place for organizing it and making it easier for, you know, layman and people that don't work with oceanographic environmental remote sensing data or some sort of sociological and economic data. They all come from different disciplines, and they all need to be combined into a format that can be used and that requires data management coordination system, which we currently do not have for fisheries related data in the U.S. Caribbean.

So, I don't know. I mean, Katie, maybe this is something you can talk a little bit about. How do you take regions that do not have this in place or plan in place for developing it and put together all of the partners to work towards a, you know, goal like that. Or can you?

KATIE LATANICH: That's a good question to answer. I think a couple of thoughts I'd offer in response, and I'll probably end up just turning the question back to you. One thing I think is important is that, like we talked about this morning, I think, and actually, I think you spoke to this near top, but every Council region is developing their ecosystem-based fisheries management process. You know, everybody's at a different point

on that trajectory. Some are just getting started. Some have been doing this and publishing fisheries ecosystem plans for decades. But I think every region has gone through this process of trying to figure out how do you better connect people who have data to contribute with Councils that want to put that data to work. And so, I think there are probably some useful lessons to learn.

One of the nice things about Councils having these SSCs is that you do have some of that cross collaboration and people who are involved in the Caribbean, who may have insight into how that's process worked in other agents. But that said, I don't know that any region has this figured out. I think everybody's likely struggling with similar challenges.

And then the second way I'd answer your question is, to think about how you would design a process, it kind of goes back to beginning with a vision and understanding which specific things you think should be easier and more efficient to do. And, you know, you're talking about a network of many, many data providers and many types of data, I think it would be helpful to be more specific about some of your, I guess, some of the biggest missed opportunities to put data to work or some of the most important connections that needs to be made first. It's hard to tackle this in a comprehensive way to begin with, but I think by identifying some specific needs that helps frame the problem you are hoping to solve.

So, like I said, I probably didn't answer your question at all, but I think you're asking great questions.

SENNAI HABTES: Yeah. No. I think you did answer it, and I think it's a good jumping off point for more of the discussion.

I Think what might be helpful is if you have any other projects that might have been in a similar state, like, what are the kind of first steps we can try to get all of those people into a room to identify those issues. What are the objectives or, you know, steps that we need to check to move towards that kind of system? And feel free to answer with we haven't done that, or I couldn't tell you. But, you know, just thought that would be a good thing to point out.

KATIE LATANICH: Yes. I think that's a great question to pose. I think most of our projects have been that we started with a more focused need where somebody sees a piece of a data system that they would like to operate more effectively or has an innovative idea of something they want to do with data, with that broad,

kind of, better connecting people with data and purpose across an entire region. This is much broader in scope, and I'd want to, I think, take a little more time to think about the process to get that right.

But it's, you know, across all of our work in really all data system improvements everything's a matter of scale. Some things are small projects, some things are big projects, but a lot of the times, those are the same. I think, like you said, identify the users, identify what's out there and getting people in the same [inaudible] that starting point.

I guess that's probably about as specific as I'd want to be at this point. But absolutely, it's a project that requires a lot of planning.

SENNAI HABTES: Totally understandable. Thank you, Katie. I see Orian's hand up. Do you have another question?

ORIAN TZADIK: Yeah. Maybe not a question, but kind of a comment just to bring it up to this group. Sennai, Graciela, Liajay and I were on a call together and I think what this discussion highlights is, potentially, a need for some sort of project to actually identify what those data streams are. I think that we have a lot of discussion about this been, that us been, you know, we're managing fisheries on small island nations. And so, when you talk about data that's relevant into fisheries, I think that the data that is relevant to fisheries here could very well be very different to the data that's relevant to fisheries in, let's say, Alaska, for example.

I think we're going to want to have a data stream from something like the trash authority on the islands. Right? Their process for not allowing trash into the ocean, those sorts of things. Whereas I don't think that would be necessarily such a big consideration on a bigger land mass.

But, anyway, just, you know, I think it highlights that need for mapping that out, the data streams and how they how they affect fisheries.

SENNAI HABTES: Graciela.

GRACIELA GARCÍA-MOLINER: So, I'm going to bring you back to the morning conversations about the letter that you wanted the Council to move forward and provide to all the other agencies that you think that are outside the fisheries [inaudible], which is going to be, you know, an uphill battle because we've done

that for essential fish habitat and all these agencies have been contacted and they've been asked to come to meetings. So, what we saw in terms of the conceptual model is that I think it was a very good step forward in moving all other parties into the picture. So maybe when we think about that letter that you want the Council to write, that needs to be brought in.

Secondly, the Southeast Fishery Science Center is very focused on the fishery's data because that's what the Council does. It deals with the fisheries. So, we all recognize that there are oceanographic events, that there are, you know, anthropogenic events, that infringe on the fisheries on the island, especially at this very small scale that we deal with.

So, I think that it's very clear from the conceptual models that many things outside the realm of fisheries are the ones that people are most concerned about. And stakeholders not only in fisheries, but stakeholders among all the businesses that are related to fisheries.

I mean, I'm an advocate of data sharing, data management somehow and we've been talking to Julio, we've been talking to people that do this because we don't have the expertise. And that's something that we need bring to the table. So, you know, after this meeting, I think that it's going to become very clear, especially when we hear from the from the ESR, and we hear from the DAPs, and we hear from the SSC that, you know, the Council will probably have to move forward and see how we are going to bring all these other groups into the picture. Specifically, because they are the owners of all that other data that we want to look at. So, you know, it's going to take probably quite a bit of doing and if anyone knows, and I was just going to ask Katie if it would be something that they do, like, facilitate a meeting for us to understand what actually means to bring all this data to the table to archive it to know what you can use it for and to actually have it available for decision making.

So, I mean, I don't know if that something that Net Gains Alliance would be able to do. But, I mean, from hearing the conversation, that's what I come up with as a recommendation. So, you know, would they able to facilitate something like that? Can they identify someone who deals with this kind of data and bring us together to talk about it.

So, I know I wasn't at the Council meeting when that happened, but I think that you, as the Technical Advisory Panel, can make that recommendation. Again, if you bring it to the SSC, Sennai, you would be at the next Scientific and Statistical April 12 and

13, and then the SSC will then recommend to the Council.

So I think that this is a very good opportunity and especially looking at the strategic planning that the Science Center is doing to make sure that we include-- and we've already talked about this--include not only that inventory of the reports, but next step, the inventory of the actual data, next step is shaped by that need to be created to have, you know, everything spatially identified. So, I think that we're in a very good stage. The question would be, you know, if this is the kind of thing that the Net Gains Alliance can do. And, you know, the part of it would be where would the funding come from to do this next step.

KATIE LATANICH: Happy to answer your questions the best I can at this point. So, I certainly want to discuss with the rest of my team before we can make any commitments.

I'd say that what you're looking for is very much in line with the types of conversations we hope to support. As far as, you know, the scope of work like this, it's kind of hard to say much at this point without doing kind of like the time frame of the scope for a project of this size, but helping you figure out how you might tackle this conversation and whether we're the group to help you do that or putting you in touch with somebody else who could, I think that's the part of the conversation we'd be interested to have with you.

SENNAI HABTES: Great. Thank you, Katie. Were there any other follow-up questions to that point or did anyone else have a new question that they wanted to discuss.

JULIO M. MORELL RODRÍGUEZ: If I may give you a piece of advice.

SENNAI HABTES: Will you identify yourself just for the record, please.

JULIO M. MORELL RODRÍGUEZ: Julio Morell, CariCOOS. Make sure you don't try to reinvent the wheel. We went through that. For that you need a lot of background work and looking around to see what you really need, and you can use. It is a big investment for sure.

SENNAI HABTES: Thank you, Julio. I agree with you. I think, you know, as I've said before, there are other partners in the region that have developed these DMAC systems from other data sets and I think, you know, CariCOOS is a natural fitting partner. Many of us have worked with them on things before. I

think Julio will present some of the data sets that they're working on later on this afternoon. Or is it-- yeah, this afternoon.

So, I think, you know, as we move forward, that's one of those things that we need to think about. And these aren't, let's not reinvent the wheel but let's look at systems that are in place in the U.S. Caribbean already and either how can we partner with them or how can we build similar systems that share resources across those systems.

So, with that I don't see any other questions, and we've reached that time limit that I had identified earlier. So, with that, I will say thank you to Katie. We really appreciate you coming in and giving us this opportunity to talk to you. I hope that, you know, after you speak a little bit more with some of your colleagues, you will reach back out to us and let us know if Net Gains is interested in continuing to partner and work with us here in the U.S. Caribbean through the EBFM TAP, and just keep us posted.

So, with that, thank you again.

KATIE LATANICH: Thank you. We'll follow-up with you.

GRACIELA GARCÍA-MOLINER: Thank you.

SENNAI HABTES: I think next on the agenda was going to be the EBFM workshop summary, and that's Tauna Rankin who's going to give us a report on that. I think it's regarding EBFM working groups workshop on ecosystem status report application. So, Tauna, if you are on, can you just let us know that you're ready to go with the presentation.

TAUNA RANKIN: Yep. I'm ready.

SENNAI HABTES: Excellent. Well, the floor is yours.

EBFM Workshop Summary

TAUNA RANKIN: Alright. Thank you all. Again, my name is Tauna Rankin, and I'm in NOAA Fisheries office of Habitat Conservation. Most of my work is focused on the NOAA Coral Reef Conservation program, but I also serve on this national EBFM working group, which is made up of people from each of the Science Center's Regional Offices and Headquarters offices in NOAA Fisheries. And we coordinate on the implementation of NOAA Fisheries EBFM policy and road map.

This group held their first workshop in the summer of 2020. And it was then that they identified the desire to dig more into the use of ecosystem status reports. I served on the steering committee with all these lovely people listed here to organize that workshop, and I'm just going to share a little bit of a summary and some of the outcomes from it.

Next slide, please.

So these are the goals of the workshop to identify ways to integrate ecosystem status reports, also known as ESRs, with achieving other EBFM milestones and improved connections with fishery management through identifying management priorities that would benefit from ecosystem information, included in those ESRs; identifying types of on-ramps to deliver this information into the fishery management decision making process; and engaging regional offices, Councils and other policymakers in the use of EBFM science products.

And so, the steering committee brought together, not just the EBFM working group, but the ESR authors, Council staff and other ecosystem experts in the agency to discuss these topics.

Next slide, please.

We started off with just developing a common understanding of the state of ESRs across the nation. As you can see here, we have ESRs that have been produced in every region. There's quite a bit of variability in when they were first produced, how frequently, also some of the target audience. Some of that's driven by the fact that the earliest ESRs were developed as part of the integrated ecosystem assessment or IEA program. The scope, scale, and target audiences of those IEAs deferred.

Next slide, please.

The steering committee, in preparation for the workshop, solicited some input from NMFS Regional Offices and Councils to get an understanding of how the ESRs are currently being used, what's appreciated about them and what could be improved, and what management challenges could benefit from more ecosystem information.

Next slide, please.

And so, we shared some of that feedback at the beginning of the

workshop and found that most respondents felt that ESRs were meeting their expectations and that their great reference, education and communication tools. A number of people mentioned that they're interested in using the information more directly in management decisions but most of them are unsure how to. Both regional offices and Councils are struggling with a lot of EBFM related challenges, especially those related to climate and socioeconomic impacts. But a number of people also mentioned dealing with process related challenges of implementing EBFM, such as interpreting complex information and communicating uncertainty.

Next slide, please.

Then, we received some regional highlights to hear about how different regions are using their current ESRs. The first was on the California current ESR. The Council primarily uses that ESR as a contextual document. However, they are finding that having the ESR is elevating their ecosystem related discussions on the Council and setting the table for discussions of emerging issues, particularly related to climate. It's also spurring engagement with other users of indicators and promoting interdisciplinary collaboration.

The ESR actually led to the development of a habitat compression index and eventually a whale entanglement dashboard. What the researchers found was that periods when cool habitat is compressed on shore often correspond to increases in whale entanglements. So, the top figure on the right is an image of the habitat compression index. You see when that is low, there's a higher risk of whale entanglement, and that also corresponds with a period of reduced upwelling.

Next slide, please.

Then, we heard from the Alaska Science Center. They've taken indicators from their ESR to develop a stock specific ecosystem socio-economic profiles and risk tables. They use that information in their stock assessment process. They use it as context that's considered outside of the stock assessment model that may prompt the stock assessment scientists to recommend a lower acceptable biological catch from the maximum that's produced from the stock assessment model.

This provides a very transparent way to document recommendations and the information that was considered in their recommendations through the whole process, and they're able to look back at how consistent they've been with past recommendations. This has led

to increased consistency across different stock assessment scientists.

Next, slide, please.

In the mid-Atlantic, they're using indicators from their ESR and a risk assessment that they update annually. In their first risk assessment, they found that summer flounder had the greatest number of high and moderate risk factors across ecological and management related risks. And so, they focused on summer flounder and developed a conceptual model that helped frame management questions to focus management strategy evaluation around. And they landed on focusing on the effect of discards, which was a high risk in the risk assessment and connected to a number of other high-risk factors in the conceptual model. And they're in process with that management strategy evaluation right now.

Next slide, please.

We also had a presentation on climate vulnerability assessments. I believe that we have climate vulnerability assessments for fish and invertebrates produced or in process for all the regions, but there have also been vulnerability estimates done for marine mammals, sea turtles and marine habitats in the Northeast. They all have used similar methodology of evaluating multiple sensitivity attributes and exposure factors and bending them in a low, medium, high, and very high bins to come up with a with a metric for their vulnerability to climate change. And while these are mostly developed independently of ESRs, they may use some of the information contained in the ESRs. The Northeast center is working to include some of their habitat climate vulnerability assessment in their next ESR to link currently vulnerable habitats to species that depend on them.

Next slide, please.

Then we had a few presentations about the development of resilience indicators, which is something a number of regions are now working to develop. The West Hawaii IEA is tracking herbivorous fish abundance as an indicator of coral reef resilience. The authors noted that they're finding that herbivorous fish abundance is not always tracking linearly with coral reef health and resilience, and that's sort of a challenge of using a single metric for resilience.

They're also exploring indicators a human well-being, but this is a really complex area of study and hasn't been invested in

similar to their biological and physical indicators. And one of the speakers also mentioned how paradigms around resilience often assume that there's one desired steady state and that confounds what to track in a changing climate because, often, there isn't one possible steady state and returning back to the original state may not be possible in a changing climate.

And so, there was a panel discussion and the panelist agreed that having a suite of indicators is probably the best course of action since any single indicator is probably going to fall short.

Next slide, please.

Then we had some presentations about incorporating traditional ecological knowledge and learned that there are a variety of methods to incorporate TEK into ESRs. The main take home message was to consider the capacity of the researchers and the burden on the knowledge holders in determining how best to do it and that it's always best to involve knowledge holders early on in the management process including during question development.

And Kevin mentioned red tide as an example of an ecosystem issue in the Gulf of Mexico. Southeast Fisheries Science Center did this participatory system dynamics modeling similar to the conceptual modeling that's being done for the Caribbean to understand the extent and impacts of red tide affecting fishermen and this led to collaborative monitoring and identifying actions to increase resilience during severe events.

Next slide, please.

Lastly, there was a bit of a discussion on engagement by folks in regions with relatively mature ESRs. They shared that they give presentations on their ESR to multiple audiences. They don't have just one key audience at their ESRs. Councils, SSC, regional offices, among others, and sanctuaries were mentioned as well. They're also experimenting with multiple forms of communication including briefs, web stories, videos, and the Alaska Science Center recently added a feedback session in the spring each year to kick off their ESR season.

The Northeast Center structures their ESRs around fishery management objectives drawn from Magnuson, but they are working with stakeholders to try to clarify the objectives they should be using so that they can make the reports more useful and relevant.

Next slide, please.

At the end of each session, we had regional breakout discussions. And so, the Southeast regional breakout group was formed with folks that work in the South Atlantic Gulf of Mexico and Caribbean. In this region, at the time when the workshop was happening, the Gulf of Mexico was the only Council that had an ESR produced, although the South Atlantic one was being finalized.

So, the folks in that breakout discussion really found hearing from the other regions helpful, so that they could learn from those regions. And there was recognition that ecosystem reporting should be aligned with the assessment and management process when possible. But this is a big challenge for this region just given the time available on SSC and Council schedules and also current staff loads, particularly in the Science Center since they're divided among 3 Councils.

Next steps that were discussed included finalizing the South Atlantic and Caribbean ESRs; developing a strategic approach to engage Councils and managers on the type of ecosystem reporting that would be more useful; and continuing to learn from the Northeast center since they have a fairly mature process; and developing approach for updating ESRs given current resource restraints, including partner collaboration.

Next slide, please.

So, here's just a couple of the takeaways and next steps. What we found was ESRs can definitely be used in other products that serve as on-ramps into the management process. This works in both directions. Information from other products is also being integrated into ESRs. Council staff and regional office engagement is critical to clarifying those management priorities that could benefit from more ecosystem information. It was also noted that trying to make ESRs do too much could result in them not doing anything well. And that there's also a need to balance staff workload on ESRs versus other products. Some of the regions who've had ESRs for years have tweaked them year after year after year and what is gained from that may not be as much as what they could do with taking the information and putting it into other products.

The EBFM working group is currently finalizing a workshop report in the form of a tech memo. I expect that to be released within the next month or so and we'll definitely share. We're also, the working group, is trying to build on the momentum of the of the

workshops, continue the regional discussions and our sharing lessons learned through the working group.

And last slide, please.

That's about it. I am not the expert on all of these topics, but I'm happy to try to answer a couple questions and can definitely point you to the people who have the answer if I don't.

Questions

SENNAI HABTES: Great. Thank you, Tauna. We appreciate the presentation and report out on all that information. I'm going to open it up because I think we have maybe five minutes. We're a little over time, but that's fine, to open it up for questions. So, does anyone have questions for Tauna? Again, you know the rules, in the chat or hand up or hand up in the room? Thank you. Kelly?

KELLY MONTENERO: Hi. This is Kelly Montenero. Tauna, I just wanted to thank you so much for that presentation. For summarizing how ESRs can be implemented in fishery management across regions. I do want to note that I'll be talking a little bit more about how the ESR can be used in management for the Caribbean and comparing to different regions. So, I think this really sets the stage for how this can be implemented in the region, and I think we are already a leg up in that everyone on this panel is already thinking about that. So, again, I wanted to thank you for setting the stage for that and I look forward to continuing the discussion later on in the meeting.

TAUNA RANKIN: Great. Yeah. I agree.

SENNAI HABTES: Seann?

SEANN REGAN: Thank you, Mr. Chair. Seann Regan, NCCOS. Yeah, Tauna, thank you very much for the presentation. And looking forward to the tech model that'll be coming out of the EBFM Working Group. I was just curious, in that, do you see guidance from NOAA HQ coming for sort of best practices going forward or do you think that's still sort of a more of a regional approach you alluded to how these ESRs vary pretty drastically depending on which ecosystem and group of folks that they're collaborating with. But do you see sort of a more standard going forward? Or do you think it will still be kind of regionally driven? Thanks.

TAUNA RANKIN: Yeah. Great question. As far as I can tell, there's not going to be any attempt towards greater consistency.

There was real recognition in that each region is different, their needs, and their priorities. And to the extent that we can leverage resources to support each region, to develop ESRs on a more regular basis or to suit the needs of the Councils and regional offices, we'll do that. I know that Office of Science and Technology had an effort to try to support the different regions on improving automation of data that feeds into ESRs but that was kind of an initial pilot effort, and I know it's not going to get every region to where it needs to go. But those are the kinds of things that we would do and not try to strive for any national consistency.

SEANN REGAN: Alright. Thanks.

SENNAI HABTES: Okay. I don't see any other hands raised on Zoom, and I don't have any other questions in here. I think with that, I'll just make one other comments. Thank you again, Tauna. I hope when that technical report comes out, you'd be willing to share with the EBFM. And, hopefully, we can use it to reference some things and understand a bit more about the process.

If there are any other regions that are a little ahead of us, you know, on some of the ones that have been creating ESRs for multiple years and have, like, a lot of these systems built in place, like, data monitoring and consolidation efforts and that you're still in touch with, please, let them know we'd be very interested in talking with them or even having them down to kind of give us a presentation on the process they went through, at our next EBFM TAP meeting

TAUNA RANKIN: Oh, sure. Great idea. Yeah, I think the Tech Memo will be a useful resource. There's a lot of links to papers and online system to give you a flavor of what folks are doing in other regions. So, I'll definitely forward that along and coordinate with the folks in the Southeast center on how to engage any other centers or regions to support the Caribbean effort.

SENNAI HABTES: Great. Thanks again for the presentation, Tauna. With that, I'm going to, unless there are objections from the EBFM TAP members, I'm going to push ahead and have Alida present now, and then we'll take our break after Alida finishes presenting. So, if I don't see any objections made to that, we'll just continue. So, no objections. Alida, you're up if you don't mind.

**CFMC's Outreach and Education Advisory Panel Update: Public
Engagement**

ALIDA ORTIZ SOTOMAYOR: Okay. Thank you so much. I'm glad to be here. Hope you have a good afternoon, a good lunch. Did Graciela give you the cookies? That's part of the outreach product, so you can identify the fish that you're eating. Okay. This is my presentation. I'm going to be really quick. First, because much of what I have already has been discussed and what we would like to have is the recommendations of the group to make the outreach products and also to improve whatever we are doing.

Next one, please.

Which one did you put? Okay. So, what we have been working with the fishery ecosystem plan is what you have already showed us not only in this meeting, but in many of the meetings of the Council where the fishery ecosystem plan idea has been presented. So, the basic information is the same one that you have.

Next one, please. Next one. Okay.

So, the first time that we began working with the FEP, was when the DAPs and the SSC engaged in those conceptual models, and we had an idea of what they were trying to put together and the connections and all that.

Next one, please.

But with this type of information, it's very difficult to do outreach. So, one of the issues that we would like to ask you and to give us ideas is that all this information, does it have to be for only for each one of the DAPs separately? for the fishers separately? Or do we have only one conceptual model for the entire fishery ecosystem plan. Because once that is decided, then we can start working on how we translate that into a language that the stakeholders can use, into illustration that they can understand it.

Next one.

We have had updates at the Outreach and Education Advisory Panel about this. But then they, again, come with the top 10 drivers, 13 drivers for each one of them. So, how do we translate this into a manageable piece of information for the public?

Next one.

This gives me a lot of information, but also, where do I put it?

How can we put it in a way that it is useful, that it is consistent to all the stakeholders so that it is not something that you have to change one time or another.

Next one.

And when we talk about the stakeholders, actually, we are always stakeholders. It is the fishing community, not only fishers, but all the people that live around who the fishers, fish and sell their product, educators. And it is educator, not just for outreach. How do we get this information into the formal curriculum where they are discussing the marine ecosystem, but they are doing it only from the ecological aspect. How do we put all this sociology literature, art, everything that can be, you know, integrated into this? And it is also business, but it is not only the big business of distributing the fish, it is the business around these communities and in the case of the U.S. Caribbean, fishing communities in the East are very different from fishing communities in the West. And then if we take the Virgin Islands, Saint Thomas, Saint John and Saint Croix, they are very different among them. And also, they're very different in terms of history, in terms of the way they do things, in terms of the way they communicate. So, we have to be very specific how do we do outreach for these people.

Consumers, planners, government agencies, federal, territorial and in Puerto Rico, we have to take into account the municipalities because many of the municipalities that are on the coast have people that work with fishers from the government, from the local government. So, it is not an easy way to get everyone at the same time with this information.

Next.

We have had some information already. This was in our outreach action well before we started talking about the fishery ecosystem plan because we had to let people understand the differences between the exclusive economic zone and the local territorial administration of the fisheries. So, we had we had information for special habitats. We had information for habitat areas of particular interest, and these are fact sheets that are available in the Council, in the website, and also that we take to all the presentations that we make to fishers.

Next.

We also use very intensively the material that Michelle Duval produced when she presented a strategic plan for the Council.

And this is something that we are going to use, you know, everywhere and in any of the meetings that we participate.

Next one.

Right now, we have worked on an illustrated booklet on the ecosystem-based fishery management so that the fishers and the people who read it can understand what this thing is of ecosystem-based and what does it mean for management? And the only thing that we touch on in this booklet was that people thought that the fishery ecosystem plan was another plan, just one more plan and that it would be everything for management again. So, we made it very clear that the fishery ecosystem plan was how to integrate all this information about the sociology, the human being participation, the species that are there, the habitats that are there, in the approach to ecosystem-based fishery management.

This has gone to printing already, but it is not available yet. As soon as we get it completely, I'll send it to you so that you can take a look and see what else we can do with that.

Next one.

So, these are some of the ideas that I have in mind. Right now, we have Adyan. Adyan Ríos is part of the Outreach and Education Advisory Panel. We ask Adyan to bring to each one of our meetings an update from that very wide scope that is the fishery ecosystem plan because we have reports from the group, and usually, it's Liajay or Graciela who give us an update of what's being discussed. But if Adyan can help me open up the Outreach gates for this it will be very, very useful and it will very important. So as soon as we have a document or information that we can use and put it to the stakeholders, we'll start doing that.

We have done that with the ecosystem-based already and we have done that with the special habitats. There are videos in social media, there are notes, fact sheets, on different topics that we distributed to PEPCO, that's a training session for the fishers. We also bring into the marine education plan, MREP, that reunites the fishers and give a workshop today. So, all this information is available to that fishing community, but then we need to open that up to the rest of the stakeholders.

We would love to work with infographics on those conceptual models.

But are they only one for the entire region? Do we have to do

one for each one of the islands? That's something that I need help from Orian, I need help from Sennai and ideas of how we can do that.

And then we included the final FEP document in the presentations that we are making to the PEPCO workshops. But right now, the only thing we have is, this is going to be the fishery ecosystem plan. This is the approach for fishery ecosystem. And then include that in the fact sheets that we are preparing for the island-based fisher management plans. As you know, we used to have a management plan based on species for Puerto Rico and the Virgin Islands but in the past two years we've expecting it to be approved totally. We will have one fishery management plan for each island, Puerto Rico, Saint Thomas, Saint John, and Saint Croix. We have to do meetings with the fishers, we'll have to do meetings with the other parts of the community and there, we will, obviously, introduce the fishery ecosystem plan.

So, we would be very, very grateful if you can give us the general idea that we should be trying to get to the stakeholders and also how do we do that? Is it just a meeting? Will it be better to use a radio or will it be better through social media. The difference among the stakeholders to me is so great, so large, so different that we cannot do one product just for everyone. It will probably have to be different products. So that's what I would like to hear today. Please, you know, you can ask any questions and we'll be there.

The next slide is actually the last one. Please.

SENNAI HABTES: Okay. Thank you, Alida. I think we'll open it up. I think there are questions and maybe have a little bit of discussion.

ALIDA ORTIZ SOTOMAYOR: That's for questions. In that in that last slide you have my email at the Council. So please, you know, feel free to reach me for information that I can give for the information that you can give us for outreach. So, questions? Ideas?

Questions

SENNAI HABTES: Yeah. I think let's open this up to a discussion. First, I'd like to say thank you to Alida, as always, your Outreach and Education presentations are extremely informative and very interesting and fun to listen to and watch. So, thank you as always.

Now, I think I'll start with J.J. because J.J., I think, wants to go back to one of your slides and give you some information or comment on it.

JUAN J. CRUZ MOTTA: Thank you, Chair. Thank you, Alida. Excellent presentation, especially because you've raised some very important question. Just to give a short answer. That simplified conceptual model will be produced, when? and I tell you how in in next few minutes. Second, you're totally right. The way, not only how the different stakeholders perceive the system is important, but how you communicate back about it is going to be different by default. So, we're on the same line. So, what is going to happen is the following. As it's now, we have between 40 and 50 conceptual models that we have crude.

Yes, yes. No, but that's important and I'll tell you why. Because it is important to capture the variability between stakeholders and also within each one of those stakeholders. Because-- and you know this better than me-- how the fishers in the East think, or in Vieques, in Culebra it's very different from those in Parguera, right? So, with those 40 and 50 we're not trying to make your life complicated. What we are trying to do is to capture that variability.

ALIDA ORTIZ SOTOMAYOR: It is great because I can't work with 2 of them.

JUAN J. CRUZ MOTTA: So, it is a 2-step process. The first step is to actually compare the different conceptual models within a given stakeholder. The final product for that will be combining a single model for those stakeholders. I give you the example for fishers. Right? Provided that we have about 25 different groups of fishers, we will have an estimation of how important the different components and the different interactions will be across those groups within the fishers, right? And that will allow us to identify the most important connections.

Using those most important connections, then, we will develop this simplified conceptual model that, hopefully, you would be able to use to communicate to that specific group of stakeholders. And then the second step is-- well, I said before we had 7 different types of stakeholders. So, the second step is to compare those 7 conceptual models. If possible, we will develop then a combined conceptual model out of those 7. Right? But it may be the case, that they are so different, that the views and conceptions of those different groups are so different, that perhaps we need different conceptual models for different regions or different stakeholders.

I don't know if that gives you a little bit of tranquility or adds to your stress. [laughter]

Thank you, Alida.

ALIDA ORTIZ SOTOMAYOR: No. To me is great, J.J., because I said I was going crazy, but I know I am not.

JUAN J. CRUZ MOTTA: Yeah. There is no way we're going to show this by getting salad to the people. Also, Alida, it's very important. I haven't mentioned it. This is probably a preview because Tarsila, and Stacy would be talking a lot about this tomorrow.

The other thing, which is important in this process, once we have this combined conceptual model, let's say, for the fishers, we have to go back to each one of those communities that we visited and validate that what we thought is the combination is okay. You know what I mean, it is a second validation on what we believe is that conceptual model. Thank you.

ALIDA ORTIZ SOTOMAYOR: I agree with that.

SENNAI HABTES: Go ahead.

STACEY WILLIAMS: Hi. This is Stacy. Just to stress what J.J. has mentioned and what I've heard from the fishers in the different workshops. Yeah, Alida, as you mentioned, we definitely need to produce something that communicates to the fishers to clarify because their concerns are that this is just going to be another regulatory body that is not going to allow them to fish. We have to be clear about what we're going to actually produce and their input into this process.

So as J.J. mentioned, since we are going around the island and doing these workshops, in all different parts, not just in Puerto Rico but the U.S.V.I.s, is to get the variability between within Puerto Rico and between the different islands. I think that's going to be important because as we see, you know, like, just now we've really focused-- and Tarsila will mention this tomorrow --we focus mostly, right now, on the West Coast. We've done some San Juan areas but just on the West Coast we've seen some variability within the components that are mentioned in the different workshops.

So, yeah, I'm excited to see what we can produce and what you can translate to the stakeholders. Thank you.

ALIDA ORTIZ SOTOMAYOR: That's a very good idea, Stacy. Sometimes it will leave the Council with the basic source of how to address all these different stakeholders just because of their geographical, sociological, historical, face and also for all the fishers that are different in each one of these areas.

SENNAI HABTES: Tarsila, I see your hand up online, did you want to make a comment?

TARSILA SEARA: Yeah. I just wanted to echo what J.J. and Stacey already said, but also, Alida, you ask an extremely important question, and so I just also wanted to emphasize that. I think the effort of trying to figure out how we're going to present this information is extremely important in and of itself. And there are a number of examples from, you know, past/previous efforts in ways that this can be done, and I would be happy to share and I would really like to, at some point, have a conversation, a more in-depth conversation with you, Alida, about the best way to move forward with this, which would be, you know, the best way to communicate to each one of these different stakeholders. So, I just wanted to stress that I would really like to do that.

ALIDA ORTIZ SOTOMAYOR: Great. Thank you so much. It would be very, very important to have, first, someone like Tarsila that has a lot of experience with the contact with the people, and then that you have also the vocabulary that it's going to be used. Thank you so much. I will manage to either ask the Council to allow us special meetings for outreach and education just on these issues, so that you can be present, and Adyan can bring information.

One of the issues that I have to find a way to put it, is this thing of a stock assessment. Because a stock assessment, we can understand part of it but then we have to show all these huge words and vocabulary in a way that the fishers, especially, can understand that. Okay. Any other comments, questions, ideas.

SENNAI HABTES: So, I don't see any other online. I'm going to take a moment to make a comment, Alida. I think—

ALIDA ORTIZ SOTOMAYOR: Yes, please.

SENNAI HABTES: --what would be really, really beneficial for us is, one, during your next OEAP meeting, we could have you invite Tarsila and J.J., and some other to really present. And then, within the OEAP-- because you're already tasked with this, being

OEAP, you don't need to create a special meeting --you guys can come up with a plan, right? Identify the types of outreach materials as well as the areas for outreach that are necessary as we move through this FEP process. And then, in our next EBFM TAP, I think you and Tarsila and J.J. can present that to the EBFM TAP, and we can then refine that here. And kind of incorporate that into the FEP that we're designed. Does that do that sound like that would work?

ALIDA ORTIZ SOTOMAYOR: Yes. Yes. To me it's the first approach that we have us together sharing all that information and then making sure that it is what the FEP Outreach and Education needs. So, I'll managed, and I'll let you know about our meeting.

SENNAI HABTES: That sounds great. Can one of you remind me to put that on the slide for tomorrow when we go through motions? Alright, thank you. J.J. has one more comment, and then after that, I think we're going to move to the break.

JUAN J. CRUZ MOTTA: Yeah. Very short. It is definitely very important to have the outreach and education materials. But at the end of the day, what is really important, in my opinion, and based on this EBFM approach, is that what is important and what was capturing those conceptual models fits back into the priorities of the management.

For example, this morning, we heard a lot about-- Kevin's talk -about how we select the species for the next SEDAR based on data availability. But then if we're going to follow on this EBFM approach, then also what all these people are thinking, especially when there is consensus in some issues that should feedback on the top, which is basically what is described in the Lenfest loop. Thank you.

SENNAI HABTES: Great. Thank you, J.J. and thank you, Alida, for such a wonderful presentation and I think it sparked a lot of good conversations. I'll end this by just mentioning, I think too often when we wait till the end of designing a process like this to incorporate the outreach as a part of it, and that's a mistake. Right? We need to kind of devise a plan now based on the plan that we're developing and start actually putting that in place now. Like, build the connections with the communities that we're going to need to go out and iteratively test a lot of this information.

So, with that being said, thanks again, Alida, and I look forward to working with you on developing this, as we all are.

And so, I think we're going to go ahead and take a break. It is 03:10 now. Let's do a 10-minute break and be back here at 03:20 where we will restart or, excuse me, reconvene with-- I don't have the agenda. Give me one second. With J.J. who is going to be presenting on the Gold Copy and a lot of the other stuff they've compiled over with Lenfest. Alright. Back in 10 minutes. Thanks all.

(Whereupon, a brief recess was taken.)

SENNAI HABTES: Okay. Good afternoon, everybody. We're going to go ahead and bring things back. It's now 03:25. Again, March 16, 2022. This is the Caribbean Fisheries Management Council Ecosystem-Based Fisheries Management Technical Advisory Panel meeting. Before we move on with the next set of presentations, I'm going to propose a change to the agenda. Given time is kind of running low, I think we should move our guest presenters that aren't going to be available tomorrow up in the agenda. And then, we will push back J.J. and Kelly's presentation to later, if you don't get to it this afternoon, we'll start off tomorrow's session with the two of you.

So, to do that I need a motion from an EBFM TAP member in a second.

ORIAN TZADIK: Motion to adjust the agenda to have the guest speakers go before Kelly and J.J.

STACEY WILLIAMS: I second.

SENNAI HABTES: So, for the record the second was Stacey Williams. Sorry, I'm blanking on names at the moment. I need-- that what I just poured another cup for. And so, with that, I will move to vote. I will just do it. So, if there are any objections, please say "Aye" or raise your hand in the zoom. Okay. Hearing no objections that motion is approved, and we're going to move forward with the next set of three presentations from William Hernández and Roy Armstrong on sargasso mapping, followed by CariCOOS' Oceanography and Biology by Julio Morell. And then the Sargassum Plankton Surveys from Áurea Rodríguez.

So, first off, we'll start with William. William are you available and online and ready to present?

WILLIAM HERNÁNDEZ: Yes. I'm here. Can you hear me good?

SENNAI HABTES: We can indeed. Thank you.

WILLIAM HERNÁNDEZ: Okay. So, I'm going to ask to move the slides a little bit since I'm connected remotely and not connected to a computer. So, if one can move the slides when I tell them that would be great.

SENNAI HABTES: Yeah. If you just say next when you're ready, they'll adjust the slides for you.

Sargasso Mapping

WILLIAM HERNÁNDEZ: Okay. Okay. Thank you. I'm very glad to be here, and thanks again for the Ecosystem-Based Fisheries Management Advisory Panel team for the invitation.

Today, I'm going to talk a little bit about the different projects that we're currently working with. Mostly related to sargassum impacts to the coastline. And these are focused mainly on addressing various issues with sargassum, but from a different approach. In this case, from a remote sensing perspective approach, and we're going to talk a little bit about that in the presentation.

But the agenda is very short, and you can see. I mean, we're going to talk a little bit about what is sargassum just to recap very briefly. And some of the highlights of the two major projects that we're currently involved in, working with sarcasm in coastlines and some major findings and how these findings could help support the ecosystem-based fisheries plan.

Next slide, please.

As you all know, sargassum is a floating alga that is present, mostly, in the sargassum Sea, in the North Atlantic, and it's an essential fish habitat. But once it starts reaching the coastline, then it becomes an issue. This is an image of one and others that shows the sargassum density for the year 2018. And as you can see, this sargassum, what has been called now, the Great Atlantic Sargassum Belt, is a new source of sargassum from the Central Atlantic that is currently reaching us since 2011 and has been increasing in the past years, especially this year of 2018.

So, we're focused on understanding a little bit better what the impacts of that sargassum in the coastline are.

Next slide, please.

And from that sargassum, as I mentioned, once it reaches the coastline and inundates that coastline and massive accumulations occur, then we get in trouble. We get, in this case, the impacts are divided in two, just for the sake of simplicity. But the main impacts are the socioeconomic impacts. Which, in this case, limit the use of the natural resources, let's say, beaches, access to marinas, and even could have economic impacts in ocean dependent communities. That is something that our colleagues are studying right now, how these impacts could have detrimental effects in the economy of these ocean dependent communities. But our main interest of our research is focus on the environmental impact. So how that accumulation alters the ecosystem or coastal ecosystem biochemistry, either by releasing toxic compounds due to the position of that accumulation, light attenuation, fish mortality, impacts to the cores of seagrass adjacent to those locations. And the famous sargassum brown tides.

As you can see in the pictures on the right, those are drone images from Palmas del Mar's side, that is Southeast Puerto Rico, in Humacao, and La Parguera. That is El Palo. And you can see that the leaching from that sargassum accumulation is what we call sargassum brown tide. That has some effects in the coastal ecosystem and in adjacent benthic habitats as well.

Next slide, please.

So as part of these, we were able to get funded through a Sea Grant two-year research project, which I'm the PI for that project, focus mainly on better understanding where these sargassum hot spots are located. And from determining those hot spots, using high resolution imagery, we then focus our attention on two sites. One is La Parguera natural reserve and the other is Palmas del Mar Humacao in Southeast Puerto Rico, in the Humacao area.

We are interested in these sites because one is a natural area. The West side of La Parguera is a mangrove forest, a fringing mangrove forested area. But the Palmas del Mar area is as a beach area with a very large marina. So, we're evaluating how these impacts affect these two different areas in terms of uses as well. And also monitoring the in-situ water quality effects using multi parameter sounds and drones. And also, from that, identify best sargassum management practices and see if we can promote recommendations of management for these sargassum issues.

The drone images on the right are images from the Isla Cueva

side, on the West side of La Parguera. You can see in the top image, sargassum already in the bottom covering the seagrasses around that area. The other one's blocking different channels, mangrove channels, around La Parguera.

Next slide, please.

And also, as part of these efforts, we're also collecting sargassum observation. So not only collecting water quality, but also making a record for locations, sargassum accumulation level, if there are sea turtles present or nesting sites, if there are debris or fish mortality associated with that accumulation. That survey was developed using the ArcGIS Survey app. We can collect photos and geolocation. In the map on the bottom left, you can see that is the Palmas del Mar marina area and the red dots indicate different sites where these surveys were collected. The boxes with the colors represent the stations that we collected, not only in pictures, but also water quality data as well.

That helps us a lot because we can send, instead of a big crew to collect information, we can send one person with their phone to collect the survey and collect also the water quality data, which in terms of COVID last year was a pretty good solution.

Next slide.

And as I mentioned, we were collecting water quality data, mainly pH, temperature, conductivity, dissolved oxygen, and turbidity profiles at different locations to evaluate what were the conditions once the sarcasm reached that area.

In Palmas del Mar, it was really dramatic, especially in the areas very deep within the marina because once that sargassum influx came in, it was very hard to flush out from the marina. And the oxygen levels there were pretty low throughout the whole sargassum season. So, from May, all the way to September was really below 3 milligrams per liter. So very anoxic conditions there. There was virtually a lot of fish mortality and mortality in the marina life when compared to a month before, in April of that last year, which it was all different. So, it was a very dramatic change from two months. The changes were very dramatic from two months that we sampled from the beginning.

So next slide, please.

The other equipment that we integrated into this monitoring was remote cameras. Again, with the limitations from COVID, it

really allows us to get a good picture of what was happening around those sides. This is a remote camera that was installed in Isla Magueyes, La Parguera, where the Department of Marine Science is located.

There's an animation. Sorry. That was a PDF, but I will share the PowerPoint that shows the animation. It collected an image every hour. So, we can get an idea where the sargassum is coming in and validate the presence of sargassum, but also, we use that to validate the satellite imagery that we're using for the estimation and presence of sargassum.

Next slide, please.

This is something that we're working on right now. We're now integrating not only the survey data, the water quality data and the data from the remote cameras into a GIS mapping application. So, we can integrate that with additional GIS information that is available, for example, coastal uses, all the white dots that you see there are identified coastal uses, either diving sites, marinas.

That information is from the ESI maps, environmental sensitivity index maps. So, we're integrating that to develop a decision-making tool, so stakeholders can use and assess the coastline. And then use that information to determine the best managed practice for sargassum inundation. There's a link below, so you guys can feel free to link in and collect and see it in more detail.

Next slide, please. Next slide?

As part of this research and also expanding our reaches with support from CariCOOS, we were able to assess, using high resolution imagery, the impacts of sargassum in coastal areas. And in this case, we're using very high-resolution imagery, so commercially available imagery. And we saw an accelerated impact to the fringing mangrove's located, especially in Isla Cueva site since 2018 to the present. That analysis was done using NDVI.

As you can see from the image on the right, we were able to assess initially the accumulation of sargassum, but we validated that sargassum presence using drones. So, this was an excellent approach because we were able to survey a larger area and assess the impacts of sargassum.

We're very interested now, we saw the presentation early in the

morning about the mangrove maps, and we were interested to see and compare our results with what they're finding in terms of the mangrove cover change around Southwest Puerto Rico. So that's a whole work for us.

Next slide, please.

Another project that we currently involve in, and which Doctor Roy Armstrong is the PI for this. This is a NASA Oceans funded project. It's a three-year project that is focused, again, on assessing and monitoring sargassum impacts to coastal mangroves and shallow benthic communities. But in this case, using NASA's suite and access to sensors and satellite imagery. But using, in this case, a machine learning and deep neural networks approach. So, the area of focus of this study is the Güanica and La Parguera sites, the ones in red that you can see on the map. And Jobo's Bay area. And the area for validation will be the East side of Puerto Rico. So that project is fairly ongoing and we're now collecting all that imagery and it's getting set up to be put into the analysis for machine learning.

Next slide, please.

And the benefit of having multiscale imagery is that you can assess sargassum at various spatial scales. The image on the top left is a MODIS Aqua AGAI or Alternate Flooring Algae Index, one kilometer image. And you can see the green and yellow areas indicate floating alga presence. And from that same day, the image on the right, a Landsat 30-meter image, you can see those mats, sargassum mats, coming into the West side of La Parguera area. The image from the next day, the bottom left, is a very high-resolution imagery. So, we're talking about now 5 meters to sub metric imagery, and see the sargassum accumulation there, and the image on the bottom right is a drone survey that we did while these images were being collected by the satellites.

This is the San Cristobal Reef located in La Parguera. You can see not only the mass coming in, but also the accumulation in the fore reef and the reef lagoon crust. In the reef lagoon and the crusts as well. So, these sargassum accumulated there it flushed out relatively fast, but still consecutive patches can be present there throughout the orgasm season.

Next slide, please.

This is the summary of the different sensors that we'll be using for this NASA Oceans project. So, we use the modern resolution sensors where we have the daily data at 250 meters to one

kilometer. And again, the products are floating algae index and alternate floating algae index, and we will use that to focus on offshore waters. But once it reaches the coastline, we would then switch to higher resolution sensors. So, Sentinel-2 and Landsat and from that, evaluate hot spots and chronic exposure of different areas. And from that, develop what we call our vulnerability index of that coastline. So, we will characterize those coastlines based on the vulnerability of sargassum accumulation and impacts to those coastal sites.

And using the very high resolution, we will then focus more on change detection. So, evaluate if benthic habitats or benthic composition has changed during this sargassum season or before and after each sargassum season and throughout the years that we have sargassum accumulation on those sites.

So, this is a-- as you can see --an all-encompassing project focused mainly on detecting and increasing the number of observations that we have for sargassum.

Next slide.

To accommodate the amount of data that we're going to process here, we'll be using what we call machine learning, multi-sensor data approach. To simplify that approach, what we do is we co-register the imagery based on its geolocation. And once we do that co-registration, then we fuse the data together and train the classifier to detect sargassum at different spatial scales. And once we have that sargassum detection already in place, then we can generate data products, evaluate sargassum presence at all spatial scales throughout the imaging.

Next slide, please.

Also, as part of this project, we will be expanding our water quality assessments, water quality evaluation, at not only La Parguera site, but also in Jobo's Bay area. We'll be including also optical information. So, we'll be including attenuation in PAR light, Photosynthetic Active Radiation light. Attenuation coefficients at 490 nanometers and also using hyperspectral profilers to characterize different signatures of sargassum and how we can correlate that to the process imagery that we're currently working with.

Next slide, please.

So, how can this information be used to support the efforts of the Fisheries Ecosystem Plan. Well, what I see, and this is just

a very brief summary of some ideas that could be used and some of the information that could be used. For example, one of the products that we're interested in developing is the coastal areas impacts or how the coastal areas are impacted. And we can then correlate that to, let's say, what effects that has to local fisheries in terms of not only catch or compare that to the fish landing sites as well. And also, correlate that to the vulnerability. So, if we have areas with high vulnerability, let's say coastal areas where fringing mangroves are heavily impacted, how does that correlate with the current landing sites and currently fish stocks there? So, it's something that, since this data will be geolocated, they will have a geospatial component, it is something that we could assess using different web mapping tools.

As well, I mean, we will have access. This information, as I mentioned before, and I included the link, will be included in our GIS mapping application. So once that data is in that format, we can then tie it down or combine that information with the SEAMAP data that J.J. will be presenting tomorrow in this case. And some of the water quality products that we already developed for open ocean and coastal areas.

So again, this is something-- just some from very brief suggestions. And it is something that we're very interested also in collaborating with, since it can be a great asset having that information combined with the sargassum effects in the coastline as well.

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Yes. To acknowledge, and this is our thanks to sponsors. This case, a Sea Grant College program and the NASA Ocean Program as well. And our collaborators for these projects, which most of the work that was collected for water quality and sargassum observation was done by the University of Puerto Rico Humacao, undergrad student volunteers. So, they were trained in the collection of water quality data, but also in the observations and how to collect that. So, my thanks to them and the other collaborators as well.

So, next slide.

I'm open to any questions for the presentation. Thank you.

Questions

SENNAI HABTES: Excellent. Thank you, William. I'm going to open

the floor now to questions. I'm going to take 3 questions and then I'm going to have to move on to the next presentation. So, Stacey, has had her hand up first. Have at it.

STACEY WILLIAMS: Hi. This is Stacey. Great presentation. William, I-- Can I ask multiple questions, or should I just focus on one?

SENNAI HABTES: If they are short, you can have two questions.

STACEY WILLIAMS: Okay. I think-- I believe they are short. So, I know that you're still collecting data, but can you say, are there specific hot spots that are consistent throughout the year? Like, do they move around the island, or, you know, between years, you can say, "okay, this particular area, this is a hot spot for sargassum accumulation."

WILLIAM HERNÁNDEZ: Well, that is a good question. We're still analyzing data as we speak. But from the general observations that we've done throughout the data sets that we have, areas in the East, Southeast mainly and Southwest Puerto Rico-- So, the whole South and East are the most impacted areas. And from there, you have areas that are oriented to the Southeast, usually the bays, enclosed bays or very narrow channels, those are the areas that see the biggest accumulation. Palmas del Mar is one example and La Parguera here. The Western side, La Parguera, is another one. You can get a sargassum there present most of the time during the season. Once it reaches there, the main thing that happens is even if you don't see it there, it has already sunk to the bottom and it's there having an effect, still having an effect to the coastal ecosystems there.

So, from a general answer will be, yes, we have some hot spots already identified, and we can share those if you're interested in more information for that.

STACEY WILLIAMS: You know, looking at your last slide, if we want to see if there's any type of relationship between fisheries impacts and the sargassum and looking at what hot spots there are, I think that's a great tool. Really quick question. How are you estimating the change in benthic cover? Like, what are your parameters or factors when looking at the effects of sargassum?

WILLIAM HERNÁNDEZ: Well, for the benthic cover, we started evaluating the different benthic cover areas. For example, the paper that was published had a second part that was focused on the benthic cover. Changes in the benthic cover. The issues with

the benthic cover are that we need to get very high-resolution imagery without any other features like turbidity or resuspension and it's been proving very hard to do, especially in areas where you have a lot of resuspensions or are subjected to blooms or anything.

But what we see from the field observations and from some of the drone images is that areas where you have consistent accumulation there's been a displacement of whatever benthic feature was there, whether it was seagrass or other microalgae, and it was substituted by this fine sargassum decompose matter that looks like mud, and it's tied down with mud. So, so you have maybe two or three feet at most places of sargassum just accumulated there and there are no benthic features there.

So, it has displaced completely whatever benthic feature or benthic habitat that was there. From some of the sites that we evaluated. Still, there are some places that we need to go, but that that's the main feature that we've seen. We're interested now in seeing if that has some effect in areas where we get corals. We have corals and if we had the same effect, on those corals as well. So that's something that we are now, you know, planning to assess for this year.

STACEY WILLIAMS: I have other questions, but I'll contact him. Contacting, so I'll pass it on. Thanks.

SENNAI HABTES: Thanks, Stacy. Who else had a question? I saw a hand over here. So, Julio and then we'll go to J.J.

JULIO M. MORELL RODRÍGUEZ: Hi William. Great presentation, I think it's a great approach you have for the problem. You know, we are working on the same subject. I wonder if you are planning in turning this imagery into a biomass loading.

My view is that is not just the biomass that gets there but the [inaudible] loads system in terms of carbon and nitrogen. That really can upset the ecosystem and turn it into anoxia and acidification.

WILLIAM HERNÁNDEZ: Yeah. That is a good question, Julio. We're not necessarily focused on the biomass estimate. That's something we're trying to test if we can assess it using imagery. But even with a very continuous, let's say, for example, the planet lapsed data that we can get imagery every three days, for example, it's very hard to detect sargassum even at five-meter spatial resolutions in some places because of clouds and certainly the other effects on the surface. There's

good value, as you mentioned, for that influx of carbon and biomass to the system. I mean, that's something that needs to be evaluated. I know you're working towards those efforts as well; you'll probably present a little bit more about that.

What we're focusing is more from an imagery standpoint perspective to see if we can evaluate some biomass estimates using imagery while we're on the field measuring that. So that's something that we're testing and will be testing this sargassum season. And, hopefully, we'll get some results for that. But definitely, it's a very hard thing to do with imagery, so that's something that we're going to be testing this semester. I'm really interested to see if we can collaborate in those efforts as well since I know you've been working on the biomass aspects of this project.

JULIO M. MORELL RODRÍGUEZ: Yes, we have to talk about that.

SENNAI HABTES: Say it again, Julio, I don't think they heard you.

JULIO M. MORELL RODRÍGUEZ: Okay. You can hear me? We have to collaborate towards that end to estimating the biomass input rate.

WILLIAM HERNÁNDEZ: Yes, I couldn't hear the question, Julio. Could you repeat that? Sorry.

JULIO M. MORELL RODRÍGUEZ: I was just repeating the answer from my previous comment. Maybe the mic doesn't help. We'll be in touch.

WILLIAM HERNÁNDEZ: Okay. Okay. Yeah. Sure. Sure. It's hard to-- it was kind of looking around. So sorry.

SENNAI HABTES: Okay. I'll allow one more question and then I think we should move on to the next presentation. Kelly, you want to go ahead.

KELLY MONTENERO: Thank you. This is Kelly Montenero. Super quick question. You mentioned the machine learning for image fusion of satellite data, and I was just wondering what the time scale is for that? Are you looking back in time? And whether you could extend the spatial scale larger than just the two study sites or if it's just concentrating on two study sites for now for the image fusion and machine learning work?

WILLIAM HERNÁNDEZ: Yes, and that is a good question. We just

had access to the NASA suite of products and our plan is combining the multispectral data-- sorry, the modern resolution sensors with the higher ones so we can go back before sargassum started. So, we're looking back to start around 2005. That's where we've evaluated that we have very good imagery for most of the sensors that we're interested in. So, that will be a good starting date, if you put it that way, for the imagery. From 2005 to present, for all spatial scales of those imagery.

And also, we will be processing, like I mentioned, using the machine learning approach, and that is something that Doctor Emmanuel Arzuaga from the electrical engineering department is currently working with to evaluate. Since we'll be collecting imagery at various special scales, we will also be focusing mainly on the sites that I mentioned before. So, the Southwest, Puerto Rico, Jobo's Bay, and the East, but it's not limited to those sites because once we train the classifier, and it knows the imagery and the sources and what is the spectral composition of that imagery, you can feed additional imagery from different sites, let's say, U.S.V.I. at some sites or some other sites around Puerto Rico and it could do the processing for it.

So, yeah, that's something that can be done and it's something of interest to you, you can contact me, and we'll talk a little bit more about that.

KELLY MONTENERO: Thank you.

SENNAI HABTES: Great. Thank you, William. As always, it's great to see what you're working on. Thank you again for agreeing to present here. I think that it would be great to stay in touch. We're absolutely going to be interested in a lot of the data that is going to be coming out of your project as part of the EBFM and the FEP work we're doing for Councils. I think this new sargassum presence is going to have a lot of impacts in how we manage our nearshore resources going forward. So, thanks again.

WILLIAM HERNÁNDEZ: Thank you. And, yeah, I'm looking forward to that.

SENNAI HABTES: Thanks. And with that, I think we're going to move on the next presentation, which is going to be Julio Morell. He's going to give us a presentation on the science, from CariCOOS oceanography and biology. So, Julio, give Christina a second to get it up, to get the presentation up and then you can go ahead and get started.

CARICOOS Science: Oceanography and Biology

JULIO M. MORELL RODRÍGUEZ: Yes. I hear some echo. Can you hear me, okay? Do you hear me fine?

GRACIELA GARCÍA-MOLINER: Julio, apaga el volumen de tu Surface.

JULIO M. MORELL RODRÍGUEZ: ¿De mí qué?

CRISTINA OLÁN MARTÍNEZ: De la computadora.

JULIO M. MORELL RODRÍGUEZ: Ah, esa es buena. ¿Ese es el feedback? Vamos a cerrar la computadora. No, no creo que es. Another mic, maybe.

Anyway, there is quite a bit of overlap with the previous presentation.

¿Me muevo? Okay, what about now? Much better?

Yes, there's going to be a little bit of an overlap with the previous presentation. I'm pretty excited about having a couple of groups from our department working on this problem which we already recognized as a chronic issue.

After a decade, now we know it's not something that's going to go away pretty soon and the community scientists but also the managers are being asked for solutions or how can they help when they approach this problem.

Next slide, please.

So, we understand that we should do-- what we intent to do in this project I am presenting is, first, the identification of vulnerable areas that could be protected or clean up as possible. That includes threatened ecosystems. We need to device a way to have sargassum loading rates, and then assess the impact like William was saying hypoxia acidification, light attenuation, circulation and flux. And, of course, we need effective forecast because I don't think the state will be able, or the agencies will be able to deal with the problem region wide. So, the idea is that we'll be able to tell them beforehand where they should deploy protection or some devices to avoid extra loading or excessive loading of carbon in the system.

Next slide.

GRACIELA GARCÍA-MOLINER: We are having a problem with the-- so that's not coming. Sorry about that. So, the people who are in

Zoom are still in the first slide. So, one second. Alright. Ahora.

JULIO M. MORELL RODRÍGUEZ: Can you hear me?

GRACIELA GARCÍA-MOLINER: Yes.

JULIO M. MORELL RODRÍGUEZ: Okay. So, the approach is we figured if we get a handle on the sargassum influx rate. Right? We do that using traps, which you'll see later on. And we can document the expression by loading in terms of time and evolution of that expression. Some of them being hypoxia and acidification, and then we can develop and validate the sargassum forecast or a loading rate forecast. We can actually tell people this is the priority for this inundation event. Like [inaudible] nowadays. Right?

And one of the impacts we're assessing in terms of ecosystem is the monitoring of the zooplankton biodiversity in the nearshore impacted areas. The idea to do this came from the concept of the nurseries for juveniles for fisheries for important species. That role could be certainly negated or denied in case of anoxia or acidification.

Next slide.

So, these are the traps, on the right, that traps influx of sargassum. There's about eleven of them in La Parguera. They sample weekly. There is a chemistry station, as well, there is like 10 of them, the sites on the left, where we measure oxygen, PH, alkalinity so we can compute aragonite saturation with an index of dissolution of carbonate structures in La Parguera, across the gradient from offshore to inshore. Again, the idea being, to see if we can actually tell them-- and we already know that the outer islands are not as much impacted. So, we have to start writing, basically, a model to be able to forecast if you allow this amount of sargassum in. In this event that we are forecasting, you are going to be getting this level of hypoxia or acidification within the [inaudible] regions.

Next slide.

This is what happened. This is 2021, and you can tell this are weekly samplings. And as you can tell, this one station is the most critical station. And as you can see, the biomass loading is enormous in terms of kilograms per meter of front reef or mangrove per week, dissolved oxygen and pH. We also measure, again, saturation, aragonite saturation, which is an index for--

it's not there --for dissolution of carbonates, which is a big problem that we might face.

As you can see the seasons started pretty early. By April it started showing up and it gets critical by July and August, and then slowly dies down. But it's there for over eight. Some stations are anoxic for eight months or suboxic for eight months, and the pHs are way low, where we expect to be actively dissolution of carbonate in sediments, but also in organisms.

Next slide.

This is a comparison between what the sargassum loading means with other carbon sources in the region. This is for the event of July 2020. That's for a three-day event. As you can see, a lot of sargassum is in order of magnitude over mangrove or seagrass put in as carbon just in that sargassum event. Same thing with nitrogen and phosphorus.

So, the chemistry deeply altered by just one event, and it takes weeks to recover. Right? So, the threat in terms of an ecosystem like ours, which are already compromised in terms of the ability to mineralize their carbon and to neutralize the acidification, it's really challenging, and it proves like it stays. The inner stations are extremely vulnerable.

Next slide.

This is a paper we just published. It's by Melissa Meléndez. There are two stations there, one which is in La Parguera which is the black line. The red line is in Florida, a reef in Florida. The La Parguera, is Enrique Reef where we have the acidification buoy. The message there is that most of the year we are already in dissolution mode, and the reef, Enrique, is in heterotrophic mode.

So, there's more respiration that is actually primary production of carbon fixation. What that means is that reefs are already dissolving as an ecosystem. They're [inaudible] dissolving which means that the infrastructure of the reef, not just the corals, but the infrastructure of the carbonate, if we keep bringing in more carbon this is going to get worse and we will be seeing, actually, the deterioration of the structure of the reef and the disappearance of these critical coastal barriers for the use of us as protection, but also for other ecosystem services.

Go on.

This happens in some other places. This is a model we're running right now with Hugh Roarty from Rutgers for forecasting the monocarbon that can get in. It's running for regions throughout Puerto Rico and the Virgin Islands. You can barely see them at the right, but you can find them in the link.

That's going to be the basic data that we're calibrating with the trap data from the carbon trap data, sargasso trap data, and will allow us to forecast a couple of days beforehand the loading rate that we can expect.

Next. I think that's it. Any questions?

Questions

SENNAI HABTES: Great. Thank you, Julio. Really interesting presentation and a lot of really interesting data that I think we would like to incorporate into some of what we're doing for the FEP.

JULIO M. MORELL RODRÍGUEZ: Of course.

SENNAI HABTES: I definitely would like to see some of this expanded to the U.S. Virgin Islands despite the fact that I'm not necessarily working directly with CariCOOS anymore, but we'd like to continue our partnerships that we had before.

JULIO M. MORELL RODRÍGUEZ: Of course, we should. Yeah.

SENNAI HABTES: So, going forward, I think, we have a little bit of time for questions, so I will open it up. Same rules. People online raise your hand or put it in the chat. People in the room raise your hand. I'll call on you in order. And Julio wants to say one more thing.

JULIO M. MORELL RODRÍGUEZ: Yeah, I still owe Graciela what she asked me for, some updates on the oceanographic data we're collecting, and I want to-- One thing we are doing we are expanding the radar network for currents around the island. This data you use for the [larvae?] dispersal and pollutant dispersal and so on.

We'll be deploying visual buoys based on our remote sensing for water quality, turbidity, temperature, and so on. But we'll be adding the buoy in Saint Croix and deploying the buoy back in Saint Thomas in this upcoming month. There's a glider program will continue doing it. It'll provide us the context on the open ocean oceanography, deep water oceanography, which I think we

can use with the temperature for the deep snappers. I think that that would match really well.

And we're just starting a coastal barrier assessment project with Miguel Figueroa, where we are going to do an analysis of the status trends and threats, we can identify from remote sensing in situ chemistry and the status from the CRMP, the Coral Reef Monitoring Program. So, you'll be seeing that in the upcoming months.

I think that's most of the new stuff we'll be putting out. Maybe—Where is my deputy director? Hey. Patricia Chardón is our deputy director at CariCOOS. She can add some remarks on this. Did I miss something? Okay. Promise?

SENNAI HABTES: So, anyone with questions? Marcos is recognized.

MARCOS HANKE: Hello, beautiful, important presentation. The only thing that I don't hear very much is the effect on the larval stages of conk and lobster because they produce the shells with the low pH and so on. Is there anybody working on that aspect? Because for ecosystem-based management, that's something very important on the main resources of fishery, like lobster and conch.

JULIO M. MORELL RODRÍGUEZ: Actually, one of the main drivers behind the study of acidification, having the mollusks, the commercial growth of mollusks in the U.S., that's something that's been proved. The shell gets thinner and weaker. Actually, in fish otoliths as well. Those are some of the aspects that are being studied right now. But there certainly is damage, there's damage.

SENNAI HABTES: Graciela and Orian.

GRACIELA GARCÍA-MOLINER: No? Okay. So, I go. Thank you, Julio. One of the reasons why we are very much interested in the deep water and making sure that that gets brought into the picture of the ecosystem approach to fishery management is that it is one of the highest fisheries, at least in Puerto Rico. It is quite significant in Saint Croix. Although in Saint Thomas it's not as prevalent as in the other two islands. The thing is that the fishers have been complaining about changes in what they think it's the deep waters, whether it's temperature or whatever. So, the Coral Reef Conservation Program has provided funding for working with the fishers to follow their fishing, you know, not in the standardized way that the Science Center is doing, but just to know what they do when they go out fishing. What things

they look at when they go out fishing. And we're doing vertical profiles of salinity and temperature at the same time that we're collecting the information from the fish that they harvest, fish communities at depth via the photographs and video that gets taken.

So, we're hoping that we can put all this together. It's kind of very different from the shallower area that we're all mostly talking about. So, we need to make sure that we don't forget about those deep-water areas that can also be impacted by, you know, changes in the currents, for example.

JULIO M. MORELL RODRÍGUEZ: Yeah, that makes sense. The temperature in like the deep snapper, like cartucho would be about 300 meters, which is in all the water mass, not the same way we've seen at the surface. So certainly, it's worth checking. Have you thought about using sensors in the fishing gear for temperature?

GRACIELA GARCÍA-MOLINER: So that would come in, hopefully, in the future. We had originally thought about it, but that would be something that, again, like the GIS work that was done, that you give people the sensors and they can deploy them for you, etcetera. So, we were thinking about it. So, let's talk about it later.

JULIO M. MORELL RODRÍGUEZ: Yeah Yes. Since, since it's a deep-water mass and we've been monitoring that water mass since 2014 with the gliders, we can certainly look at that data for you.

GRACIELA GARCÍA-MOLINER: Thank you.

SENNAI HABTES: So, if there are no more questions, I don't, I don't see any online. I'm going to make just a comment since we have Julio here and this is Council work. I've been trained as an oceanographer and trained as a fisheries person. I would recommend, particularly in light of the increasing changes to the ecosystems in the U.S. Caribbean, that both fisheries and the oceanography and even the marine biology kind of team up to propose creating a time series for the U.S. Caribbean.

There's currently no tropical time series that has a long data set in the Atlantic. There was one in the Cariaco Basin, but the destabilization in Venezuela has stopped NSF for funding that. I think if we, as academics and managers, work together to organize and push something for that, it would create a unique and very important data set that is necessary to understand both

the deep water and upper atmospheric and upper oceanographic changes that are occurring within tropic regions all over the globe. And I think it has a unique importance to a place like the U.S. Caribbean, where deep water is so very close and allows ample opportunity to study at least three different significant water masses changing and their impacts on nearshore places in the region.

So, with that said, I will get off my soapbox, but I think this is like an important issue and something we could all easily work together on with our federal partners to identify a way programmatically to make this happen in the U.S. Caribbean. So, Julio?

JULIO M. MORELL RODRÍGUEZ: Yes. We had a zero station, the Caribbean time series, up to 2003 and we had to stop it because we had no ship. Nowadays, we have gliders and the ideas to take a bimonthly cruise in gliders [inaudible] the temperature structure on it. But certainly, that won't take care of other measurements that you cannot take with a glider.

SENNAI HABTES: Right. Primarily the ocean biogeochemistry. Right? And that is what we don't have going down in a column to the, you know, deeper waters across the different water masses. And I think that's what we can, that and some other interesting things like the zooplankton and phytoplankton, sediment deposition rates, carbon, you know, none of that is really well known in recent years for the tropics. Graciela?

GRACIELA GARCÍA-MOLINER: If I may. I just remembered that even if it's not a continuous data set, we do have deep water cruises that come through the area. The Nancy Foster, it's actually, right now, off the northwest coast of Puerto Rico. WHOI, the Armstrong, the research vessel Armstrong, was just off the North Coast here in Puerto Rico.

We have another mission coming in in April. And I think that we should also explore those databases because, you know? They do collect information as the ROVs go down. They collect information on temperature and things like that. So, you know, speaking of all the deep water needs that we have, and that's also part of the EEZ and it's also part of the corals of the deep waters around Puerto Rico and the Virgin Islands. So, you know, I'm making a note because there should be another data set that we can bring in from NOAA and Wood Hole etcetera. Because a lot of people, as Rachel said this morning, do a lot of research here and then we don't hear anything else about it. So, you know, these are the things that we need to make sure that we

have them available.

JULIO M. MORELL RODRÍGUEZ: There's going to be a new boat in the area purchased by Blue Tide, the not-for-profit. She's equipped with CTD down to 500 meters. So, it's not the full thing, but we could use that if there are funds.

SENNAI HABTES: Great. Okay. Other questions? Concerns? Thank you for humoring my soapbox for a bit there. All right. Seeing none, I think we can go ahead and move on to our next presenter. Once again, Julio, thank you for joining us and thank you for the wonderful presentation. Next, I believe is Áurea Rodríguez and I don't know who that is because I haven't met them yet. Is it-- Ah, there you go.

Áurea, thank you for showing up. She will be presenting on sargassum. What'd you say? Oh, she'll be presenting on plankton surveys around the sargassum. So, if you give us one second, we'll get your presentation up. In the interim, Áurea, if you don't mind introducing yourself and your affiliation.

Sargasso Impacts on Plankton and Hypoxia

ÁUREA E. RODRÍGUEZ-SANTIAGO: Yes. So, I'm Áurea Rodríguez-Santiago. I'm working for CariCOOS right now with a project with zooplankton. I'm really happy to be back to work in my field that is zooplankton and to be, again, in the field to do this project. And so, I'm really grateful to be here and to be working with CariCOOS. Thank you for the invitation from this forum.

Okay. Gracias. So, thank you. We'll be talking about zooplankton diversity and dissolve oxygen patterns through seasonal sargassum pulses. So, we're going to see more sargassum here and some pictures. So many pictures that we are always taking. Every time I move and there's sargassum, I'm taking pictures of these.

Next.

So, as you all know, we have been, you know William and Julio, we've been talking about sargassum. So, starting in 2011 coastal areas of the Caribbean and Tropical Atlantic Ocean began to experience this extraordinary yearly accumulation of this brown alga. The decay is creating many biological consequences as reduction of light, oxygen, pH, and increment in ammonium and hydrogen sulfide concentration as we have been talking about here.

So, this can affect the stocks of commercial and non-commercial fishes. It can be directly to species or affecting the food sources of these organisms.

Next, please.

So, more pictures, and these are mine. My plankton. So, these effects of low oxygen and eutrophication can have and are known to have wide effects, range effects, on the zooplankton. The diversity of zooplankton is key, as we all know, to our healthy oceans. And the role in the ecosystem is very, very important as this intermediate species is transferring energy from their primary producers to higher trophic, such as invertebrates and fishes.

Next, please.

So, as the growing attention on this issue, there have been, already, some studies on the effects of sargassum in some areas of the Caribbean, whereas research in Puerto Rico is beginning with our colleagues but it is still limited, especially in zooplankton.

Next.

So, our focus is directed on the impacts of hypoxia caused by sargassum's accumulation on the biodiversity of zooplankton, of course, ichthyoplankton, post larvae and fish juveniles that inhabit shallow coastal mangrove systems. We have been working in La Parguera so far.

Next.

So, the approach is to access zooplankton biodiversity at four stations within La Parguera region, pre, during and post sargassum events. Measuring dissolved oxygens by different means. So, the sampling frequency that we proposed are-- we have been working in a pilot project, but we are proposing beginning another project now. So, once per month with up to six additional samplings depending on the sargassum pulses. So, we might add some other samplings depending on the arrivals. We have DO loggers, dissolved oxygen loggers, deployed monthly for two periods of five dates, or depending on the pulses too, encompassing zooplankton samples. So, the loggers are placed before the zooplankton sampling, a few days before, and are taken after the zooplankton sampling.

Next, please.

So, these are the stations. The one that you see on the left that says, ZMJ1 is also one that Julio have been talking about. The, the data that he presented was this station. That is a heavily impacted station. So, I'm going to present some data on these stations too. But we have all these other stations throughout the Parguera area.

Next, please.

So, we are using to collect the zooplankton we are using mainly light traps with a chemical light. They are deployed at dusk and retrieved a dawn. So, they stay in the water around 12 hours depending on the season. This is a trap that has slits. These slits, those tubes, they have slits in between. The organisms come attracted by the light and stay trapped in the bottom pan that has a mesh. So that's mainly what we put that in.

Next, please.

So that is placed with a concrete block in the bottom, and it stays below the surface. So, these are very shallow areas. So, we adjust the height to the depth of the water. So, these are us getting the samples ready. This is an example of how it looks on the water once the trap is placed.

Next, please.

So, this is an example of how some samples looks after we collect the pan. They are preserved in ethanol and stored at four degrees until further processes.

Next.

Simultaneously, we are doing plankton tows with a 202 mesh net and tow for three minutes. This tow, we do it after we place the light trap. So, we do this tow, and we are going to compare the data. We are mainly concerned about the larvae and fish larvae that are caught by the light drops. Actually, those light drops are. Specially made for fishes. So, our main target here are fishes. But with this plankton we can catch some other organisms that are not attracted by light. So, we are doing it too.

Next, please.

So, then at the laboratory, we sort out the larvae and juvenile fishes and the organisms. We, morphologically, so far, we have been identifying the organisms morphologically to the lowest

taxonomy possible level that sometimes is not that low. So, we do photo documentation of the organisms.

Next.

But we are doing metabarcoding coding. This is a tool that is helping a lot to identify many organisms using the CO1 gene. That is the barcode of life. We chose this gene because there's a lot of data about this, you know. It's growing database so we can more information to compare to. This is a diagram only showing this. How is the single barcoding compared to the metabarcoding coding that is to the right.

Next please.

Just to-- So that's a mix of a sample that is great because you just extract the DNA from the whole sample and do the metabarcoding coding. So, it is a lot faster and very specific.

So, the instrument for the DO, here we have an YSI. There are the data loggers, HOBO data loggers, the DO and pressure. And also, a pendant that is for temperature and light.

Next, please.

These instruments have a base, that base has a weight. So, the DO data logger is on the inside. Then we have the light, pressure and light, and the other sensors around it. So that, we are placing it three days before deploying the zooplankton traps. We do the YSI every time we go to put the trap and deploy the trap. Actually, the YSI is done when we put the sensors, when we put the trap, and when we retrieve the traps too.

Next, please.

So, this is some data about that station that I was talking about. This is the morphological data where we have abundance of organisms. Also, the red line is the biodiversity, in this case it is a number of groups, not species because this is how we got it to the morphological, but you can see a drop there in June. Actually, it doesn't show organisms. We had, like, fifteen organisms there of about five taxa. And then we have July. You can see that drop in abundance and biodiversity as well.

Next, please.

So here we can see the graph that Julio showed us. This is also the worker of Priscilla Molina, his graduate student. So, if can

you see, you see that in June and July there is a drop there also on the oxygen. So, for this time, we didn't have the loggers yet or the YSI. So, here's where we're using their data that is the winkler. So, these are direct measurements.

Next, please.

So, this is since October till February, the data of the stations with the YSI. So now we have this. This information is just to show you that we have this now. So, we are doing pre, this is a pre-- actually, post because we October is like the post event, and then we are now doing it every month. So, we are going to go on doing that. This is for the four stations that we are focusing now.

Next.

So here are some examples of the fish larva we're getting. We're getting blennies, pretty tiny blennies.

Next please.

We have some croakers and clingfishes. I am showing that was a big one. So, I had to take a picture, like-- I didn't cut it. I just took a picture. So, there are many anchovies, of course, because we are in mangroves environments.

Next, please.

This picture is not mine. I couldn't find the picture of the sargassum fish, but we got one. Actually, we sometimes see them but only caught one because we didn't want to burden so much, but we recorded them when we saw them. We caught one and so that's something that-- a lot of stuff come in the Sargassum, of course.

Next, please.

So, this is near Magueyes. We got this for post larval gray snapper. We are going to confirm-- this is my morphological identification. We're going to confirm that with DNA. That's the next step.

Next, please.

So, here are some other organisms. We have a sargassum crab. We also got a sargassum shrimp. So those mainly come with the sargassum. And many other invertebrates there.

Next, please.

So here, where you can see nothing but there's a lot of stuff. This is the metabarcoding data for 12 samples that we sent. That mix of organisms that we sent. This is without the fish larvae. Fish larvae was sorted out because I wanted to-- well, they are less abundant, first, and I'm really worried, also Julio. I'm really worried that that data gets lost, so I'm really careful about doing that and I would like to validate first, you know, the species.

So here you can see, like, these are many, many, many organisms, but we could find the same groups that we found on the morphological aspects. So, we find copepods, barnacle, lobsters, but we found, or we detected. Let's say, the DNA was detected of some organisms that we didn't see as lobsters. So, we had panulirus showing up there, but I never saw a larva and those are big. So that's something-- Some stuff of this could be in the stomachs of shrimps, of those big crabs, so that's something that at least is detected. The DNA is detected.

So, we have a lot of organisms here. Cnidaria, we also found, it was detected, again, let me say the word. DNA was detected of some acropora species. So, there's something, a lot of information that we can get from this, and we are going to keep working on that.

So next, please.

So, what's the message so far? So, we detected the decreasing zooplankton biodiversity and abundance, as I show you, associated with the low DO for June and July 2021 in the station, MJ, what we call MJ1, [inaudible] Jose Uno.

So, we have more data, more samples, to be analyzed. We need more time to account for the natural life cycles of this organism. The zooplankton is very complex. We have all the life stages of these fishes, invertebrates, and also the holoplankton. What is all this plankton.

So, we have to account, and we need time to have a longer time of observations, to be able to see these cycles. And see if the effects of the sargassum accumulations and the DO is really affecting them. So, we plan for long-term monitoring of zooplankton. The DNA metabarcoding is very effective, time efficient and very specific to monitor this biodiversity. Very important for the fishery. So, this is a question I make, you

know, to the fishery people. Maybe we can relate that to the catch efforts in the area. Potentially predict the health of the fishery directly for zooplankton fish larvae. Also, species like the yellowtail snapper which is planktivorous it could have an effect on these organisms. So, that's what we have so far, and we have a lot of samples to see and to work.

So, I want to thank CariCOOS for bringing me back to the lab and to the water. Patricia Chardón for her support in the field. Luis Rodríguez, Erick García, Adolfo González and in the office Edda Larracuenta that is always helping with the project. So, thank you. If you have any questions. J.J.?

Questions

SENNAI HABTES: Yeah, give me one second, Áurea. I'll moderate the question just because we have people on online.

ÁUREA E. RODRÍGUEZ-SANTIAGO: I'm sorry. Yes.

SENNAI HABTES: No, it's all good. So, thank you for the wonderful presentation. It's always great to see zooplankton and ichthyoplankton work on display. That's my background too, so thanks again. I'll open up the floor to questions. Just a reminder, put it in the chat or raise your hand or raise your hand in here. All right, J.J., you had your hand up first.

JUAN J. CRUZ MOTTA: Thank you. Thank you for the presentation. I think this work is very, very important because one of the things that we have identified on the gap analysis is precisely data on ichthyoplankton.

So quick questions. I mean, back and forward.

ÁUREA E. RODRÍGUEZ-SANTIAGO: Mm-hmm.

JUAN J. CRUZ MOTTA: When did you start this project?

ÁUREA E. RODRÍGUEZ-SANTIAGO: It was started April 2021.

JUAN J. CRUZ MOTTA: So, you have been sampling for about a year?

ÁUREA E. RODRÍGUEZ-SANTIAGO: Yeah, we-

JUAN J. CRUZ MOTTA: And then the plan is to go long-term.

ÁUREA E. RODRÍGUEZ-SANTIAGO: Long term. Well, we have money for

a year, so we'll see from that.

JUAN J. CRUZ MOTTA: Yeah. I mean, in terms of that data, I mean, it is necessary, but then to be incorporated on this EBFM approach, you know, and to be able to put that into the models I would suggest-- this is just a suggestion, if that can be incorporated on what you're doing. Instead of having intensive temporal sampling, try to do it less often, but then more stations. One of the reasons for that, if you're trying to evaluate-- I mean, one of the various reasons. If you're trying to evaluate effects of the sargassum accumulation, of course, it is important to sample where you have sargassum accumulation but also, it's important to sample places that you don't have sargassum. Because the whole point here is to tease out how much of the change in the ichthyo is related to the sargassum versus not.

ÁUREA E. RODRÍGUEZ-SANTIAGO: Yeah, you're right. And to that question. We have a station in Enrique that we are using as a control of non-impact, not that much impacted by Sargassum right now. But yeah, you're right. Definitely the more station we would like, maybe after a year or two years that we will have we could get more stations. And, actually, that's the goal of this project, to expand it not only to La Parguera, but to [inaudible] or to other areas to do this work.

JUAN J. CRUZ MOTTA: And also, and I'm going to mention this to you because I know you know about what I'm going to talk about. Use a multivariate analysis. I mean, by definition, this is a multi-dimensional data.

ÁUREA E. RODRÍGUEZ-SANTIAGO: Yeah, definitely. And I will talk to you about that soon.

JUAN J. CRUZ MOTTA: No worries. And second what we're trying to convey with this EBMF approach is not about a single species or the total biomass of the total abundance, which is informative, but that's not it. It's about what's happening with all the species at the same time. But yeah. Thank you, Áurea. Really interesting.

ÁUREA E. RODRÍGUEZ-SANTIAGO: Thank you J.J. We'll talk.

SENNAI HABTES: Stacey.

STACEY WILLIAMS: Hi. Stacey here. I just have a quick question. Are you thinking of-- because I think it would be interesting to see what the residual effects are. You've mentioned it multiple

times that this can last for up to weeks. And are you thinking about extending your sampling period? Because you have five days maybe doing it a little bit longer after the Sargassum has decomposed and—

ÁUREA E. RODRÍGUEZ-SANTIAGO: Do you mean the oxygen? Do you mean the oxygen, Stacey? What's your—

STACEY WILLIAMS: Yeah, you were talking about the brown waters and basically effects of the oxygen hypoxia. So, are you going to extend the sampling period to incorporate that? Like, what is the long-lasting effect on the sargassum inundations.

ÁUREA E. RODRÍGUEZ-SANTIAGO: you mean within one month? I'm not sure if I'm understanding the question. Within one month, in the same month, extending the biochemistry.

STACEY WILLIAMS: Both, biochemistry and also your plankton samples. Right now, you said that you take samples before, during, and after. And those are five days, if I understood. Correct?

ÁUREA E. RODRÍGUEZ-SANTIAGO: No, no, no. I mean, in the season. We are taking samples every month. But I mean the season, like pre-events-- Actually it's going to be continual, continuously right now, but I get your point. Yeah. Right now, we are doing it every month.

STACEY WILLIAMS: Yeah. But with specific events of Sargassum, my understanding is that you take. Samples before, during, and after. And that is just five days, right? Of all?

ÁUREA E. RODRÍGUEZ-SANTIAGO: No, actually we are doing it every month. But what I mean with pre during, and post is in the season. So, we are going to have all the year, let's say, all the seasons. That was actually from the proposal that we were proposing to do pre, during, and post. And we are planning to do more intense or more often when we have the events going. But it's every month. We are doing it every month. And the oxygen, Priscilla, is doing it every week. So, we have that data.

STACEY WILLIAMS: So, during these events. How often are plankton samples taken during, say, do you go out every day and take it, or is it just one sample during that event?

ÁUREA E. RODRÍGUEZ-SANTIAGO: Once a month.

STACEY WILLIAMS: Okay. I don't think—

ÁUREA E. RODRÍGUEZ-SANTIAGO: Last year, the event began in April and actually it's August, September we're still having flows of sargassum coming in. Yeah. Maybe it is a misunderstanding of that.

STACEY WILLIAMS: Yeah. What I understood, like during the event you take before, after-- I mean, before, during, and after, and those were five days. But maybe, yeah, I misunderstood.

ÁUREA E. RODRÍGUEZ-SANTIAGO: No, it was before the event. So, we want to have a database of before event, during the event and post event. And we are doing that right now. We are completing one year. So, we began just before, actually, like a week before the Sargassum was arriving in April 2021. And now we are going to go continue. We've been working like-- the only month that we didn't take was I think December because of some other stuff out of our control. But, yeah, we've been taking samples every month.

STACEY WILLIAMS: Okay. And do you see a difference, like, after and post, like during and post?

ÁUREA E. RODRÍGUEZ-SANTIAGO: In June and July, we saw that decrease in biodiversity and abundance, it was dramatic, and it was associated with the drop in that oxidant for that seas-- Actually, the good thing is that because Priscilla has the weekly DO measurement chemistry, so it was good because we could see that related so far. We need to have more, to observe more and see, but we got that, it was very dramatic. Thank you, Stacy.

SENNAI HABTES: So, I don't see any hands up online. Do we have any other questions here in the room? If not, I have one for you.

I'm interested in the way you're doing the metabarcoding, are you doing it from individual samples or are you doing the liquid that they're preserved in?

ÁUREA E. RODRÍGUEZ-SANTIAGO: So, we preserve with ethanol.

SENNAI HABTES: Mm-hmm.

ÁUREA E. RODRÍGUEZ-SANTIAGO: And then we take it as subs-- Sorry. So, it is for each sample. Let's say for one station, one sample. They are separately. So, we do a bulk, we split the sample and we take some part of the sample. Sometimes it's half,

sometimes is quarter depending on the biomass. We do the extraction of the whole, that bulk, for each sample.

SENNAI HABTES: Okay, so it's extraction of the fraction that you're using. And then you get like a qualitative kind of percentage of how much of the bulk sample is represented by that particular [crosstalk]

ÁUREA E. RODRÍGUEZ-SANTIAGO: There's a heat map. Yeah, we have a heat map. Heat map about that. We didn't show that there. What I showed was only the, you know, the whole thing, all the many species that we have. But we have that for each sample. That was like the whole bunch. But we have one of those trees, phylogenetic trees for each sample.

SENNAI HABTES: Are you just going to the taxonomic level or are you getting down to the species level as well?

ÁUREA E. RODRÍGUEZ-SANTIAGO: They compare. The company that-- it was not done by me. That's our outside facilities. Yeah, it was down to species. But because depending on the availability of the data, on the database, some species were not from the Caribbean. So, let's say we're going to trust the genus, in that sense.

STACEY WILLIAMS: I just have one more question. How do you take plankton samples with a net during sar-- I mean, it's just a technical thing --during sargassum events?

ÁUREA E. RODRÍGUEZ-SANTIAGO: No, you're right, you're right. We, we go around. So, for the net, you go around. Actually, sometimes we cannot even get in to put the trap because. Let's say in April, we had the trap and we got it inside, but when we get back in June, July, we couldn't even get into the place where we had the trap. So, we have to play around. And sometimes for those three minutes, if the net gets glowy, we split it in one minute, one minute, one minute. So, we reduce the clogging of the net. But the net we do it as close as the side of the trap.

JULIO M. MORELL RODRÍGUEZ: Of the mud.

ÁUREA E. RODRÍGUEZ-SANTIAGO: Of the mud we have. Yeah. You are right.

KELLY MONTENERO: Great presentation. This is Kelly Montenero. One quick question. Are you looking at gut content analysis from plankton at all? You know, in discussing snapper, things like

that, or would that be for a future study?

ÁUREA E. RODRÍGUEZ-SANTIAGO: We are not doing-- You mean for big fishes, for adults.

KELLY MONTENERO: Or larva.

ÁUREA E. RODRÍGUEZ-SANTIAGO: Oh, well that's a good question because I wanted to make a try. I wanted to make a try of one sample. Julio. So, I sent only the shrimp that you saw there? No, I sent like maybe five shrimps for the DNA barcoding. So, they extracted the whole, and we got a lot. So, that was in the gut.

KELLY MONTENERO: Hmm.

ÁUREA E. RODRÍGUEZ-SANTIAGO: But we cannot tell if that came in the sargassum. So, if they ate that there or if they came from other places where they ate. So yeah, that happen without really intending it. But the depth of the extraction in the bulk, that was only a few of those shrimps, but that information can get lost in the whole bulk extraction. So that's something about the methods, those are drawbacks of the methods. But we might be getting that. And I think we do, because DNA was detected of some stuff that I didn't see. Yeah.

KELLY MONTENERO: Thank you.

ÁUREA E. RODRÍGUEZ-SANTIAGO: Thank you.

SENNAI HABTES: Okay. I see no other hands online, and I don't see anyone else in here, so I'm going to say thank you to Áurea for the great presentation and please stay in touch. I think, you're one of the few people collecting this type of data in the U.S. Caribbean. So, I mean, it's important food web information that we need for a lot of what we're doing within the EBFM TAP. So, if there are ways for us to support you, please do let us know.

With that, I believe it's 04:52. Now, we were planning to end at 5:00. I would've liked to get at least one more of the presentations. But I think we're going to reach diminishing returns if we try. So, I think it's probably better that we adjourned for the afternoon and then pick back up with Kelly and J.J.'S presentations in the morning and just move some things around for our discussions in the afternoon to make sure we have enough time for everything.

So, I will ask for a motion and a seco-- oh, Graciela.

GRACIELA GARCÍA-MOLINER: So just so when we put the slide tomorrow morning on the items in the agenda, in what order do you want them? Do you want Kelly? Do you want to start with Tarsila? How do you want to do that so that people know that that has changed in the agenda?

SENNAI HABTES: Tarsila, are you still on?

TARSILA SEARA: Yes.

SENNAI HABTES: Would you be okay if we start with Kelly and J.J. before you in the morning? So that would probably push your presentation back like an hour to or so. Do you have that kind of time in the morning to wait?

TARSILA SEARA: Yeah, that's fine with me.

SENNAI HABTES: Okay. So tomorrow we're going to start with Kelly, then J.J., and then Tarsila. And let's just do one quick motion and second and vote to approve that agenda change.

ORIAN TZADIK: Orian Tzadik, for the record. I motion to have Kelly go first tomorrow, followed by J.J. Then the rest of the agenda as follows.

STACEY WILLIAMS: Stacey Williams, I second.

SENNAI HABTES: Okay let's vote on that. All oppose to that motion. say "Aye" or put it in the chat or raise your hand on Zoom. Hearing none. Seeing none, the motion passes. So, we will amend the agenda to begin presentations tomorrow with Kelly Montenero, followed by J.J. and then Tarsila and continue it as follows. We may do some adjustment in the afternoon, but we can deal with that tomorrow.

In terms of. What we need to do for the afternoon session, I believe I need a motion and a second to adjourn the meeting. Prior to that, let me just give an announcement to the rest of the group. For those online, we will be beginning again tomorrow at 9:00 AM and it will run from nine to 5:00 PM tomorrow. Or until we get everything done, which will hopefully be 5:00 PM. You can find the links again on the Federal Register at the CFMC website under meeting agendas.

And in the interim, if there are questions or connections that you need made from today's meeting, please feel free to send me

an email and I will do my best to get to them when I have a little more time. Maybe when I'm back in Saint Thomas, but I'll make sure to try and connect everyone as needed.

So, with that, I will ask for EBFM TAP members if there are any other comments or questions or concerns that we want in the record for today. Okay. Hearing none, seeing none, I will ask that somebody motion for us to adjourn for the day? I'll need a second and then we can vote on that.

JUAN J. CRUZ MOTTA: Motion to adjourn for the day.

ORIAN TZADIK: Second the motion.

SENNAI HABTES: Thank you J.J. and Ori. There are rules for a reason, J.J. [laughter] Okay. This is how we get things done. All right, with that, I'll have us all vote. If there's anyone in opposition to adjourning for the day, say "aye" or put it in the chat or raise your hand. Hearing none, seeing none, we are adjourned for the day. Thank you all. We'll see you tomorrow, bright and early at 09:00 AM.

(Whereupon the meeting recessed on March 16, 2022.)

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March 17, 2022

THURSDAY MORNING SESSION

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SENNAI HABTES: Okay. Good morning, everyone. It's 9AM on March 17, 2022. Welcome to the second day of the Ecosystem-Based Fishery Management Technical Advisory Panel at the Caribbean Fisheries Management Council hybrid meeting. Today, we will be continuing the agenda from yesterday and trying to get through a lot of things, so I ask if everyone can be as brief as possible with questions and comments and things to the most pertinent things that need to be discussed.

Just a little housekeeping. Again, before we begin, for those of you who joined yesterday the rules are basically the same but for any newcomers, just a reminder for those of us in the room, we will be requiring everyone to wear PPE. So, masks on during meeting despite changes to Puerto Rico health advisories and rules regarding mask wearing in indoor spaces.

Second, again, those of us in the room, we have mics in front of us so that we can be communicating what we say to everyone on the meeting. So, remember when you were either making a comment or speaking during your presentations to use the mics in front of you. In addition, just some general rules for how we will proceed with the meeting. If you have a question or a comment, please save those until the end of our presentations, and we'll ask that if you're on Zoom, either raise your hand or put it into the chat, which I will be monitoring and wait for me to call on you for questions. Those in the room I ask that you raise your hand or get my attention and another way that isn't too disruptive, then I will call on you in the order in which I received the requests.

With that being stated, I believe that's all the housekeeping that we need to mention, so we can go ahead and get started.

First step, I believe, is we need to do a roll call for all people present. Let's go around the room. First, starting J.J. to my right and we'll go to the left around. To speed this up, what I'll ask is if you are an EBFM TAP member, just mention that. So, we all know who the EBFM TAP member are. If you're not, just please also state your affiliation as you introduce yourself. And then, once we've gone through the room, I will go through people on the chat or in the Zoom meeting via the list of participants that I have on the screen. Alright. J.J., go ahead.

JUAN J. CRUZ MOTTA: Good morning, J.J. Cruz, EBFM TAP.

KELLY MONTENERO: Good morning. This is Kelly Montenero. I'm a NOAA Affiliate with Southeast Fisheries Science Center.

SEANN REGAN: Good morning. This is Seann Regan. I'm a NOAA affiliate with NCCOS.

STACEY WILLIAMS: Good morning. This is Stacey Williams. EBFM TAP member.

ORIAN TZADIK: Hi everybody. Orian Tzadik, EBFM TAP member.

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

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

CRISTINA OLÁN MARTÍNEZ: Buenos días. Good morning. Cristina

Olán, Council Staff.

MARCOS HANKE: Good morning. Marcos Hanke, CFMC Chair.

IRIS N. OLIVERAS: Iris Oliveras, Council Staff.

SENNAI HABTES: Morning. Sennai Habtes, EBFM Chair.

And now open for the people online. Let's go ahead and start with Alida.

ALIDA ORTIZ SOTOMAYOR: Good morning, Alida Ortiz, Outreach and Education Advisory Panel and FEP TAP member.

SENNAI HABTES: Thank you, Alida.

HELENA ANTOUN: Morning, everyone. Helena Antoun, Puerto Rico Fisher Liaison.

SENNAI HABTES: Okay. Thank you, Helena. Kevin McCarthy.

KEVIN MCCARTHY: Good morning. Kevin McCarthy, Southeast Fisheries Science Center and TAP member. Happy to St. Patrick's Day.

SENNAI HABTES: Thank you, Kevin. Same to you. Mandy.

MANDY KARNAUSKAS: Morning. Mandy Karnauskas, Southeast Fisheries Science Center.

SENNAI HABTES: Thank you, Mandy. Miguel.

MIGUEL A. ROLÓN: Good morning. Miguel Rolón, Council staff.

SENNAI HABTES: Morning, Miguel. Rachel.

RACHEL ECKLEY: Good morning. Rachel Eckley. I'm a NOAA affiliate at the Southeast Fisheries Science Center.

SENNAI HABTES: Thank you, Rachel. Sarah Stephenson.

SARAH STEPHENSON: Good morning. Sarah Stephenson, NOAA Fisheries SERO.

SENNAI HABTES: Thank you, Sarah. Rafik Orhun. Sorry for my mispronunciation.

RAFIK ORHUN: Good morning. Rafik Orhun, Southeast Fisheries

Science Center.

SENNAI HABTES: Morning. Tarsila.

TARSILA SEARA: Good morning. Tarsila Seara, EBFM TAP.

SENNAI HABTES: Thank you, Tarsila. Tauna?

TAUNA RANKIN: Hello, all. Tauna Rankin here at NOAA Fisheries Office of Habitat Conservation.

SENNAI HABTES: Morning. And, I believe, Áurea, is that you on there?

ÁUREA E. RODRÍGUEZ-SANTIAGO: Good morning. Áurea Rodríguez representing CariCOOS.

SENNAI HABTES: Excellent. I believe that's everyone. If I've missed anyone, please just put your hand up or go ahead and step in and introduce yourself.

Okay. With that, the first line of business that we need to do is to approve the agenda for the day. The tentative meeting agenda is up on the screen. We've amended it to include the two presentations from yesterday that we did not get to, so we'll be starting with Kelly's presentation on the Ecosystem Status Report, and then we'll go into J.J.'s. The rest of the agenda is the same as it was previously. Are there any changes, updates, or edits that we need to make to the agenda? If so, please either raise your hand or put it in the chat, so that we can make those changes now before voting to approve the agenda. Graciela?

GRACIELA GARCÍA-MOLINER: I'm waiting to hear from Richard. I know that he had said that he wasn't going to be on the first day. So, the SSC report, we might either look at this presentation from the last Council meeting which has the summary of the ECM that they have developed. Or a having complement to the next meeting. Thanks.

SENNAI HABTES: Thanks, Graciela. I think that's fine. So, we'll just leave it on the agenda as is and if we have time, we will go through it. I think that if we're running low on time, we'll save it for the next meeting. I believe that's already on the Google drive and so, I would just recommend that all EBFM TAP members do take a look at that. So, Liajay or Cristina, when the meeting's over, if you could maybe put that in the notes to the TAP members are reminded when I send out the minutes from this

meeting.

Any other comments, corrections, or revisions that need to be made? Okay, hearing none, seeing none, why don't we vote? I'll need a motion in a second to approve the agenda as stands.

ORIAN TZADIK: Orian Tzadik motion to approve the agenda as it stands.

STACEY WILLIAMS: Stacey Williams, I second.

SENNAI HABTES: Thank you, Orian, Stacey. Thank you, Alida.

So, with that, let's have a vote to approve the agenda as it stands. Anyone in a position to accepting the agenda as on the screen please say "Aye", raise your hand or put it in the chat. Okay. Hearing no objections, seeing no objections we're going to approve the agenda as is amended. And then, why don't we go ahead and get started? I'm going to turn over the floor to Kelly. Oh, wait, before that. There's one announcement. Graciela, did you send that information to me yet? Alright.

So, I just wanted to remind J.J., Tarsila and Stacey, that you guys are invited by Alida to the next OEAP meeting to identify outreach and education materials for the public. So, Alida, if you can send them an invite email with the dates and, Liajay or Cristina, can you send the Federal Register for the next OEAP once it comes out, just include J.J., Tarsila and Stacey.

ALIDA ORTIZ SOTOMAYOR: Yes, I will.

SENNAI HABTES: I think that would be a good way to start the conversation for how we can build an outreach and education platform that will tie in all of the ecosystem EBFM that we are all doing. J.J.?

JUAN J. CRUZ MOTTA: Yeah. Alida, do you know when is going to be that meeting?

ALIDA ORTIZ SOTOMAYOR: Usually, it is in June.

JUAN J. CRUZ MOTTA: Thank you.

SENNAI HABTES: So, you got some time, J.J.

ALIDA ORTIZ SOTOMAYOR: Yes. Yes.

SENNAI HABTES: Okay. With that, I'm going to go ahead and turn

it over to Kelly. So, Kelly Montenero, is going to present to us now on-- sorry, I closed my agenda, I was going to-- there we go. Ecosystem Status Report and Ecosystem Indicators. Take it away Kelly.

Ecosystem Status Report: Ecosystem Indicators

KELLY MONTENERO: Good morning, everyone. Thank you, Mr. Chair.

I wanted to introduce myself. My name is Kelly Montenero. I am an affiliate with the University of Miami supporting NOAA's Southeast Fisheries Science Center. I'll be presenting today on the Caribbean Ecosystem Status Report Work and giving you an update. So, thank you so much. We really appreciate the chance to share our work today. I'm presenting on behalf of my colleague, Seann Regan, he is here today from NCCOS. And Dr. Mandy Karnauskas, who's joining us virtually. She's a scientist with NOAA Southeast Fisheries Science Center.

Next slide, please.

So, I presented to this group back at the beginning of this project, but I realized it's been a while. So as a refresher, just wanted to go over what ecosystem status reports are. We discussed it a little bit yesterday. Thanks to Tauna's, excellent presentation. But as a refresher, ecosystem status reports are products that are produced nationally that provide science information using time series data on past and possible future conditions of marine ecosystems.

And I want to note that they utilize suites of indicators to, you know, synthesize this information. And the information provided in the ESRs provides the context for decisions related to ecosystems and supports an ecosystem approach to marine resource management.

Next slide, please.

So, again, Tauna gave an excellent presentation yesterday, giving an overview of how ESRs are used in different regions and can be used in EBFM. But as a refresher, I've got an example for how ESRs are used in a couple different regions. They're a little different in different regions. For example, in the North Pacific, they're used to support single-species quotas set in the context of ecosystem information. In the Pacific, the FEP requires an annual ESR describing status and trends to provide a context for science-based decision making. In the mid-Atlantic, the indicators are linked to specific management objectives and

that supports our risk assessment as well.

Next slide, please.

So, in developing and organizing this ecosystem status report or ESR, we organized it into two types of indicators. Those that track performance towards fishery management objectives, as shown in this example from the New England region, where they synthesize the different indicators per objective to give an overall view of status and trends. And those that indicate risks to meeting fishery management objectives, such as thermal stress or storms, land-based sources of pollution, sargassum among others.

Next slide, please.

So, this gives us a diverse stream of data for many types of data providers. So again, we've got these two types of indicators. We derived the first type of indicator from the island-based fishery management plans. And we derived the second type of indicators from the DAP and SSC conceptual models to create a list of proposed indicators. Then went through an indicator scoring process and utilized discussions and input from expert working groups to come up with that suite of indicators.

So, highlighted here are top scored connections from the conceptual model components that Liajay, I believe, will be presenting on later today. But I wanted to mention that these are represented in the ESR and that, you know, there is a connection between those two bodies of work.

So those that'll be featured in the presentation today are pollution, hurricanes, and extreme weather, coastal development, sargassum inundation, condition of marine habitats (including coral reefs,) climate change impacts and changes in tourism, population, GDP and wages.

Next slide, please.

So, again, during the rest of the presentation today, I'll be sharing results from the indicators related to risks. And that's this list here. Specifically, SST, coral bleaching, primary productivity, hurricane activity, land-based Sources of Pollution, and Coastal Development, Habitat Condition against Sargassum, Tourism, GDP, and employment (specifically in the ocean economy.) Sorry, you should have mentioned that earlier. And market disturbances.

And I wanted to go over quickly how to interpret our time series plots here. This is kind of a standardized form that most ESRs use to display their time series data. And again, it shows that time series with some stats incorporated. You can see that the dotted line in the middle shows the mean, the solid lines on either end show a plus or minus one standard deviation. So, the peaks and drops are highlighted in red and green, not necessarily indicating good or bad, just, you know, above and below that standard deviation line. The status and trends are indicated by circles with plus, nothing, or minus, to show that distance from the mean. Arrows showing the slope related to the standard deviation from the mean.

Next slide, please.

So, jumping into our indicator suite. We analyze sea surface temperature using monthly mean as well as monthly minimum and maximum for the whole U.S. Caribbean region. So, in these plots you can see that there's a general increase over time at an average rate of 0.25 degrees Celsius per decade. However, in the last five years we see that the mean is above average. Interestingly and significantly, the monthly minimum is more than one standard deviation above average, as you can see with that little plus sign as well. There's no trend in the last two decades in the monthly maximum, but there were positive anomalies seen in 2005 and 2010.

Next slide please.

So, related to that, coral bleaching stress was measured using average annual degree heating weeks for both Puerto Rico and the U.S.V.I. islands. You can see that it was generally below average the number of annual degree heating weeks until 2004 with a notable peak in 1998 where we know that coral bleaching was observed. But then there was a sudden record peak in 2005. Oh, sorry. I forgot to tell you that the bluish grayish, kind of purple-ish on this screen, area indicates the last five years trend. So, the last five years were average, but an increasing trend is indicated by the arrows.

Next slide, please.

We looked at primary productivity using mean chlorophyll a concentration via satellite data. So, we saw no long-term trend. However, we did see a number of peaks and those are related to anomalous events such as Orinoco River plumes and hurricanes, as you can see in the image.

Next slide, please.

We investigated hurricane activity using the annual accumulated cyclone energy index which measures sum of squares of recorded wind speeds for storms that track through the entire U.S. Caribbean region. So, this was actually generally below average according to the data for the last two decades. However, you can see peaks in notably year 2017 was an all-time high across all six decades of data. No surprise.

Next slide, please.

We investigated land-based sources of pollution by mapping a number of sites that are relevant to coastal and marine spaces, and water quality, as well as condition of marine habitats. I do want to note that these sites are not necessarily removed from LIS in a timely manner because there's an associated legal process. But it's important to know where these different monitored sites for pollution are located.

A guide to what these things means. That NCDB or National Compliance Database, focuses on regulated chemicals. Superfund sites are known contamination where the polluter is responsible for cleanup and there's monitoring involved, and these areas are often under active cleanup or containment. Brownfield is a property where they use or reuse of it may be complicated by the presence of a hazardous contaminant. And the Toxic Release Inventory Document Sites with permits to manufacture, transport, or dispose of registered toxins.

So, you'll see that the majority of these sites are in northeastern Puerto Rico, you know, generally matching up where industry and population are higher.

Next slide, please.

We also considered coastal development. Now, unfortunately, the data from Puerto Rico was not available at the time of making this presentation, but we are working with colleagues to procure this data. We see an increase in developed land and impervious services which as we know leads to impacts and modifications to shoreline habitat as well as water quality. We saw an increase in Saint Croix and Saint John in the percent change in developed land, however, not in Saint Thomas. We did see percent change in impervious services leading to increased runoff in all three islands in the U.S.V.I.

Next slide please

To look at coral reef habitat conditions we used the National Coral Reef Monitoring Program data, which is a limited time series but started in 2014 and will continue to be monitored. It monitors a number of parameters related to coral reef habitat. Here we plot the percent coral cover for hard corals as well as the coral species richness. And you'll see that there's general declines in percent coral cover in all island groups. However, we see a mixed trend in species richness in Puerto Rico and Saint Croix, but a decline in coral species richness in Saint Thomas and Saint John, which, you know, unfortunately probably relates to the coral disease outbreak.

I do want to note that the NCRMP status reports, which I believe a number of you are familiar with, or were involved in, rated Puerto Rico and the U.S.V.I. coral condition is fair in their most recent report in 2020. These reports are revisited, you know, periodically. I do want to note that the socioeconomic surveys are happening now for NCRMP and so this data is not yet time series data, but we hope that it can be used in future reiterations of this report, if possible.

Next slide, please.

We investigated Sargassum inundation using satellite data from MODIS, and we looked at both areas covered by annual means sargassum inundation, as well as the wet biomass, and that was looking at mean monthly sargassum. We note that it was, as discussed yesterday in a variety of excellent presentations and studies, largely absent until 2011, however, a strong seasonal pattern was seen as of 2014 with an increasing trend in both the area covered and the total biomass over the time series.

I do want to note that these plots and this data came from our co-author at USF.

Next slide, please.

We investigated tourism activity using hotel occupancy rates for Puerto Rico and the U.S.V.I. These trends show a clear impact from hurricanes María and Irma and of course the pandemic. Now, unfortunately, this data doesn't capture 2022 yet and any possible recovery, but again, future iterations of the report, if possible, you know, can continue to capture that data.

Next slide, please.

Thank you. We looked at socioeconomic health by using GDP as well as wages and number of employees in the ocean economy. And this tells the story of economic instability and some recovery as well as hurricane damage and impacts from COVID. Also relates to the population decrease that started in 2017. We see decreasing trends in GDP in Puerto Rico, as well as the number of employees and wages in the ocean economy. Though we do see an interesting recovery in GDP in the U.S.V.I. in the past five years.

I do want to note that this data is different for U.S. territories versus the continental U.S., so there's different methodologies for establishments. I also want to note that since this data only goes to 2020, it doesn't yet capture the growth in recovery since 2020. But again, if there are future iterations of this report, then we can look at that growth in recovery.

Next slide, please.

Thank you. So, we investigated disturbances in the fishery by looking at distributions of landings throughout the year. So, for primary target species, excluding species that have seasonal closures that are implemented throughout this time series, we looked at the proportion of landings in each month by year, and then some of the squares of the deviation from the mean for each year. So that anomaly represents the level of disturbance from typical pattern seen. So, you can see that that bold black line is our average seasonality. Individual years are the skinny black lines. And we highlighted two weird years, of course, 2017 and 2020. And that arrow is showing that anomaly a level of disturbance from the difference from the mean.

Next slide, please.

So, by using that method described in the previous slide, we can see that the disturbance level was generally below average from 2000 to 2014. However, there is a significant increase in the past five years in both Puerto Rico and the U.S.V.I. with the highest disturbance value in 2017. I do want to note that this was looking at top species indicated in the images on each island group.

Next slide, please.

So, in summarizing these indicators that relate to risks to meeting fishery management objectives, there's chronic and acute stressors. Chronic stressors that we see increasing, sea service

temperature, sargassum inundation, coastal development, and habitat condition. Acute stressors, high temperature anomalies, as well as bleaching stress, hurricane activity, impacts from COVID, and economic instability.

Next slide, please.

So, next steps are to focus on FMP objective indicators that relate to impacts on fishery management objectives. So, we've got them listed, but these will relate to the FMP goals of food production, including market preferences and landing proportion, socioeconomic health, equity and fairness, engagement reliance and participation, bycatch reduction, governance, outreach and enforcement, and protection of ecosystems and trophic integrity.

I do want to note that the full ESR will have a full suite of 35 plus indicators that are identified.

Next slide.

So, I was really excited to hear the discussion that's already been happening in this group about how this report and other ESRs and how these indicators can be used in FEP development and EBFM and the idea of, you know, bringing indicators to Council consideration and the discussion that they can also perhaps contribute to risk assessment indicator suites as well.

So, pulling this together, thinking about how this ecosystem status report can be used, I do want to note that the indicator suite does link directly to those FMP objectives for tracking an evaluation of FMP progress. They provided identification of long-term as well as short-term data sets and, you know, show where we still need information. I do want to note that it can be helped to-- it does meet EBFM roadmap needs for the Caribbean, including the guiding principles listed below of advancing understandings of ecosystem processes; prioritizing our vulnerabilities and risks related to ecosystems and their components; incorporating ecosystem considerations into management by setting habitat conservation indicators; the goal of maintaining resilient ecosystems by evaluating and tracking ecosystem level reference points to assess changes in resilience; and by evaluating and tracking ecosystem services; And by identifying and tracking community level health and socio socioeconomic metrics.

And of course, I want to note that the Lenfest effort is creating the models for FEP development and the ESR can provide status and trends of spatial habitat and social, community and

economic indicators as well. And that these efforts provided in tandem can support ecosystem-based fishery management in the region.

Next slide, please.

So, our next steps are to finalize and continue summarizing indicator trends with respect to FMP objectives. I want to know that the ESR does provide a discussion of emerging issues and facilitates interdisciplinary collaboration. And that the full ESR tech report will need to be reviewed and approved by NMFS. Then it'll be published and publicly available, as well as provided to Council staff.

I want to note that we do have potential capacity for focus on identified needs as well as data visualization. And we've been discussing this a little bit with Alida and Council staff, but you know, we're interested in continuing discussions later on.

Next slide, please.

Thank you. This whole work would not be possible without our experts, data contributors and co-authors from agencies, academia, and Council staff listed here. So, thank you to everyone that has assisted with this report development.

Next slide, please.

Thank you so much. Here's how to contact us and I would love to take any questions at time.

Questions

SENNAI HABTES: Excellent. Thank you, Kelly, for this very informative presentation. I'll open up the floor to questions. As I've mentioned before, if you're in the room, please raise your hand or grab my attention. Online, please raise your hand on Zoom or post in the chat and I will call on you to speak. Let's start with Orian.

ORIAN TZADIK: Hey, Kelly. Great presentation. Thank you for that. I just want to note that I think this is going to go really well with the next presentation. I'm excited to kind of discuss how this group can kind of combine the two and see what we can come of it. Had a couple questions. I'll limit it maybe just to one right now. I think this might be for Seann.

You identified GDP as an indicator that you were tracking. My

understanding is that GDP is problematic in Puerto Rico. Can you speak to that? Maybe? I don't know about the Virgin Island. Is it the same?

SEANN REGAN: Yeah, thanks for the question. So yeah, you bring an excellent point. So, we used a few different metrics from the ENOW program. The way that GDP is calculated in the territories, as you point out, is quite different. The data inputs are a little different and then the dependency on the marine resources is more significant. So yeah, GDP as an indicator is one, I think we should be careful about its interpretation. So, it's a great point.

ORIAN TZADIK: But what you presented was GDP values as is, without any corrections or anything like that.

SEANN REGAN: So, there's two elements. One is just GDP from the Bureau of Economic Ana-- BEA data. And then the other one, the actual ocean economy data, is a subset of that.

ORIAN TZADIK: Okay. And are you guys comfortable with that? Or do you think that there needs to be more data collection on top of the kind of correction factors.

SEANN REGAN: Yeah, no, I think it's one we need to, honestly, have more discussion about. I think that was one we included as an indicator because it's one that's kind of common in other regions. But as Kelly pointed out, especially in the U.S. Caribbean, the data inputs are a little problematic.

ORIAN TZADIK: Okay. I can hold off for now and the rest. Thank you.

SENNAI HABTES: All right. Stacey?

STACEY WILLIAMS: Good, nice presentation, Kelly. I just have a quick question. Are you considering using other data sets with habitat condition? Because NCRMP has some limitations and just looking at your graphs, kind of, make me cringe with 6% coral cover for the reefs around Puerto Rico. I know that there's long-term monitoring in Puerto Rico in the U.S.V.I.s that could lead to, I guess, a more accurate picture of what the conditions are on these reefs.

KELLY MONTENERO: Yeah, so we will be, I mean, this was just a subset of indicators because of time limitations, but we've also analyzed different kinds of habitats, of course. We did settle on the NCRMP data in that, you know, we liked the methodology

that they use for different reefs and, honestly, it was what was most available, but I would definitely be welcomed to suggestions of other time series data that incorporates sites around the entire island to be able to describe, cover. Especially, hard coral cover around the entire region and incorporating reefs as well as patch reefs inner and outer shelf areas. So yeah, maybe you and I can have a discussion about other data sources to add to this as well.

I do want to note that obviously the NCRMP work has been extensive in the region, and I think a lot of you have been involved in that. So, we do want to involve that in this report as well, so that we can dovetail both of these projects. And we do like that they have a number of parameters that do include other things like ocean acidification and socioeconomic surveys as well. But yeah, maybe you and I can discuss more sources, especially spatial data, spatial cover, and different measures of coral cover in the region. That'd be great.

STACEY WILLIAMS: Yeah, definitely. And also, in consideration with like mesophotic reefs not just shallow water reef. But there's definitely some work that has been done throughout the years and the just recent report on time series data on some of these mesophotic reefs around Puerto Rico.

KELLY MONTENERO: That would be great. Yeah.

STACEY WILLIAMS: Yeah. So definitely. Yeah, we could chat more about this later.

KELLY MONTENERO: Okay. Thank you.

SENNAI HABTES: Okay, J.J.

JUAN J. CRUZ MOTTA: Thank you, Kelly. Great work you guys did. So, my first comment was related to what Stacey was saying. Yeah, about, for example, using the Puerto Rico Coral Reef Monitoring Program data, which is longer data series. Right? Of course, but not limited. The second question also, perhaps related to what Stacey was saying is, when you see that data, for example, you see that some places, yeah, definitely things are going down, but other places are not as bad, and I wouldn't say places are increasing. Right. But, you know, like, not in every single place, the trend is the same.

This is more for opening the discussion, not for this work because I know that's the method you're using and-- What about looking at that spatial variability, not only from an ecological

point of view. You know, like, different places are doing different things. But also, from the management point of view. What do you think or what the group thinks about doing this but like, East Puerto Rico, West Puerto Rico, Saint John, Saint Croix. Because we have said like—

KELLY MONTENERO: Site specific. Yeah.

JUAN J. CRUZ MOTTA: Yeah. The three places will be—actually, we have separate plans for the three areas. I don't know, but what you think Kelly? what does the group think? It's more like a—

KELLY MONTENERO: Yeah, that is an interesting point. Oh, sorry. Go for it.

SENNAI HABTES: No, you go ahead.

KELLY MONTENERO: Yeah, it is an interesting point too, and we had discussed that with our NCRMP data providers as well, because obviously they do have the different regions that they do the surveys, and we know that east and west Puerto Rico and the islands are all pretty different. So, we could represent coral cover, for example, or coral species richness or, you know, different parameters related to coral and marine habitat at a sub island scale if that's most relevant to management needs. You know, we could still change that at this point. Thank you.

JUAN J. CRUZ MOTTA: Yeah. If I may?

SENNAI HABTES: Yeah, go ahead.

JUAN J. CRUZ MOTTA: Yeah. Without my glasses I cannot see. The land-based pollution you showed, do you have time series on that, or you just like--

SEANN REGAN: Yeah, to answer the question, this is Seann from NCCOS. So, a lot of the indicators that we were not able to find good rich time series data for, we have spatial information for instead. I would say a lot of it, at least in my eyes, is sort of the thousand-foot view or sort of the high-level view. We made a decision for a lot of the indicators to look at the whole EEZ.

So, some of them though, that have a fine spatial resolution, we could also do, as you mentioned, sort of an island analysis or sub island analysis. But, no, we didn't really have a good time series data.

KELLY MONTENERO: And just to add to that-- oh, sorry. This is Kelly Montenero, NOAA affiliate with Southeast Fisheries Science Center. And thank you, Seann.

Just to add to that, yeah, we did. We did have concerns about the data and showing it in a time series manner since, like I noted, you know, the list of sites for land-based sources of pollution the list is not removed in a timely manner relating to cleanup necessarily, or implementation due to the changes in legal process. So, we felt like it wasn't necessarily representative of the status of land-based sources of pollution. Yeah. Thank you for thinking about that.

JUAN J. CRUZ MOTTA: Thank you. And the last question. You mentioned that the original list of indicators was 35, right? And those were the ones that that group of experts mentioned?

KELLY MONTENERO: Kelly Montenero, NOAA affiliate with Southeast Fisheries Science Center.

Yeah. So, I wasn't able to present the full list of indicators and the time today, time constraints and, you know, completing and consolidating and vetting all of this is still going on. However, yeah, our full list is more than 35. And again, that went through the two different types of indicators where we derived them from the island-based fishery management plans, as well as from the conceptual models to create our formal list of proposed indicators. We went through a scoring process using experts in our expert working groups by creating decision criteria about, what makes a good indicator? is the time series data available? is it's spatially complete? is it representative of the question that's being asked? And that gave us our final list of indicators. That included expert working group discussions too, so that we could get a good view of it. I do have an extra slide relating to the process if you're interested.

JUAN J. CRUZ MOTTA: Related on?

KELLY MONTENERO: On the indicator selection process, if you're interested.

JUAN J. CRUZ MOTTA: Oh, yeah, if you can.

KELLY MONTENERO: Okay. Could I have the next slide, please, Christina? There you go. Thank you.

So, this is how we came up with our full list of indicators for the Caribbean ESR. I believe I've shared this with this group, but I realize it's been a long time. The goal is to match the indicator suite to the fishery management plan objectives as well as indicate risks. If there is a direct match from, you know, the proposed indicator list, that was the indicator. If not, we talked through potential indicators with those expert small working groups who then scored a decision matrix of the list of potential indicators against criteria. And then, the yellow box indicates where we are right now in the process. Does that answer your question, J.J.?

JUAN J. CRUZ MOTTA: Yeah, definitely. Definitely. I was asking this because I'm already thinking the way we can combine these results with what we are doing. Question. The scoring, you did it yourself or the experts were involved in that scoring.

KELLY MONTENERO: And no, the experts individually scored themselves. And then sent them back to me.

JUAN J. CRUZ MOTTA: Oh, okay. Perfect.

KELLY MONTENERO: So, yeah, that was way better.

JUAN J. CRUZ MOTTA: I promise. This is the last question. Is that raw data on that exercise publicly available? Can it be shared?

KELLY MONTENERO: It's not publicly available right now, but I'd be happy to share it with you if you're interested.

JUAN J. CRUZ MOTTA: Ah, perfect. Yeah, yeah, sure. Definitely.

KELLY MONTENERO: Great. Yeah. I'm hopeful that these projects can dovetail and help each other out a lot. I look forward to your presentation and learning more about your work as well.

JUAN J. CRUZ MOTTA: Yeah. Thanks a lot, Kelly.

KELLY MONTENERO: Thank you.

SENNAI HABTES: Sennai Habtes, Chair. We have a couple people online. I believe Graciela has like a comment on the process. I'm going to let her go first. No. Okay, good.

So, I'm going to start with Tauna, she's been patient and has her hand up and then I'll go back to Orian and Stacey who have follow ups for-- Nope. So just Orian who has a follow up from

this conversation. So, Tauna, go ahead.

TAUNA RANKIN: Thank you. Tauna Rankin, NOAA Fisheries Office of Habitat Conservation. Thanks for the great presentation, Kelly. It's really exciting to see the indicators even if some of the trends are disturbing.

My question was kind of process related as well, and that is when is the first iteration of this ESR plan to be finalized? and how does that relate to developing the FMP objective indicators you mentioned on slide-- I can't remember --20 something? Are those being developed now and will be in the final report? Or is that something planned for the future?

KELLY MONTENERO: Thank You, Tauna. Again, this is Kelly Montenero, NOAA affiliate Southeast Fisheries Science Center. Liajay-- Oh, sorry, Christina, do you think you could go back to slide number 20 please?

I apologize, perhaps I wasn't super clear on this, Tauna. We do have the indicators selected already for the ones that do relate to the FMP objectives and we're developing and finalizing the figures and vetting and confirming the data sources for the suite of indicators. But the selection has already been completed. And again, we're just vetting this by our expert groups and discussion, and, again, making sure that this is best representing the FMP goals listed below on this slide. But we are open to input, of course, and advice and data sources and things like that since the full report is not, you know, finalized and publicly available yet.

TAUNA RANKIN: Okay. Thanks for clarifying that. So, do you have sort of an estimated time horizon of finalizing the report?

KELLY MONTENERO: I don't have a deadline for you. I apologize for that. I realize that that's, you know, something that people will be wondering. Like I said, we're in the near stages of completing it. Again, just making sure that we have the best data representing these indicators and that we're including everything that needs to be included while still keeping the ESR, you know, nimble and responsive and indicative, for lack of a better word. But I will keep you posted for sure.

TAUNA RANKIN: Okay, great. I don't know that it has to be final, but this is really intriguing, and I see a lot of connections to my presentation later on. So, thanks again.

KELLY MONTENERO: Good. That's what I was thinking too. Yeah. I

look forward to continuing that discussion with you.

SENNAI HABTES: Great. Thank you, guys. Orian, go ahead.

ORIAN TZADIK: Orian Tzadik, for the record. I want to go back to the issue of spatial scale we were discussing just with regards to different data sets and uses. I think that this group should think about, potentially, what exactly do we want to get out of that and whether it's something to make the ESR more complete or whether it's going to be used for management. I think that the two might differ.

So, for example, I think it's important, for the coral coverage example, I think it's probably important to get spatial variability and that'll probably influence management, kind of, on that same scale. But I think we need to be a little bit careful when we start talking about some of the indicators, probably. I think the scale just might be specific to the indicator and that might-- you know, we have to think about that, maybe when we're talking about management, and what we want to achieve here, and I think that might play into Tauna's risk assessment later.

And so, the original risk assessment we had discussed had to do with the impact of each risk element and the spatial scale of that impact. I wonder if we fold that back into the mix because something like, you know, hurricane activity, I don't think we need to really go by, you know, what coast of the Virgin Islands we're talking about, right? I mean, the hurricane covered the whole Virgin Islands. But the coral coverage example is a good one where we might want to start thinking more granular.

So just some food for thought as we continue these conversations, and particularly with regard to the risk assessment down the line.

SENNAI HABTES: Thank you, Orian. Graciela?

GRACIELA GARCÍA-MOLINER: I'm really happy to see this kind of information being brought forth. Specifically, when you look at examples that are real and the SSC has dealt with it and actually impacts the annual catch limits that are imposed on commercial fishers. Specifically speaking of the 2005 issues that we had with the landing, showing extreme peaks that they actually could not be included because there was no actual explanation for that, except for a certain percentage that was due to double counting or the correction factor, or whatever. But also, in the change in the species that are harvested, when

you look at the impact of hurricanes and the impact of storms. Then you bring it back to what people are telling you that there is a big problem of pollution in the marine environment, and that has to do with the concentration of the polluted areas and the concentration of the rivers in those areas, and the concentration of the coral associated fisheries of that area. So, when you start looking at all these layers together, you might find some information that really doesn't have to do with the actual overfishing. I was having some talks with Sennai about that. You know, the selectivity of the fishers versus the selectivity of all these other things that are coming into the action.

So, you know, having said that, where are the data that you're already doing, the QA/QC for, where is that going to be stored? Is that going to be a geodatabase so that other people can use it to look at the multivariate impact of all these parameters to the fisheries, that it's what the Council deals with directly.

And the coral cover and the habitat is a very significant issue, specifically when we looked at the information that we have from the inundation of sargassum and the impact of nursery grounds, juvenile fish, etcetera and the further impact of increased sea surface temperature. The problem with the HABs, the harmful alga blooms of the sargassum, which they should be considered by now. The changing oxygen acidification and the changing species that you're going to have because of the impact that that will have in the future. So, then we have to deal with the lag of time when one thing happens and when does it show up in our fisheries.

So, I'm extremely excited to see all this coming to fruition and the problem would be, how do we put all this together so that Marcos and the Council members can look at it and say, "okay, so all these things happen, so maybe we should be thinking about--" Well, actually telling the agencies that deal with clean water, with the EPA, etcetera, all the superfund, you know, "We do have this problem and it is impacting fisheries." Then have the local governments, which are the first that receive that impact also be brought into the equation. And finally, you know, the EEZ and the deeper water, the mesophotic reefs, etcetera, I mean, how are they going to be impacted? If that's supposed to be our refugia to bring us back into the shallow water? Is that really going to happen? Or are we going to be looking at a complete shift in our ecosystems, in the shallow waters?

So, you know, I just have to say that, because my main interest would be, where is that data going to be? If it's already

QA/QC'd no one has to deal with that anymore, and then we can use it for other things. That probably for Kevin to answer.

KELLY MONTENERO: Well, I was going to-- Sorry. Kelly Montenero, NOAA affiliate. Southeast Fisheries Science Center.

And I do want to note that we do want to share the data, of course, but we are not the primary data providers of most of this data. So, we will be including a table and a source of where exactly we got all the data and our methodology for procuring it. Both, for information for anyone interested and for, you know, future iterations of this report to make it, ideally, easier. If there is going to be another iteration, which I can't speak to for sure, but, you know, we want to make it as easy as possible for any possible efforts in the future.

However, if it's data like landings there, of course, is the NDA process for sharing data such as that. So, I too would like to continue discussions about how we can have this QA/QC'd summarized data available for related work so that we don't have to start again at the beginning with also being cognizant and respectful of our primary data providers that do want to make sure that caveats and their data are noted, that metadata is included, things like that.

So yeah, I would like to continue that discussion and think about how best we can store and share and make this data as available as possible while still respecting privacy of individuals, fishers, efforts and the primary data providers that made this possible. But yeah, I definitely think we should continue to discuss that. But thank you so much. I'm so excited that you're excited about it.

I did want to note too that this will include a synthesis at the end too, of the integrated indicators and potentially pulling out, you know, connections between the different indicators as well across, you know, the different data streams. So that'll be exciting.

SEANN REGAN: Thanks, Chair. Yeah, first of all, Seann Regan, NCCOS. Graciela it's great to hear of the excitement, and I appreciate your synthesis of this. I think one of the-- so, a lot of past DSRs certainly it's relatively easy for us to deliver a clean geodatabase or a suite of indicators. To Kelly's point, we're not the sole source of a lot of the data. And then I think one of our concerns collectively is, there's a lot of geodatabases out there. There's a lot of, you know, data sets and I think there's going to be some future presentations. I

think it was brought up yesterday, but I think it's really important to make sure that we're all aligning so that users know where to go and there's not a sort of an over inundation of data sources.

But, yeah, thank you for the comments.

SENNAI HABTES: Okay. I don't see any hands in the room. I have one comment to make and then we can move on to J.J.s. I think this is a discussion that we can continue later and need to be part of the FEP that we are developing, which is how are we going to take indicators? What format are they going to be in? and what type of database are we going to be creating?

I think this points to a clear need-- not to beat a dead horse --for an understanding for data management and coordination within the U.S. Caribbean. There needs to be a clearinghouse for where this data comes through. And there are, yes, a lot of existing geodatabase and servers that are set up through a lot of different organizations, but within the fisheries management community, particularly within the U.S. Caribbean, there isn't enough people and time and expertise with the time to do that on an annual basis. To create ecosystem indicators that can be presented to the Council.

So, it's going to be incumbent upon us to come up with a strategy that we include and a planning process. And I will, again, to those people in the room that are on the Council and that meet with the Council, there is a need for us to create some sort of plan for database management and coordination for all of this data so that we can put it into a format that can easily be sent to the Council. On an annual basis, otherwise, there is no use of these ecosystems' indicators for management considerations, period. And then this would be an entire waste of time.

So, with that said, I think we can move on to J.J.'S presentation, which will be a great example of the amount of time and effort it takes to kind of compile all of this ecosystem indicator data that is necessary to make management decisions. It shows us a point that it's not possible to do it on an annual basis unless there is money and infrastructure dedicated to that. So, with that, I will open up the floor to J.J. for his presentation.

**Integrative analyses and visualization of SEAMAP-Caribbean
(SEAMAP-C) data in Puerto Rico and the US Virgin Islands (aka
The Gold Copy)**

JUAN J. CRUZ MOTTA: Thank you Sennai. Can I share the-- Thank you. Before I start on my presentation, I want to say two things. First of all, related to what Sennai was saying before, I believe there are mechanisms in which, eventually, if the task force is set up and there is time and expertise for that, we can develop tools, like for example, shiny apps, in which basically, like, user-friendly apps that we can use as the information becomes available. We can just put the data in, and it give us, you know, like, a graph with how the indicator is doing.

For example, currently we're working on such a tool for something more specific for resilience scores of coral reefs. So, as the data from the Puerto Rico Coral Reef monitoring program gets available, the app just gets that info and gives you directly the results of resilience for the-- But that can be extrapolated and that, if you ask me, that is a midterm vision that I have on how to implement an EBFM approach, like, you know, how to bring down all these ideas we're discussing into some tool that can be useful by the managers, right?

That's one thing. The second thing-- but I believe we're going to talk more about that in the afternoon. Second, is related to my talk. The talk is related to SEAMAP-C data. But instead of going into details, what this project was about, I would like to concentrate on how we can use this type of data in an EBFM approach. So, of course, I will mention a few details on how we collected and curated this data set. But I'm going to concentrate mostly on the analysis we have done so far.

So, in this first slide, what you have is-- let me have this ready. Okay. What you have is the objective of the of SEAMAP-C program. SEAMAP-C is a cooperative program with the task of collecting, managing, and disseminating fishery-independent data. One of the objectives of that is to monitor the status of population and habitats by following trends of time. And this, this is very important, no? Because then we can go and follow trends on indicators as we saw in the previous presentation. But also, we can see trends on the overall, for example, assemblage data, on the overall environmental variables. And also, to monitor environmental parameters and community structure. That's another objective of the SEAMAP-C.

On the other hand, a little bit of background of EBFM, but since this is an EBFM working group, this is just to reiterate what we have been talking the whole yesterday and we will be talking today. But what I want to concentrate is in this phrase that I'm just highlighting now. "Multiple human impacts and multiple

species," right? So, the challenge here is not only to track what is happening with the cabrilla or the red hind or colirrubia, but it's how they are doing together with the other 80 something species we're trying to manage, and with the 180 other species that live in that reef.

So, based on that, on those two pieces of background, the problem was that we have been collecting SEAMAP-C data since 1991, but was not available, publicly available and easily available for stakeholder. They were mainly in reports, PDFs, and then that data had to be extracted from there and put in some digital format that could be used by everybody. Also, SEAMAP-C data has been historically criticized for having low numbers of individuals. Then, we couldn't do stock assessments. A very good example of this was the last SEDAR on Queen Triggerfish. Strictly speaking from the fishery-independent survey, we had very few individuals. I remember like only 52 in the last 30 years, or 152, which was not enough to do the standard SEDAR analysis. However, what I want to highlight with this presentation is that perhaps those numbers are not good for the SEDAR process, but they will be very useful for this ecosystem-based approach that we're trying to use.

So, the objective of this project was to compile, curate and make available all SEAMAP-C data. And then, do this analysis on temporal trends using a multi-specific approach. And today, I'm going to concentrate on the second objective of this program.

Only this is used to put in context the database very quickly and it has information at individual level on size, weight, sex, and development stage. Those fish were collected using three types of gears: traps, hand line, and long line. Out of that, we can have estimations of biomass. And those estimations are discriminated by year, month, depth, habitat, sampling station, region, and others.

And why did I put others with an asterisk here, because this data, we can factories it any way we want. For example, most of the important percentage of the stakeholders that we have engaged regarding the conceptual models have talked about the importance of MPAs, actually here, in the Council, several times.

Okay. What is the difference? What is the effect of the different federal MPAs on the structure and composition of fish assemblages? So, very easily, and I will show you an example. We can test whether there are differences related to MPAs, or not, in terms of these fish assemblages. This is like a summary information on the data sets on how many individual records we

got for East Puerto Rico, West Puerto Rico, and the U.S. Virgin Islands. Number of species, the years that the data series go for and so on and so forth.

Very important. We divided this data set in three periods. We divided it in three periods because the gear and the protocols change drastically. At the beginning, between '91 and 2006 were hook and line and traps, and the target was the entire assemblage. But then, between 2009 and '15, the target were snappers, so sampling was done at night or at the end of the day using hook and line and long line. And then, it changed back in 2016- '20 to look at the entire assemblage. So, I'm mentioning this because the analysis that I'm going to show you in a bit are discriminated for these three periods. With deception of hook and line. You can see that hook and line was used consistently through all periods, right?

This is also summary statistics in which we can see the total catch in kilograms through time for the different gears at the different regions, right? This data, as I said before, was compiled. It will be available through, I believe, the Council webpage or whatever portal we decide here we going to share all this data. It's going to be based on RGs, layers of RGs in which you can, those dots that you see here in your screen are places where we have information. So, you can click there and get the data. That interface we developed is very basic, it's not designed to do any analysis. It only used to show you, like, for example, here I selected this quadrant and then it showed me how many stations I got there. And then it gives me very basic information of what I will find in those stations. And then also not in terms of composition here and biomass and abundance, but also through time down here, right? And that data you will be able to download. All the data, only parts of the data, only some years, etcetera, etcetera.

Okay? But then, as I said, I'm going to concentrate on the example. The example that I want to develop is how we can now analyze the community structure or, better said, the assemblage structure of what we are capturing through the years. Which and why is that? Because it's directly related to what the EBFM approach is, right? Then, I'll be showing how to use that data and community composition, structure and composition, to follow trends through time. And very importantly, how we can look at relationships among components, which was one question that Graciela raised before. Also, I'll show you how using this analysis we can select indicators. And this is something that I want to be very clear about. So far using conceptual models or using the ESR approach, what we do is we go and ask the

stakeholders, "what do you believe is important in this system? What do you think we should be following through time to say something about the status of this ecosystem?" Here, we are going to get the data set and basically ask the data set what are the indicators, the species or the components that are driving those components.

So, at the end the result will be the same, but the process will be the inverse of what we have been doing so far. And for that, I'm just showing here the classical conceptual model, right? We talked about this a little bit yesterday. How are we going to compliment all the conceptual models? And how are we going to simplify this view? But I want to use the conceptual model because then here, this particular group of people, they say, "okay, look, what is important for us is the biomass," right? But that might not be necessarily what other stakeholders thought. And this is the process that we are going to follow.

I just explained this briefly yesterday but just after this talk, Tarsila will be talking about these conceptual models. The idea after combining all these conceptual models, what we hope to achieve, is something simpler like this. Very, very simple conceptual model, the product of amalgamating the opinion of all the stakeholders that we engage. And I ask the question to Kelly before, because then I want to see what's the format that they score and the exact process, because then that can also be included in this amalgamation, right?

So, this is simplified-- This is what we hope to achieve after we have engaged everybody and simplified. Come up with-- and this is used an example, that I did with four groups. And then in this simplified model, we have all these things here affecting fish biomass. Fish biomass is what Michelle identified yesterday as the receiver. In my very limited exercise, we identified that the receiver, that the box that received most arrows, was fish biomass, right? And then, using the same logic that Michelle used yesterday but from a quantitative point of view, we identify these drivers here. But one further step we did is also identify what fish biomass will be a driver of.

But again, in a simplified manner that I believe-- Alida, I don't know if this will be easier to communicate than the spaghetti salad before. Are you there, Alida? Well, anyhow, I hope so. Anyhow--

ALIDA ORTIZ SOTOMAYOR: Yes I am.

JUAN J. CRUZ MOTTA: But then, when we go, "Okay, the fish

biomass, that's what the people think. But actually that, when you go and listen at the recordings, it means slightly different things for different stakeholders, like, for example, pelagic fish or reef fish or conk, even lobster, right?

And then where do we get that information? From this multivariate data set that we have or this multi specific data set we got. Which I just want to-- a good source of that is SEAMAP-C but it's not the only one. The Puerto Rico Coral Reef Monitoring Program has data on this. The National Coral Reef Monitor has data on this. The Regional Coral Reef Monitoring Program has data on that. The catch data-- Kevin, if you're listening to me, I'm still waiting to hear from you about the catch data. Sorry to put you on the spotlight. The catch data also got information on this. And this is basically how the data looks like.

Then I want to just take a few minutes to say that this a typical multivariate or multi specific data set. It is made of observations. There are arrows here, which is basically one site. We know the coordinates of that site at a given time, using a given technique, right? It could be a trap, it could be hook and line, it could be a visual census, it could be a video transect, right? And the columns here, these columns represent different species or different variables.

So, what I'm going to show you now is how we then look at temporal trends. A similar exercise was done with the ESR, but instead of using a single variable, like for example, total biomass or total abundance of all the species or richness, we are going to do that using the entire data set. And for that, we have this analysis which are known as multivariate ordination. There is a suite of different multivariate ordinations. I won't go into details on those. But what all these multivariate ordinations have in common is that there are maps in which I'm going to represent, in this case, the different years for the region West of Puerto Rico, right? Each dot, or each triangle in this map represent how the entire assemblage looks like but look like in relation to something else. In this case, in relation to other years.

So here I have 1992, and then what I'm describing here-- and you'll see how later --is, how much the entire assemblage changes between '91 and '92. Of course, these distances are relative. Less than or more than. Basically, I can say that between '91 and '92, the structure and composition change a lot more than between 1991, '92, and '93. Okay?

So, if we follow this, we can go and then track how this structure this assemblage has changed through time and we can identify here a big difference, right? Different times or periods in the data set when things change significantly. Those green lines there, is not that I decided to put them there, they are the product of statistical analysis that identifies statistically significant groups. That means everything inside, there is no evidence to say they're different.

Okay. So, first step, we have identified a trend for the entire community, but also, we can then identify which species were responsible for those changes. And then, you can see here, for example, red hind, used to be more abundant in the early stages of the data series. And as time progresses, as we move from right to left, the abundances of red hind decreased. On the other hand, we can identify things like, for example, the rabirrubia, the yellowtail snapper, started to increase as we move from right to left or from 1991 to 2016- '17. So, with this exercise, we can identify which species we need to concentrate on to see-- I mean, that are showing most of the change through time.

The other thing that we can do with this with trend is not only identify these species, right? And of course, and I'm doing this with the species of fish, but you can go and do this with richness or total abundances. Furthermore, I can go on that temporal trend-- this is the same that I showed you before. --but instead of using the species, I can correlate that with the different environmental variables that I have been collecting, including those related to the benthos. And please note that the strongest correlation identified by this long line, this circle here means one 100%, right? So, please note this is a strong correlation of coral cover with this change in the structure and composition of the community. As we move from right to left, that percentage cover is decreasing, something that we saw in the ESR that we have also seen for the West coast of Puerto Rico for most of the Puerto Rico Reef Monitoring program.

Actually, this data here, this coral cover estimation comes from the Puerto Rico Coral Reef Monitoring Program, right? Please note that here we can put the landings, the data on the landings. Is this temporal trend related to those landings. Please note that if the correlation of the landings is small, but the coral cover is high, perhaps we should focus our attention on the habitat rather than how much the fishers are taking out of the system, right?

So please note how this data set, the SEAMAP-C data set, is very rich and is very useful to start pinning down important indicators. What is it telling me? Definitely for this Council, it is important to partner with the Coral Reef Program in Puerto Rico and NOAA to get this data right. That as soon that data comes available, it comes to whatever platform we develop here at the Council, you know, data holding. Because then we really need to track the coral cover, right? For example, look here the degrees heating week, no? It shows as important, but not as important as the coral cover. But then we know that there is a strong correlation between degrees heating weeks and coral. But then what is telling this, that the effect of DHW is indirect through coral cover. So, we also, with this, start to build indirect relationships as we were developing in the conceptual models. So please know, this is the inverse process as we are also doing with the concept models. The concept model is asking the stakeholders, what do you believe is happening? This is what the data is telling you is happening. Yeah.

I just want to show you another example. This is related for a comparison of marine protected areas. I'm going to focus on the West because Graciela has been asking, "Hey, how is Tourmaline, Bajo de Sico, Abrir La Sierra doing? Do we have all this data? And actually, I want to go further down the road, and Stacey can confirm this. Most of the fishers we meet in these workshops, they say, "Okay, here we are on another meeting, and you were here--" you, means the scientists "--two months ago or three months ago, and you have been here at least 20 times in my lifetime. And then you ask us to close this place and not to fish there. And then you have never shown us what is the effect of that sacrifice." No? In questions marks. So then, that's what we are going to do. We are going to answer that question. Is it different at least? No, we cannot talk about the processes. This is what's happening.

These are the same types of maps I showed you before. Every single dot is a sampling station in a given time. Here, are factorized in instead of years. Here, is outside those three areas and inside those three areas. Please note that there are no differences. When I said there are no differences, it's not only that graphical representation, but that's also only a representation. There is a statistical analysis behind that, right. I won't go into the details, but basically you test for defect of MPA, right? This is basically a new distribution, right? Which is permitted, this is non-parametric. And here is your statistic in the middle of the new distribution. I mean, there is no evidence to reject number. There are no differences between protected and not protected. Okay?

I won't say that those places are not working, because what could be happening is a spillover effect. So, everything is so good that it goes beyond the-- but they're not different. The other thing that we can do with this data, with the SEAMAP-C data is then go say, "Okay, what is happening here?" And comparing outside the blue and inside the red. I can look at what species are making those differences. So, what's basically what you see in this plot here on the left, you have all the species that were detected as important to differentiate those places. And then in each one of those, each line, for example, here, cabrilla. Cabrilla, please note was consistently caught outside, but not so much inside. So, I can identify what are the species, not only that they're not different, but then what's happening inside, outside using different species, right?

The other very important thing, something that Marcos brought up yesterday. "Hey, but I know these two species here come together when we fish them." Well, what you can see here is, and you can see that by these clusters, right? You see those little red lines. Basically, what those red lines is telling you is that those species have the same spatial and temporal patterns. So also, with SEAMAP-C data, I can identify groups of species that are behaving similarly through time and through space. For example, these three. Now, don't ask me ecologically why the spatial pattern of a barracuda and triggerfish has to do. But the fact is, they are positively correlated. When you get more of one, you get more of the other, right? So, you can use the SEAMAP-C data to identify groups of species that have temporal patterns of spatial and temporal distribution, right?

But this is a classical univariate analysis you will do. This is an analysis on richness on the left and CPUE that not necessarily will give you the same resolution at identifying differences through time or across the space. But this is, I mean, I show you '91, 2006, '16- '20 same pattern, no differences.

I just want to finish the presentation saying that the only protected area that was different from the rest is Desecheo. Desecheo, in this graph, is represented by these green triangles. Please note that up here I have outside Bajo de Sico. The pink one is Bajo de Sico. But that might not be because it's protected, it's just because it's separated from the platform.

But anyhow, these are just examples how we can use or how SEAMAP-C data can be very, very rich to understand these patterns that we need to identify if we want to use an EBFM

approach.

So, as conclusions, and I will leave it here for questions or comments. We can with SEAMAP-C data identify temporal trends of the entire assemblages, identify indicators associated with those trends, identify potential drivers of change-- I showed you an example with coral cover for the West --and test evaluated hypothesis derived from the conceptual models.

I want to finish with this one to introduce Tarsila's talk because we are aiming at having these common conceptual models. But it might be the case that for some stakeholders those conceptual models will be so, so different that it will be impossible to amalgamate. Then we can use this data to test support for one or another conceptual for model. Or what elements from model one you have to take and what elements from model two you have to take.

And with this I'll leave my presentation for question, comments. Thank you.

Questions

SENNAI HABTES: Thank you, J.J. Sennai Habtes, Chair. At this point, I'm going to open up a floor to questions. I'll start within the room. Áurea, go ahead.

ÁUREA E. RODRÍGUEZ-SANTIAGO: Hello, J.J. Great presentation. This is just like a comment. You didn't find any differences inside and outside. So how do you tell that to the fishermen? What would you say? Because we want to have the protected areas, but then you want to say, "Hey, it's the same." It's just like this.

JUAN J. CRUZ MOTTA: I don't know, Alida, help me out. How do you go back to the--

ÁUREA E. RODRÍGUEZ-SANTIAGO: When was the MPA established?

JUAN J. CRUZ MOTTA: Well, it depends. Desecheo and the three aggregation sites were in different dates. Perhaps Stacey knows.

ÁUREA E. RODRÍGUEZ-SANTIAGO: Or can it be like, you know, the inside and-- Well, if there's like a spill, you know, it's not like it's--

JUAN J. CRUZ MOTTA: Okay. sorry. I forgot to mention. Those three sites were selected to be very specific to protect the

aggregations of some groupers. Right?

ÁUREA E. RODRÍGUEZ-SANTIAGO: Okay.

JUAN J. CRUZ MOTTA: And we are not targeting that, I mean, this is used looking at the entire assemblage, right? So it might be that there are so few groupers left in those areas that it doesn't make a difference when you look at the entire community. That's what might be happening.

ÁUREA E. RODRÍGUEZ-SANTIAGO: Yeah, I don't want to be negative. I just, I'm worried about, you know—

SENNAI HABTES: Hold on one second, Áurea. I think, I'm going to just step in. We need to be very clear about what this data shows, right? And also, the way the data is collected. These are long line and hook and line surveys. They're not quantified by area in terms of area covered and how much. It is simply an abundance estimate based on samples within an MPA and outside of an MPA. To develop actual specific questions that test the efficacy of an MPA as a completely different study design than what this is. This is an informative measure to identify long-term trends in abundance associated with MPAs, accorded to certain species. So, it's a good informative tool to allow us to understand how we can design studies to test efficacy, but that has to be quantified in terms of effort and area, which we're not doing currently with this study.

ÁUREA E. RODRÍGUEZ-SANTIAGO: Okay.

SENNAI HABTES: So, we're not able to answer some of the questions from this. But it is a great use of long-term data to identify better ways to create management decisions that can help us inform that.

ÁUREA E. RODRÍGUEZ-SANTIAGO: Okay.

SENNAI HABTES: So, I just want to clarify that before we go too far down the line of asking a question that we can't necessarily answer with this specific data.

ÁUREA E. RODRÍGUEZ-SANTIAGO: Thank you.

SENNAI HABTES: No problem.

ORIAN TZADIK: Orian Tzadik, for the record. That's very much in line with what I was about to say. You know, you have to look at what this data is and what it's representing and what the

question actually is and what you're asking. I mean, there's a difference between what J- I mean, Sennai just laid it out great, so I'll leave it at that.

JUAN J. CRUZ MOTTA: Yeah. The conclusion is the structure and composition of the assemblage inside and outside are not different and that's it. We identified a pattern, what the processes behind that pattern are, we cannot say. And I would like to take the opportunity of this remark because data gathering is important. Understanding the patterns is important. However, one thing we are missing, in my humble opinion, is to develop the necessary experiments to test hypothesis about the processes. For example, here I proposed based on a correlation, and we know correlation does not imply a cost consequence, no? I proposed, "Look, there is a strong correlation with coral," right? And let's suppose this is theoretical. I'm not saying this is happening. When we have the catch data, let's say that correlation is not as strong as coral cover, right? We cannot jump and conclude that the process is loss of habitat. We need to test a specific hypothesis about that. So again, thanks for that comment. The result is this is different to that. What is the process behind that? We don't know. And I believe we are behind on doing the necessary experiments to test a hypothesis about the processes. Thank you.

ÁUREA E. RODRÍGUEZ-SANTIAGO: I mean, thank you.

SENNAI HABTES: I see a Alida's hand up online. So, Alida.

ALIDA ORTIZ SOTOMAYOR: Yes. Just a comment. J.J., thanks a lot for this excellent presentation. For outreach and education, I always look at our fishery in the region. Of course, it is artisanal, it is in small scale, but it is very, very complex. You are giving us the ideas and you are giving us the ways to look into these specific issues that characterize the fisheries and then get that information, obviously in a different vocabulary and a different way, to the public. Thanks a lot.

JUAN J. CRUZ MOTTA: Thank you, Alida.

SENNAI HABTES: Stacey?

STACEY WILLIAMS: J.J., nice presentation. So, the other factors, like you have degree heating week and coral cover, because I know, like, Bajo de Sico, like the coral cover is really low, but it's just a structurally complex area with a lot of current. And comparing that to, say, Tourmaline, which is also very, very different habitat, that maybe those, like the

environment, could be playing a large role. So, I wonder if you used other habitat factors or parameters in this analysis, just not coral cover, because I don't think that would be an accurate assessment of seeing the difference between some areas.

JUAN J. CRUZ MOTTA: Very, very good point. Stacey. Yes, we did. Actually, we did a few things, right? We correlated the entire fish assemblage with the entire coral community.

I mean, like not total cover, but cover of *montastraea*, *orbicella*, you know. We also use that heterogeneity rugosity measure you are all directly collecting in the field. So that's built in there. And what happened is that what says coral cover, was in reality 12 different lines representing the coral builders, right? So yes, we introduced the data as raw as possible in this analysis. Only for communication purposes, based on what Alida mentioned yesterday, I lumped all these all those lines representing different species of coral builders into what I mentioned there, coral cover.

Please note that also, you can do the correlations at two different levels, using the indicators. And for example, remember the resilience analysis we did. I use the indicators and I also use the entire community. But yes, we used a lot of it. The thing is didn't show up there. And also, What's the reason, because in this case is the west. So, we clump together all the sites in the west.

Please note that also, you can do the correlations at two different levels using the indicators. And for example, you remember the resilience analysis we did? I use the indicators and I also use the entire community. But yes, we use a lot. The thing is we didn't show it up there.

And also, what is the reason? Because in this case is the West, so we clump together all the sites in the west. That might not be a good idea based on the comments we were making before about the special variability. Thank you, Stacey.

SENNAI HABTES: Graciela?

GRACIELA GARCÍA-MOLINER: Two things. One, the changes in the regulations that we have had in the MPAs and in the local area regarding banning gears, etcetera. That's more on the commercial side of things but SEAMAP also followed, some of these years when the regulations were implemented and did not fish for the specific targeted species that we were protecting, red hind. However, you know, and that happened in the early 1990s. So, the

question is, how do we look at that part of the regulations? And they have changed because Bajo de Sico now has six months versus the three months that it had before. It covers only the reef fish; the other areas prohibit all fishing. We've prohibited bottom tending gear in the areas. So, it's a mix of things that we have to consi-- but don't move from there because I have a question that is directly related to this picture.

So, the second axis that you have, is productivity. Can I ask your definition of productivity in this case? And the reason for asking is because then it goes into the 2010-2011 changes that we talked about yesterday on the sargassum inundations and the changes in SEAMAP protocol going specifically at that time. Sorry.

JUAN J. CRUZ MOTTA: No, no. Sorry. I was just trying to get rid of the--

GRACIELA GARCÍA-MOLINER: So that productivity axis there, right? What's the productivity definition in the SEAMAP?

JUAN J. CRUZ MOTTA: No, this is not SEAMAP-C data. The productivity was collected by-- Sorry. Productivity is not collected by SEAMAP-C data. That was collected from publicly available data sets. That was collected by Iliana Chollett.

Do you remember--

SENNAI HABTES: It's MODIS Chlorophyll-a. Isn't that what Iliana used?

JUAN J. CRUZ MOTTA: Very likely.

GRACIELA GARCÍA-MOLINER: [cross talk] is productivity in general. So, the only reason why I'm asking is because it points out to the changes in the SEAMAP protocol going from, you know, I think that there was a change to yellowtail snapper in where that axis is going to, right? So, I mean, this would give us other information regarding the changes, not only in SEAMAP, but in the actual changes in the environment that we see. And 2010-2011 would really fit into that pattern of complete change, not only from the gear, but from the environment that people were fishing in. Is that correct?

JUAN J. CRUZ MOTTA: Yeah, that's correct. And actually, as you can see, these are correlation between two matrices. In this case, only the fish, and then the environment habitat on the other. But then we can do, and this is the ultimate objective,

is to correlate more than two matrices, which is the challenge, right? And then one of those matrices could be used indications of what type of gears you were using on different times or what were you targeting in different times. So, but it was not done here.

And yes, you're totally right. It's possibly that that big change between 2009 and '10 was related because we started targeting the snappers, right? Even though that started in 2006. But, let's say, it is possible. But it can be incorporated in the model. De echo, the model not only takes into consideration habitat environment and assemblages, but it also takes into consideration a socioeconomic variables, which are variables that Tarsila won't mention, but that she has been collecting and will feed into the model, right? Because at the end of the day, okay, how much this loss of biomass of fish, or change in the structure, has affected the income, for example, of people, it's also very important. Stacey?

STACEY WILLIAMS: I have the definition of what was defined as productivity if you want me to read that out. I don't know if that-- or we could talk about it later. Yeah, you want to talk about it later?

SENNAI HABTES: No, I think-- read it into the record.

STACEY WILLIAMS: Read it? Okay. So, the productivity that was measured for J.J.'s study was calculated using the vertically generalized model production model. So, it's basically chlorophyll based model, using a temperature dependent description of chlorophyll specific photosynthetic efficiency. So that's what productivity is defined as, in this case.

JUAN J. CRUZ MOTTA: For some reason now, something that I want to mention is latitude and longitude are part of the model. It means, it is not averaging across all the places of the sites. When the correlations are done, it's looking at what's happening in that site through time for all these variables. Thank you. Yeah, I just remembered now.

SENNAI HABTES: Okay. I don't see any other questions and we're kind of running a bit behind. I will make one more comment. I think, Graciela, indicated an interesting point that I don't think you really got to answering. What she was talking about is like, on that MDS map, not only do you see like these large-scale changes based on the strength of association for your environmental variables that you would put in, or the indicators that you're using, but you can also see interesting

correlations between outliers or anomalous years. That's kind of one of those things that was indicated by, obviously, like the 2016 and 2017, possibly with hurricanes, to cite the small influence of it compared to the other indicators and productivity partially towards 2010 and 2011, which were anomalous years in some of those variables. And so that's another thing that we haven't really discussed as a useful indicator, is identifying specific indicators that can point to these anomalous years that may have strong effects on the important things that we want to measure, like biomass or changes to habitat. Identifying how those interact with the rest of the years is also an important thing that can be done from statistical analyses, like a non-metric MDS. So, I just wanted to mention that as food for thought for future discussions.

So, with that, I'll Thank you, J.J. Your presentations are always thought provoking and-- Oops, I'm sorry. María has a question. So go ahead, María.

MARÍA LÓPEZ-MERCER: Thank you, Sennai. I was waiting for the members to finish their questions. So, this is María from NOAA Fisheries. Mine is more like a comment. Thank you, J.J., for your presentation. I really felt like going back to college and taking an awesome class. Um, so it's more of comment for the whole group. Can you guys hear me?

GRACIELA GARCÍA-MOLINER: Yes.

MARÍA LÓPEZ-MERCER: Oh, okay. Sorry. Yeah. So, I was wondering if as part of the recommendations that the TAP will make to the Council at the upcoming April meeting, if there's a possibility that some of the tools, methods and things that are discussed during this meeting, with the purpose of the FEP, could also be brought into consideration for the Council for the pending evaluation of the MPAs? Because as you remember from the last Council meeting on February 9th, which was, you know, all MPA oriented, the need was identified to define the goals, define what we mean by effectiveness, you know, coordinate projects, optimize those projects, and, you know, identify funding. And I feel like this would be a good opportunity to incorporate or have things from this process into that, so that the Council could start working on this action, maybe by creating a working group or something on that line. So, we can start this process for evaluating the MPAs. Thank you.

SENNAI HABTES: Thank you, María. That's a great recommendation. I would recommend that our Council staff bring that up in via email to the Council and maybe in conjunction with the Council

Chair, you can send an email around to the other Council members to make a recommendation for that.

I'm hesitant to take that on within the EBFM TAP because we already have our hands full with the EBFM, with the FEPs and the work we're already doing. But I think we would be more than welcome to share with another working group or TAP, or if you identify specific indicators that can be used from the analysis that is already done towards the MPAs, then I think we'd be happy to share that information. Or if it's something at a future date that could be used where we could put this into the FEP as we're drafting it. I think both of those are feasible, but I'm hesitant to take on another directive from the Council within the EBFM TAP, given what we're already working on. And also, that distinction has to come from the Council to us, not necessarily from us up to the Council. Ori, go ahead.

ORIAN TZADIK: Yeah, I would echo what you just said, and I would also just caution, you know, similar to how Áurea just came to the table and said, "Wait a minute. You know, what do we tell the fishers?" We, you know, these studies need to be designed to answer the specific question of what the MPA was set up for in the first place. I mean, it's a very clear distinction. You know, we're calling these marine protected areas, but they're not, no takes. They actually don't limit fishing much at all other than some gear limitations and seasonal limitations. But, you know, so it's a little bit misleading to say, "Well, we're going to compare this MPA versus the stuff outside the MPA" if there's not actually a real protection in place. And again, as it was pointed out, those MPAs were set up specifically to protect red hind spawning aggregations. So, the answer to, is that MPA effective, would be much more targeted towards red hind surveys and fecundity analyses at the at the aggregation site and, you know, those sorts of data would need to feed in.

So, I think it's a great suggestion from María. But, you know, again, to echo Sennai's point that maybe it's not within the purview of this Advisory Panel at this time. Just make sure that the right data is going in, if we're going to go down that road, just because it's a very contentious road and you don't want to start saying things and getting people-- well, like you just came to the table and you said, "Wait, hold on, you're telling me it's not working" and no, no, no. That's not what it said, you know. So—

ÁUREA E. RODRÍGUEZ-SANTIAGO: I just had like a very simple question, but I'm really glad that all the conversation came in.

I understood more.

ORIAN TZADIK: Yeah. And that's exactly what I'm saying. It's that we need to understand more, and we need to present it in a way that's much more complete than just kind of like a couple, you know, this is one correlation that we saw.

SENNAI HABTES: María?

MARÍA LÓPEZ-MERCER: Yeah, thank you. Thank you Orian for that. No, and I absolutely-- I mean, definitely the role of this Technical Advisory Panel is very specific. It's for the development of, basically, the FEP and EBFM actions. But given that, of course, you know, we will be hopefully looking at the MPA from an EBFM perspective, and you are all developing different tools that could be used.

And I'm not saying, like J.J. mentioned earlier and Sennai, I mean, there's specific questions that were asked for the development of these tools that we are seeing in here. And those are not the questions that that we will be answering for the MPA. So obviously there will have to be some sort of, you know, development of the specific questions and methodologies to answer those questions.

So, if the TAP feels that there's-- and it doesn't have to be right now, it doesn't have to be in April or whatever --if they think, like, in the same line that we were looking at how we can use these tools in the future, right? Because these are going to be used in the FEP and the idea is also to use what we have in the FEP to answer questions, management questions, in the future.

So if the TAP expertise thinks that any of these things could be modified, developed, etcetera, to answer specific questions, I think that will be something that could be brought to the Council at the right time, so that that working group or new Technical Advisory Panel, whatever the Council wants to do for the evaluation of MPAs could take advantage of these things that you're doing in here. But thank you so much for your comments.

SENNAI HABTES: Thanks, María. I'm going to let J.J. answer and then I think we need to move on.

JUAN J. CRUZ MOTTA: Yeah. María, the only thing that I wanted to say is, yes, they can be used to assess how the different MPAs are doing. In fact, there is a paper published by one of our students at DMS where he used these methods to evaluate the

relative effectiveness of two MPAs, at least on paper, the MPAs, which was La Parguera and Mona. So, I can send you that paper.

Just to reiterate. Yes, these tools can be used to answer questions related to MPAs effectiveness. Thank you. Of course, outside the EBFM TAP.

SENNAI HABTES: So, it is 10:59 now. I think it would be good for us to take a five-minute break to give everyone just a chance to get up, stretch their legs, get a cup of coffee, and then we'll come back at 11:05 and we'll have Tarsila's presentation, and we'll try and get through at least, I think, one more presentation before our lunch break at 12:30. We may be able to push that back if necessary. So, I kind of want to get through as much of the presentations we can in the morning and use the afternoon for a lot of the discussion and questions that we need to answer for the TAP.

To just finish up. María, I think part of what we're going to be doing for the FEP is designing a strategy for the Council to use EBFM information in making decisions. That would include decisions on how to, you know, effectively manage MPAs within the federal parts of the U.S. Caribbean and along with all management strategies. And so that's one of the things we have to discuss this afternoon. How are we going to do that? How are we going to make a recommendation in the FEP for how this information can be used effectively and make a cogent recommendation that works for the Council? So, I would encourage you to stay on and join us in that discussion when we get to that point on the schedule.

All right, so with that let's go ahead and take a five-minute break. Everybody back at 11:06. Thank you.

(Whereupon, a brief recess was taken.)

SENNAI HABTES: Okay, everybody, we're going to kind of bring this back in. I apologize for the delay. We're just trying to work out some technical difficulties. We should be good now. I think what we're going to be doing here going forward is, if the two presenters, Tarsila and Tauna are okay with this, I'd like to have Tarsila present now. And then after her presentation, Tauna, I'm going to have you present. And so, then we should finish those up by 12:30 and we will take our lunch break at that time and then we'll come back in the afternoon session, and we'll move all of our talking points because the rest are deliberations that we need to have and make a plan going forward for work for the EBFM TAP. And I'd like to have as much time and

discussion for that all-in-one session.

So, if everyone's okay with that, I will just have someone motion, second and then we'll do a quick round of no objections to see if we're okay.

ORIAN TZADIK: I'd like to make a motion to accept the proposed changes from the Chair.

JUAN J. CRUZ MOTTA: I second.

SENNAI HABTES: Thank you, Orian, J.J. So, if I will ask for any EBFM TAP member with objections to the proposed changes to please say, "Yay" put in the chat or gimme a hand on Zoom.

Okay. Good. Hearing none, seeing none the proposed changes to the agenda accepted. We will move right along with having Tarsila present to us. So, Tarsila, if you're ready, the floor is yours.,

TARSILA SEARA: Alright, can everybody hear me?

GRACIELA GARCÍA-MOLINER: Yes.

Status of Lenfest Conceptual Models

TARSILA SEARA: Okay. All right. So, I will try to be very brief. I know we have a lot to accomplish, and the purpose of this presentation is mainly to just give an update on the development of conceptual models by the Lenfest Group. I will say, I was tasked with putting together this presentation and presenting, but J.J. and Stacey if you want to add throughout the presentation, please feel free to interrupt me. I can't see you, but you can shout into the mic at any point.

So, I am going to just very briefly go over the objectives of the project. This is just to refresh everybody's memories and maybe for some of the people in the meeting who are not familiar with the project. And then, I'll talk about what we accomplished to date, some very preliminary analysis, and I'd like to stress that we haven't really had a chance-- this is an ongoing process. We're still collecting data. We don't have any final products. What I'm going to share are some examples. They are basically just some notes from very preliminary analysis. And I would just, you know, hope that these would help to generate some discussion as to how we can proceed and how we can use this information for our purposes.

A lot of the points that I would like to make in this presentation have already been made by previous presentations, which I think is a great thing. Sounds like we're all in agreement so far. So, I will start, as I said by just giving a very brief overview of the objectives.

I can't change my slides for some reason. Oh, there we go.

Alright, so very briefly. The Lenfest project objectives are in line with step one of the Lenfest loop of the strategic plan for the FEPs. So, what we're hoping to accomplish here is helped answer the question, where are we now? And part of that is to develop conceptual models. As part of the project, we're also developing some quantitative models that J.J. mentioned during his presentation as well. And our, essentially, our main objectives would be to, help select indicators for these models and also to identify threats.

So, we used a mixed method approach. We have qualitative and quantitative approaches essentially to the project. I am going to focus on the qualitative approach, and specifically I'm going to talk about the development of the conceptual models as part of this effort.

So, just very briefly, we're using this fuzzy cognitive maps approach, which has been extensively discussed in previous presentations, but also just wanted to add and emphasize that there are multiple efforts and I think it's a really great thing that we've been coordinating these efforts and this will be extremely important when we try to put everything together to create these social cognitive maps, which, J.J. has spent some time also talking about. But the point is that what we hope to accomplish here is to be able to bring and stack all these maps so that we can create one big or multiple consensus maps or social cognitive maps.

Okay? So. What have we done to date? So, we have completed a number of workshops with experts and managers. So, these are completed. These happen last year between mid-June and July. These were all virtual workshops, and we were able to accomplish four expert workshops and three manager workshops. And these are the total number of people that we have talked to. So, these models are completed. We haven't yet analyzed them, but they are done.

Now, we are still working on the fisher's workshops. We have already completed eight of them in Puerto Rico. So, I also just wanted to stress here that all the data that we have so far is

only from Puerto Rico and not from all regions of Puerto Rico. So, this part of the data is incomplete and we're working on finalizing these workshops. We had a number of delays and challenges, mostly due to COVID. It was very important that these workshops were done in person and so we had to wait until it was safe enough to do so and so we're still working on that.

So, we're planning to do another seven workshops in Puerto Rico. This is to sort of finalize a representation of all of the different regions in Puerto Rico. So, they are going to be focused on the Southeast and East of the island. And we're also planning to do as of right now two workshops in the U.S.V.I. So, none of the data in the very preliminary analysis that I'm going to show next include fishers from some of the regions in Puerto Rico and, and the U.S.V.I.

So again, just stressing that these are very preliminary analysis and I just want to be cautious of that. I keep calling them analysis, but they're really notes. We haven't really analyzed this any of this data yet. So just to stress as far as sort of the main objectives of how we're going to use these conceptual models in the FEP process. You know, some of the goals are to visualize some of these in-depth analyses that we are going to do. This has a lot of importance for also the outreach component of this that I would like to stress as well would be very important. We do, again, forgot to also mention that validation of these conceptual models will be very important before we move on with a lot of these steps.

But for the purposes of this presentation, I just want to talk a little bit about how we can use these conceptual models to identify priorities and risk factors and also data gaps. And again, I think this has been already mentioned and stressed in other presentations, which is a good thing. Another main goal would be to use the information to guide a development of hypotheses. And J.J. already mentioned and did a great job presenting on, you know, what are the potentials for that here.

Okay. So, in terms of, again, I'll stress they are very preliminary analysis. These are just some notes looking at what are some of the top factors that came up in the conceptual models that we have to date. So, I just identified top ones and enlisted them here. So, for the experts, they're top drivers and top receivers, you can see all listed here. And then I did the same thing for the managers. Again, just some select top drivers. The one that had the highest number of connections and same for receivers and I did the same for the fishers. And, again, these are just Puerto Rico fishers and only the regions

that we have conducted the workshops so far.

And then, just for the sake of the example, I began to compare these a little bit. So, looking at, you know, comparing experts and managers, we can identify some of the common top drivers. Here are just the drivers. So, management, pollution and climate change were some of the top ones. Same for receivers. Comparing experts and managers we're able to identify what are some of the common. They seem to be pretty much in line.

And then I just grouped experts and managers, just for the sake of an example here for this slide and compare it to fishers. Then we can begin to identify, again, some of the common drivers that were mentioned and were considered priorities for these different stakeholder groups. A lot of these you will recognize from previous presentations. They seem to be pretty much in line with what has been discussed, which I think is really interesting and important. I also wanted to stress that for the purposes of this, for this exercise, I was looking at sort of the common drivers and I did the same thing for the receivers. But it's also equally as important to think about what are some of these factors that may be unique or that may be priorities that are specific to some of the groups and not necessarily the others.

I think that a couple of examples are also really interesting in terms of identifying what are the data gaps. One of the things that came up in the fisher workshops that we identified as being an important driver is the impact of recreational fisheries. That was something that came up a lot during these workshops. And that is an area where we absolutely need to get more data and more information to understand, what are the impacts of recreational activity?

Just again, for the sake of the example, when we look at the experts and managers some of the drivers that are unique to some of these also point out to some data gaps. For instance, you know, ciguatera was one of the important drivers for one group of stakeholders. That is also another area where we could, just have some more effort to collect data on the effects of that.

Okay. So, about our next steps. We do need to finalize data collection. As I mentioned, we're still working on the fisher Workshops. To finish Puerto Rico and complete the U.S.V.I. and hopefully these will be done. Our plan is to be done by early June. And then, part of the next steps will be to, of course, do some analysis and develop those social cognitive maps as J.J. did a great job explaining earlier. And this will also include,

not just the Lenfest workshops, but also the previous and ongoing efforts that are happening in region.

And one of the things that I also wanted to stress here, and I think that this also has some important implications for outreach and validation of these models, is that we're going to spend a little bit of time working on the terminology. I just put here an example from the workshops that we have conducted so far. These are the lists of terms that have been used. And it will be an important step to make sure that the terminology is consistent. And that, again, it will be important to validate with the stakeholders if the terminology is adequate. And so, this will be an important step, and that's something that we're going to have to do next before we validate these conceptual models and before we really begin to stack them. So that is an important next step.

And I also, you know, wanted to stress the importance of steps in terms of communicating how, you know, and not just communicating the results, but communicating all these different steps and how we're actually using this data to the stakeholders and going back to some of the previous conversations. And really wanted to stress that we have all these fantastic scientific efforts that are going on in the region, but it will be very important for us to really think about how we're going to communicate all of this information to the stakeholders. This is not just important as part of this EBFM approach, but also because part of the challenge when we talk about stakeholder engagement is that we have to do with previous experiences when information has not been communicated properly and that creates barriers for the work that we do and engagement with stakeholders. And so, it is very important that we really think about how we're going to do that. I think I just wanted to stress that as a very important next step as well.

And that concludes my presentation. Thank you.

Questions

SENNAI HABTES: Excellent. Thank you, Tarsila. I'm going to open up the floor to questions. We're going to start here in the room with Stacey.

ALIDA ORTIZ SOTOMAYOR: Yeah, I have a question, Tarsila. Am I allowed?

SENNAI HABTES: Yeah. Go ahead, Alida. And then we'll move on with the people in the room.

ALIDA ORTIZ SOTOMAYOR: I hope that we will have that meeting with you and other people from the Lenfest project, to discuss these things of communication, that specific terminology, the issues that have to bring to the public. When they say education, are they talking mostly or principally about giving them the information or are we talking also about how to integrate these issues of learning about the fisheries ecosystem in the formal curriculum, regardless of whether you are intermediate school, general school, or you are an eco-school? Because in Puerto Rico we have eco-schools and I can go and give them workshops and I can give them information and they integrate that, but that's only a very limited number of schools. Are we talking about this broad aspect of education?

TARSILA SEARA: So, Alida, it is my understanding-- I'll ask J.J. and Stacey too to add to it-- that when they're talking about education, it is how all of this is being communicated. So, I think they're talking about outreach and education in the sense of how are all these important issues and all these important efforts and all this important data that's coming out of these efforts being communicated. That is my understanding that it's not about the formal education, but it's about information dissemination.

ALIDA ORTIZ SOTOMAYOR: Okay. Thank you.

SENNAI HABTES: Stacey?

STACEY WILLIAMS: Yeah. Hi, this is Stacey. Thank you, Tarsila. And just to add on to Tarsila talk. I would like to mention that there were also some key players, people that helped us organize the, especially the fisher workshops like Vanessa Ramírez, Jannette Ramos from Sea Grant. Also, Marcos has helped us, and we are now working with Roberto Silva from the Congreso de Pescadores, and he has been helping us try to organize the rest of the fisher's workshop.

Our original plan was to make these workshops, like, have a couple around the island. I can't say COVID is a blessing because it's not a blessing by far. But I think having these small workshops and the different, whether it's at Villa Pesquera or a restaurant, has been really fruitful, because it allows us to have all the participants say what they feel, whether to talk about what is affecting them and their fisheries ecosystem in that particular area. And we've actually have received interesting data.

You know, Tarsila, has mentioned that there were similarities and dissimilarities between user groups with experts and managers. But we're also seeing that within a stakeholder group like the fishers-- just give you an example, the last two fisher workshops we did was in Rincón and San Juan. Fishers in Rincón brought up, you know, gentrification and the access to the ramp, you know, is huge. It's a problem right now in that area. What San Juan has mentioned is that the dredging of San Juan Bay has negatively impacted the prey species. So, I think that is vital information that maybe we wouldn't have captured in larger groups. So maybe to move forward, having smaller groups like this and going around the island is beneficial for these conceptual models.

And also, to think about when we were-- we've brought this up multiple times about spatial analysis for the EBFM. I think this is also another example of maybe yeah, that should be discussed when we start discussing some plans in Puerto Rico and the U.S.V.I.s. So, thank you.

SENNAI HABTES: Thank you. Stacey.

TARSILA SEARA: Is it okay if I just add a little to what Stacey just said?

SENNAI HABTES: Absolutely, Tarsila. It's always appreciated.

TARSILA SEARA: Okay. Yeah. Thank you, Stacey, for adding that. I also just to stress your very last point. Particularly, when we look at some of the social economic indicators or the data that we're using for that, a lot of those make sense at the municipality level for Puerto Rico. And so, yes, I just wanted to stress that we are going to be doing some of those analysis at municipality or, you know, at those sorts of regional levels. And so, it is really important that, you know, I just wanted to stress that, that we have this information that can also be sort of, you know, used at that scale.

SENNAI HABTES: Are there questions either in the room or online? Yeah. Kelly, go ahead.

KELLY MONTENERO: Thank you for that presentation, Tarsila. I just wanted to quickly note that it was really impressive work. I'm excited to know that you guys were able to carry out these workshops and I understand the idea of wanting them in person. I also wanted to note that, you know, it's encouraging to continue to see the good overlap with these various efforts going on in the region as far as identified drivers and indicators between

these conceptual models. The SSC and the DAP one, ESR and J.J.'s work. I think that's, you know, encouraging to see continuity and agreement in some of these indicators that are identified between projects. So that's encouraging. Thank you.

SENNAI HABTES: Tarsila, did you want to add anything to that?

TARSILA SEARA: No, I mean, I agree. I think that is a great point.

SENNAI HABTES: Okay, then I'll open it up to Graciela. She has a comment or a question.

GRACIELA GARCÍA-MOLINER: So, this is just a comment. So, one of the things that we're seeing is that the Council has the District Advisory Panels. So, they're not necessarily congenerous in the cohort, I mean, because they're not from the same background or industry, etcetera. So, it's going to be very interesting to look at the DAP's conceptual models and the specific cohorts that you're looking at in terms of the businesses and the recreational fishers, etcetera, to see how much in common the District Advisory Panel represents all of their constituents or stakeholders.

So, I just had to mention that because since we might be pushing the DAPs and the SSC for another-- and the same thing with the SSC. You know, they come from different backgrounds, from different expertise, but it's going to be very interesting when we all come up with basically the same concerns in terms of what's impacting, what's driving the changes in the ecosystem, what are the consequences of those changes.

So, I just had to mention that because, you know, looking at the specifics and then at the larger group, it's going to be interesting. Thanks. Thank you Tarsila.

TARSILA SEARA: Yes, I agree, Graciela. That is a big reason why we really wanted to do these-- especially the fisher workshops --in person, so we could get those perspectives and it will help us to do some of those comparisons.

SENNAI HABTES: Excellent. Well, thank you, Tarsila, very much for the presentation. I have one comment that I'll just put at the end here. I think with those distinctions that Graciela was just mentioning, this process does highlight a really interesting approach in that you will see what different parts of the community attribute to driving changes. And then, based on the indicators that we're able to gather through ecosystem

analysis, you will have a quantitative way to assess which drivers are actually leading to specific changes in the resources that are indicated by these groups. I think. So not only does it provide a pathway for creating decision making protocols at the Council level, but also outreach and education goals that we can follow for addressing misconceptions regarding data analysis and available information on the ecosystems within the territory.

And so, I would recommend that that's an area that we focus on as well as we go through our process for melding conceptual models and creating like decision pathways. We also think about areas that we need to highlight and understanding drivers and effects and processes within the systems and highlight that as well.

So again, thank you, Tarsila, for a great presentation. I think what we'll do now is move on to Tauna. So, Tauna, if you're ready, I'm going to have Christina put up your presentation and we can move right into that.

Risk Assessment and Ecosystem Indicators

TAUNA RANKIN: Yep, I'm ready. Great, thanks.

So, I'm going to talk a little bit about ecological risk assessment. This was an idea that came up before the EBFM TAP was even in existence, while I was doing a detail in SERO in the fall of 2018. I should have listed all the folks that contributed to the work to date but there were a great number of you that are in this meeting today. TAP members, members of the SSC, folks in SERO, etcetera. So please feel free to add anything that I'm glossing over.

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So, I'm just going to give a real quick review of the Lenfest process for FEP, and how ecological risk assessment fits into that. Then, I'll summarize what the work has been to date on an ecological risk assessment for the U.S. Caribbean, and how --ERA is how I'm going to refer to it moving forward --fits in with other projects that we've been talking about over the last two days. And then I have a proposal for how to move forward to complete and use an ERA.

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So, here's the structure that we've been looking at all week.

Ecological risk assessment is in the second part of the process where we look at where we're going.

Next slide.

Here's a little more detail on the individual steps. We've talked a lot about the conceptual models, which guide in our planning by identifying ecological, economic and social endpoints of concern. Also, developing indicators that capture status and trends of important components. Listing the threats. We haven't done this, I think in an explicit way, but it's certainly come up through the discussion of the conceptual models and indicators. Developing a vision statement, which I think we have through the draft of goal and subgoals of the FEP. And then, the last two, strategic objectives and risk assessment haven't really been done, though there's been initial discussions. Strategic objectives translate that vision statement into action and are focused on particular domains. And the risk assessment, per the Lenfest blueprint, analyzes the risk to meeting those strategic objectives.

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Here's additional benefits of ERAs as they relate to the Lenfest framework. For one, it's a very flexible and transparent process, yet provides a standardized framework to work in. The first step is usually qualitative and a triage step, so you don't have to have a ton of data in hand to carry it out. It also forces you to think through all the threats so you can complete step three at the same time. It can help inform what to include in the conceptual model. On the other end, it can also help sort of validate and refine what's in the conceptual model. It also can help with refining strategic objectives as Lenfest proposed or also developing them if you use it to sort of prioritize the issues to draft strategic objectives around. And it captures uncertainty and can inform where data collection effort should be focused.

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So, risk assessment has a lengthy history in the business world, but it's been adopted in fisheries globally. Australia was really the first country to use ecological risk assessment for all their fisheries. As I mentioned yesterday, and Kelly also mentioned this morning, the Mid-Atlantic Council used an ecological risk assessment to identify focal species and issues to invest more energy into quantitative analyses to evaluate management efficacy and potential new manage actions.

Holsman et al. 2017 is a nice compilation of different ecological risk assessments. You get an appreciation for the fact that risk assessment come in a lot of forms and different names and different levels of sophistication.

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So, this is the general process that the Australians follow via Hobday et al. 2007. Back in the fall of 2018, I brought to the informal EBFM working group that pre-seed the TAP the idea of completing the first few of scoping and risk assessment level one, which is a qualitative assessment.

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This level one risk assessment is called Scale, Intensity and Consequence analysis. It's used to screen out risk elements that are judged to have low impact and where risks are uncertain. Then, the highest level of risk is selected. That's because in additional analyses you would use more quantitative approaches to try to understand that uncertainty.

The general approach is examining what is the risk, which considers intensity and consequence of not achieving a management objective for a particular unit of analysis due to a specific risk element. And an example is, what is the risk of not maintaining structure and function of EFH in Puerto Rico's mangrove community due to shoreline alteration?

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So, breaking down the elements of that. First, is the unit of analyses. That's the component of the ecosystem that you want to evaluate risk against. The group that I was working with back in 2018, we settled on evaluating most of the risk elements against biological communities by habitat.

Looking at these five different habitats. The rationale behind that was, one, this gave a spatial element to the analyses, but also there was recognition that the interactions between these habitats and risk elements likely vary. But there's many different levels you can evaluate risk against, including at the regional level or the whole ecosystem level, by the island platforms and by the individual stocks. One additional consideration that came to mind during the conversations this morning is that we may want to look at a unit of analysis where the level of management objectives and management actions would

operate in order to get the clearest understanding of the risk.

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So, management objectives. It's important to identify objectives that managers, fishing industry and other stakeholders can agree on, but also that scientists can quantify and assess. So, they need to have an unambiguous operational definition, be accessible to prediction and measurement, and the quantities they relate to are exposed to the risk elements. At the time, there were no draft FEP goals or objectives. So, we derived some management objectives from Magnuson-Stevens and came to use achieving optimum yield for managed species; maintaining structure and function of essential fish habitat; and maintaining fishery resilience in terms of diversity, stability, employment/revenue.

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So, the risk elements are aspects that may threaten achieving a desired management objective. These can and are often human activities, but they can also be natural processes such as climatic, oceanographic, biological. And they can be within the management control of the Council but are also likely outside.

The group generated, I think to start with, over 80 different risk elements across seven categories and then tried to narrow those down a bit and landed still with 66 risk elements, which probably isn't very surprising given the complexity of all the conceptual models we've seen over the past two days. Those seven categories of elements fell into climate and oceanographic forces, ecological interactions, fishing activities, other in water activities, land-based activities, conservation and management actions and socioeconomic drivers.

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So, this is just part of one sample scoring sheet. It would go all the way down to row 66. This is showing Puerto Rico mangrove community. You can imagine once you multiply the 66 risk elements, by five different communities, by three different island platforms, it can get quite overwhelming. A table similar to this, was presented to the SSC in the spring of 2019 in hopes of the SSC providing their expert opinion and working through this qualitative risk assessment. The result was that they did a little bit of refinement and then had a subgroup kind of give some more thought to this and then decided that a better first step would be to develop their own conceptual model, which is

the first step of the process.

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So that kind of puts us back to today. I've been sort of sitting in the wings waiting for the development of these conceptual models to complete and some of these other projects and waiting to see how they can possibly contribute to an ecological risk assessment. These are some of the linkages and probably not all of them.

The conceptual models can definitely help with identifying risk elements and even maybe appropriate unit of analysis. The ecosystem status report is producing candidate indicators that could be used in the risk assessment. Also, the Lenfest quantitative analyses could point to which indicators are actually most informative since they will be looking at the influence of the driver elements on receiver elements. The draft FEP, we have developed draft goal and subgoals. I know one of the next steps is to develop strategic objectives that risk could be assessed against.

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So given all this information, this is a strawman proposal for the TAP to consider. I think it would be beneficial to form a steering committee, if there's a decision to move forward with an ecological risk assessment, that can guide its implementation. I think the results of the conceptual models, multivariate analysis and ecosystem status report will help inform restructuring of the risk assessment. The components of the individual and final stacked conceptual model would become the risk elements and the risk assessment. And to the extent that that information has been captured on sort of the strength of those interactions, that could be a metric to evaluate a relative level of risk.

But where possible it would be ideal to use quantitative indicators from the ESR and Lenfest project because that will allow us to more easily update the risk assessment to monitor how it's changing. The agreement among the models where we don't have quantitative information will be extremely helpful as a measure of uncertainty.

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So, given that the FEP, we don't have draft strategic objectives yet, but we do have a draft goal and subgoals. I pulled out a

few elements of the subgoals that risk could be evaluated against that came straight from the subgoals, increased community, human community resilience, promote ecosystem resilience, prevent overfishing and or ecosystem overfishing, and achieve optimum yield.

I think these could be used in the risk assessment and then use the results to identify what areas to focus effort on drafting specific strategic objectives. So, this is a little bit out of order from the Lenfest blueprint, but it could help narrow things down for the TAP and make drafting strategic objectives a little less broad and daunting.

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So here are some discussion questions I have for the TAP. I'm interested in your reactions to this proposal. Do you agree that the ecological risk assessment should be done, and if so, should it be used to inform the development of strategic objectives? I'm also interested in if this would fit well into the development of the FEP given your target date of, I think, the end of 2023 to have the whole draft done. And are any of you willing to devote time on a steering committee if that's decided to be the best approach? And then, what are other things, other connections or considerations that I'm missing?

And that's it. So, I'm ready for questions, your questions or answers to any of these.

Questions

SENNAI HABTES: Thank you, Tauna. I think we'll start with questions from the audience to clarify things in the presentation, and then we can circle back to those questions and have that as a discussion between now and 12:30 when we break. So, I'll open up the floor first to question. Graciela?

GRACIELA GARCÍA-MOLINER: Hola, Tauna. So, you brought this up, so I need to ask you. We were talking about risk assessment, and you mentioned the management action. For the Council specifically, that's the exclusive economic zone. So, it's, you know, far away from shore, far away from where many of the activities actually take place. So, I was looking for the definition of essential fish habitat, which is really what ties the whole ecosystem together, because it's what-- the definition says that it's the substrates and waters needed by fish to spawn, breed, feed and grow to maturity. So therefore, we might not have all of the life history stages in the EEZ, but we do

have the actual fishery of the adults in the EEZ.

So, you know, when you talk about management action, it kind of goes around because we need everything that has to do with the EEZ, but we actually also need everything that is close to shore. So, in terms of Council management actions, we are limited by that definition of what our jurisdiction is. I don't know exactly if that takes an extra step in the risk assessment that I don't see in what we've done so far. So, you know, it breaks it into juveniles and adults. What happened?

TAUNA RANKIN: Sorry, that was my calendar reminder.

GRACIELA GARCÍA-MOLINER: Okay. So, time's up. So anyhow, so management actions. Do we need one additional step, in terms of the risk assessment, to really deal with the management actions that are needed by the Council?

TAUNA RANKIN: Yeah. Thank you. That's a really great point. I need to give this a little more thought, but I will say when I mentioned management action, I probably wasn't limiting that to Council management actions. For instance, you brought up EFH and a lot of the management that's done to protect EFH is done in the nearshore through EFH consultation. So even though the Council doesn't take that action, it's very relevant. And there's others that even other agencies oversee. The Council action could be something like Marcos was suggesting yesterday of crafting a letter raising concerns to the relevant agencies about the impacts of their activities or resources that are their oversight that are dependent upon by fishery or federal fisheries.

So, that's just my initial thought, but I do want to give this a little more thought because I think this is-- something that's come up a couple times during this meeting is about the scale at which our analysis should be done and how that's going to inform management. I think that's going to be key for the risk assessment. So, sorry, I don't have a good answer yet.

GRACIELA GARCÍA-MOLINER: So, to follow up. The outline that we have right now includes, actually, one section on jurisdictions. I think we should, you know-- and actually it includes scales at some point. But jurisdictions are also coming to play here because, you know, really, it's a cascading effect as it impacts the EEZ. So, you know, I think that we should really put this in the front burner rather than the back burner, because that would--

You know, the local governments are represented in the Council. They are Council members that actually vote. Then, how do you turn that into being, you know, everything from the shore and from the top of the mountain to the deep ocean. I think that we're circling back to outreach and education, you know, the strengths of the stakeholders pushing for the real action by governments, be it the federal or the state. So, I think that that's how, you know, the jurisdiction section of that of the FEP can be extremely important, even if dry.

TAUNA RANKIN: Yep. Very fair points.

SENNAI HABTES: Thanks, Graciela. Tarsila, I see that you have your hand up? Did you want to go ahead?

TARSILA SEARA: Yes. Tauna, thank you for the presentation. My question has to do with the steering committee. What are your expectations as far as the work that this committee-- could you talk a little bit more about that, what you would expect the work to be?

TAUNA RANKIN: Sure. I haven't thoroughly thought it through, to be honest. Some of the things that came to mind when I was thinking about this was, first of all, settling on an approach. Like I mentioned, there's a lot of different approaches to risk assessment, so having that group agree on what makes the most sense, given the information that we have available. And then, to the extent that it's needed indicator identification and setting thresholds for those indicators, that's, I think, a key step in what level do we consider low, versus medium, versus high risk, for instance?

I should be clear. This is not like a funded project per se. This is something that I've been doing in my spare time, and as long as I'm in my current position, I expect to be able to devote time to it. So, I would lead the development, coordination, implementation of it. And if there was a need for additional resources, I would definitely be willing to seek those out. But my hope is that given all the work being done by these other projects, that it wouldn't be an extremely heavy lift by the steering committee.

TARSILA SEARA: Thank you.

SENNAI HABTES: Any other questions? Okay. I had a follow up to that one, Tauna, I think. So, one thing we could discuss going forward is, I think it's unlikely we can get another steering committee or working group formed by the Council, but the EBFM

TAP itself would represent that steering group. So, we can create working groups within the EBFM TAP composed of existing EBFM TAP members and have invited persons from the outside that work with us on that. So, I think that would be the best way to go and we can create a working group within the EBFM TAP, this afternoon, that will focus on this process. If we decide as an EBFM TAP, this is the direction we want to go forward with.

And then, correct me if I'm wrong, Graciela, Tauna is not an EBFM TAP member, right?

GRACIELA GARCÍA-MOLINER: Right.

SENNAI HABTES: But could we propose making her one or are we capped at the size? It's an eight-member TAP.

GRACIELA GARCÍA-MOLINER: I mean, I would suggest bringing it up to the Council. I mean, I don't think Miguel is online anymore because he's working on the 178 agenda, but I can find out for you and let you know.

SENNAI HABTES: Yeah. Orian?

ORIAN TZADIK: Orian Tzadik, for the record. I think the idea behind that originally was that no NOAA members were actually on the TAP other than Bill and Kevin. But the idea was that they are, you know, Sarah and Maria in particular, they were, and you know, CFMC staff, they're all very much encouraged to participate in the activities and everything and so it they'd said that it wasn't necessary to have them on the TAP officially, but they could definitely contribute to the process.

So not even sure we need to go that route. If, you know, I think where you're going here is that Tauna could lead that steering committee. I think that's perfectly fine.

SENNAI HABTES: Okay. Thank you. Sennai Habtes, for the record. Thank you, Graciela and Orian for the clarification. So, let's add that as a discussion point when we get to that part of the outline that we need to kind of focus on.

I also want to bring up the question of jurisdictions that Graciela brought up and we can kind of, that could start a discussion if we wanted to, as we move into these questions that Tauna brought up.

I think it's feasible for us to easily specify how these distinctions need to be made in the decision-making process that

we are designing associated with the EBFM information. For instance, we need to prioritize, like, areas and jurisdictions that have to make distinctions based on the ecosystem indicators that we're using. And within that you will have local or territorial decision-making organizations and you'll have the Council decision making process. Despite the fact that, you know, we're doing this under the Council, that doesn't mean we cannot make guidance and recommendations for the territorial governments based on the information that we're creating into the FEPs.

So, I think that is an important aspect of, you know, whatever process we decide to put into it. I like the idea of doing the ERA for, you know, merging all of these things and creating that process for discussion or for the management decision making process. But we should come to that decision as a TAP. So, I'll open it back up to you, Tauna, if you wanted to take us through these discussion questions or add onto to any of the points I just brought up.

TAUNA RANKIN: Okay. Yeah, thanks. I don't really have anything to add on what you said but I'm probably most interested, you know, if there's general support in doing ERA and if so, when does it make the most sense to carry it out? I think it would benefit greatly from the completion of the ESR and the Lenfest project. But will that happen in sufficient time to inform strategic objectives or does the TAP need to move forward with drafting those now? Yeah, let's start with those questions.

SENNAI HABTES: Okay. Thank you, Tauna. Sennai Habtes, for the record. Why don't we go through each of those. I'll open it up to Orian for a comment, and then, Orian, maybe you can just go around the different groups to ask deadlines for each of those components.

ORIAN TZADIK: Just to kind of answer the question, I definitely think that a risk assessment would help guide us to develop the strategic objectives if we're relying on these products of the ecosystem indicators as derived from the conceptual model and the quantitative data. So, if we're doing that whole process and getting these indicators and identifying what we think are important aspects of the fishery and the ecosystem to then just go at it non systematically and say, "Well, let's develop our strategic objectives" completely apart from that, doesn't make sense to me. I think that if we have a method, as Tauna outlined, to combine all of the things we've been doing already to inform how we could create these objectives, I think that that makes a lot of sense.

As far as the timing, I still think that it would help, it would just streamline the whole process to do it in that way. And so, I would advocate to do it in that in that way. I think the question was, when do we expect products from-- we have indicators from the ecosystem status report. Maybe J.J. could speak to what timeline you guys are looking at for the Lenfest project.

JUAN J. CRUZ MOTTA: December.

ORIAN TZADIK: December before there's indicators.

JUAN J. CRUZ MOTTA: December 2022.

ORIAN TZADIK: To get the indicators?

JUAN J. CRUZ MOTTA: Yeah, the quantitative ones and the qualitative one. Both. Very likely the quantitative ones will be ready before that, but it's based on how the workshops are progressing. We believe that we will be done by the end of the year. Is that right, Stacy? what? When?

STACEY WILLIAMS: Hi, this is Stacey. Yeah, as Tarsila mentioned, I think our goal is to finish the rest of the workshops by June. So, we should have enough time, I hope, to compile them. That gives us six months to meld and figure out the indicators.

ORIAN TZADIK: So, I think, that we then need to decide-- I think, this is discussion for this afternoon. I don't know that the timing right now makes sense to try and hammer that out. But, you know, whether we think that that puts us on our timeline or not.

SENNAI HABTES: Yeah. I just want to get all dates. So, we've got from Lenfest for the conceptual model, a deadline of December 2022 for compiled conceptual models and indicators from the ecosystem analysis. And then Kelly, what kind of deadline are you guys looking at for a compiled written ESR report?

KELLY MONTENERO: Kelly Montenero, NOAA affiliate Southeast Fisheries Science Center. We do have our compiled indicators, however, like I said, we're still going through the last vetting and analysis of data sources to be sure that we're using the right data. However, for the actual risk related indicators, we could get that indicator suite to you by August at the latest, but most likely very much earlier. I just want to make sure that

I leave enough time for the NMFS approval process. And Mandy, if you're still online, feel free to jump in in and correct me if I'm wrong. It'll likely be earlier than that since we do have the risk related ones that I shared with you today. Thank you.

SENNAI HABTES: Okay, let's put down August '22 for that so we can have it as a late deadline. And now, Stacey?

STACEY WILLIAMS: Hi, this is Stacey. Is it possible to extend the deadline to the Council? I know we said 2023, but given all the issues between COVID and that, I mean, can we extend this, so we have enough time to compile the indicators and do all the risk assessments and have a complete, I guess, data set to then develop a plan? I don't know if that's a possibility.

SENNAI HABTES: I have no idea. So, I'm going to push that to Graciela. I'm sure we can always-- I can submit revised timelines when I present to the Council and ask them to vote on improving an extended change to the timeline. But they did not, from what I remember, put a-- we put the deadline, I believe of December 2023. They did not. There is a timeline associated with creating an FEP that is in line with NOAA's needs for an EBFM implementation as well as the Council's needs for EBFM implementation. But I don't believe that was set at December 2023. Correct me if I'm wrong, Graciela.

GRACIELA GARCÍA-MOLINER: So, the thing is that, I mean, I would also recommend to the Council that they extent the deadline. The reason for that is because this happened in 2018-2019. This is all prior to everything that happened in the last two years. So, everything that we've done has gotten pushed back between six months to a year and a half. So, I would not think, in terms of a whole year, but, you know, mid 2024 would be--

Then the other thing would be how the groups would work in terms of pushing forward all the other parts. So, we can have-- the jurisdictional thing could be done. You know, that's writing it up and getting all the information from papers. The next section can be done this way. But the meat of the FEP, you know, to look at all of these connections to make the pathway of the decision making, that's going to take a little bit of time.

So, I much rather see it well done than pushed against the deadline. I don't think it should be a problem. I mean, because your appointments would be, you know, then it would be reappointed to complete the work. That would be, you know, my recommendation to the Council.

SENNAI HABTES: Which I believe we're doing on an annual basis now. Who did? Oh, Miguel.

MIGUEL A. ROLÓN: Yeah, if I may. I was going to say the same thing that Graciela said. Those deadlines where the [inaudible] that the Council put together. Remember, the fishery, the ecosystem plan is not really a plan, but a source document. The TAP actually was created just to work on the models, and you should not deviate from that. But, at the next meeting in April, Sennai and Graciela can present the timeline for the Council and the recommendation. I agree with a hundred percent, with Graciela.

We should not focus on the deadline because of what happened with COVID and all that. Let's concentrate on having the best possible for the Council. I'm sure that they will understand. We have the Chairman here with us today, so it will be no problem. Just to make sure. In the report to the Council, next April, just to make sure that if we add whatever dates we add, we have a rationale for it. So, we have to develop that and put it into the record.

But I think that that the Council will understand. And if we provide a rationale for the record, there will be no problem.

SENNAI HABTES: Apologies. I was just taking some notes. Okay. So, thank you Miguel for that clarification. At present I have a deadline of about December '22 for the conceptual models and ecosystem indicators from Lenfest. August 2022 for the ecosystem status report from Kelly's group. What else am I missing that we would have need to go into the ERA that we haven't identified for clear headlines

TAUNA RANKIN: Since the Lenfest project is compiling all of the conceptual models? I can't think of anything else. You know, assuming that the SSCs and the DAPs and all the different stakeholder groups models will be pulled together through that project. Those are the only other key products I can think of at this time. There may be other data out there that could make useful indicators, but I would research that after getting the full list of elements from the conceptual models.

SENNAI HABTES: Okay. I mean, I think we do have some ideas now and dates for which we can look at changing our timeline going forward and identifying whether we can use the ERA or risk assessment process to inform our development of the strategic objectives. I think we should hold off on that discussion till this afternoon when we are either developing strategic

objectives or identifying members to work within a working group to define and identify our strategic objectives.

I think at that time we can also look at developing a working group specifically for risk assessment or amongst ourselves, vote and decide if we're going to go that direction or we're going to use another direction for developing the objectives.

So, at this point, I think I'll just see if there are more questions. I see Orian has his hand up. So, go ahead Orian.

ORIAN TZADIK: Yeah. Orian Tzadik, for the record. I would just offer that I think maybe we just put whether or not we alter the timeline a little bit on the back burner and just let's focus on the products and focus what we're going to create and, you know, everything else within it, but that we're all then open to kind of push the timeline if need be. Maybe that's a discussion that concludes this afternoon, but also maybe it's not and I think that's okay.

SENNAI HABTES: I think those are-- we do need to make decisions on that because whether we choose risk assessment or we choose another process is dependent upon, are we going to get these things done in time to meet other goals? And so that is dependent upon the timeline that we set, right? So, if we're going to stick with December 2023, it won't be possible to include risk assessment into the process along with the strategic objectives that we're using from Lenfest and the ESR report.

So, I mean, I think we need to, like, those are things we want to, at least I want to know before we go up in front of the Council. Which I'm not sure if I'm going to actually--

ORIAN TZADIK: Yeah. No, that makes a lot of sense. And I think we kind of said the same thing from different angles. But I'd like to attack this issue first and then address whether we need to address the timeline. You see what I'm saying? But yeah.

SENNAI HABTES: Now I do.

ORIAN TZADIK: Yeah.

SENNAI HABTES: I thought you were saying something else. So, why don't we do this. Why don't we start with this after lunch because it's 12:25, so we can wrap up with any last questions and we'll take the break and then come back and start.

I need to look at our agenda and see what other things we have prioritized for this afternoon, and we'll update the agenda and decide how we're going to proceed. Did anyone else have comments, questions, or concerns that they wanted to express about this particular topic at this time? Okay. I don't see any.

So, with that, I'm going to say thank you to Tauna for this excellent presentation. It has a lot of food for thought and I think it will allow us to have some really engaging discussions this afternoon. And so, at this time it is 12:26. I am going to say that we're going to be breaking now and we will be returning at-- somebody put up the agenda for me. Was it 1:15? Is that what we have on the agenda.

LIAJAY RIVERA GARCÍA: 1:30.

SENNAI HABTES: 1:30. Okay. So, we'll be returning at 1:30. As a reminder, all of us in the room, I believe there's-- is there lunch, Graciela?

GRACIELA GARCÍA-MOLINER: Lunch is where you had lunch yesterday, and it's ready.

SENNAI HABTES: For those of you on zoom, please enjoy the break. Take some time to refresh and come back ready to engage in discussion and questions and answers in the afternoon.

So, thank you everyone for participating this morning and all of your attendance.

(Whereupon, the meeting recessed for lunch on March 17, 2022.)

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MARCH 17, 2022

THURSDAY AFTERNOON SESSION

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SENNAI HABTES: Let's wind down the side conversations and get to the afternoon sessions. Everybody good with that.

Okay. Good afternoon, everybody. It is 1:35. Welcome back to the afternoon session for the Caribbean Fisheries Management Council Ecosystems Based Fisheries Management Technical Advisory Panel two-day meeting. It is March 17th, 2022. As I said, it's about 1:36PM. We're going to go ahead and get started.

I've created an updated agenda on the fly here that has the information that we're going to try and get through this afternoon. The majority of them, as you can see, are discussions where we need to come up with clear identi-- Sorry about that --where we need to come up with clear identifiable plans or at least identify personnel within the EBFM and CFMC and NOAA partner that going to help us develop these things.

So that's what we're going to try and get through this afternoon. But first we're going to have Liajay Rivera, who we inadvertently skipped over her presentation this morning, but I think it's a really good example of the things that we're going to need to consider as we make these plans going forward.

So, she's going to present to us about the models that came out of the SSC and the DAPs, and a little bit of the information that came from that. And some things that we need to think about when we're looking at melding the conceptual models. So, with that, I'm going to turn it over to Liajay, and I'm going to stop sharing my screen and then you guys can switch on yours.

**Scientific and Statistical Committee (SSC)-District Advisory
Panels (DAPs) Models**

LIAJAY RIVERA GARCÍA: Okay. Thank you, Mr. Chair. Allow me a second to share my screen.

Okay. All right. Again, thank you Mr. Chair and good evening. Em, good afternoon. [laughter] Good afternoon, feels like evening.

Good afternoon, everyone. For folks who don't know me, my name is Liajay Rivera García working as CFMC staff. Also, I am technical assistant for this group, EBFM TAP, and also for the Fisheries Management Plans of the Council. I had the opportunity to join in the year 2020 to assist in the development of the ecosystem conceptual models for the District Advisory Panels and the Scientific Statistical Committee, which we'll be covering in this presentation.

So, yesterday Michelle gave us a great presentation, which briefed the conceptual models developed with stakeholders across the islands. And just today we saw from Lenfest that conceptual models created with fishermen communities across the islands. I mean especially sorry for Puerto Rico. Since the background and purpose was already covered, I'll just go over it very quickly and just focus on the methods and results of the conceptual models since more steps were involved and there were differences

in the steps taken between groups.

As mentioned by Michelle and Tarsila, the development of all these ecosystem conceptual models is part of a larger coordination project following the FEP best practices. And so, these are part of the co-creation of a more general conceptual model, as J.J. presented earlier. In this presentation, we are bringing all the scientists' knowledge and the coastal marine expertise into this different designs of conceptual models. For that, the Council reached the SSC and the DAPs and requested their contribution to develop a conceptual model for each island. That was in 2018.

The CFMC held meetings for the DAPs and the SSC in person. However, as we all know, due to COVID, most of this of this development was discussed through virtual meetings until its finalization in 2021.

So, for the DAPs first meeting, the DAP went into the different breakout sessions, and that was one session for DAP Island district. So, each DAP had their opportunity to start creating their own conceptual model. So, each breakout session started with the identification of a full suite of system components, and that was things that most influence target species, things they worry about for the future, and things they would like to preserve and or change.

The DAP participants will write them down in a provided color sticky note as you can see on that image in the upper right. The facilitator then gathered and placed them on the wall. Once these components were passed to a mental modeler software in the computer, the DAP started to make the connections between the components. The following virtual meetings allow the DAP to go over the connections more than once in different meetings during the year to add, eliminate or review connections as well as to provide direction and magnitude for all these mentioned connections. The components were briefly described and transcribed into glossary of components by each group or within notes made during the meetings.

As for the SSC, they began the conceptual model by providing eight main principal components, which from now on we'll call sub models. That will be that pink box that you can see on the corner of that image. That's the sub model. And then that was considered to represent the fisheries and marine ecosystem. Each principal sub model was then expanded by listing and defining all possible subcomponents related to each sub model, which will be those gray boxes all connected with each other. The creation

of subcomponents allowed a wider representation of each topic within the fishery's marine ecosystem. Sorry, I repeated myself there. Once all components and subcomponents were listed in the SSC, the SSC members convened through several meetings to establish, define and discuss connections within and between each sub model. The connections between sub models were called interconnections.

Each SSC member was assigned a sub model to make connections, score them, and bring them up for discussion at the meeting. These connections were discussed and scored unanimously. Once done with the intra connection, the SSC proceeded to do their interconnections. For that the SSC filled members filled out a table to establish up to three connections between one sub model to another. And all scores were determined by the average of each connection.

So, after each meeting, that is from the DPA or SSC, the rationales or descriptions were updated using as reference available recordings. That was from GoToMeeting or Zoom, or even the ones uploaded to YouTube from the DAPs and notes taken during the meeting. All score connections were reviewed and organizing to individual spreadsheets similar to the table down below for easier visualization.

And please mind that not all the groups had the same format of table. Some DAPs, for example, filled out individual sheets and others decided to do scores unanimously since the beginning. These tables not were not the only product done besides the conceptual model. There was also organized and corrected in this individual spreadsheet per group which allowed filtering results and further analysis.

So, in the end we ended up with a total of 12 ecosystem conceptual model. That was tree from the DAPs, one per District Island, and eight conceptual models from each sub model. That is the intra connections. And one big conceptual model which was the interconnections.

So here we have some preliminary results. The first one from Saint Croix. You can see here what will be five components identified as the most influential drivers based on the highest scores and the amount of connections established with affected components. The drivers and the affected components have the same meaning as the other groups have been explaining in their workshops. So, I won't need to go over that.

In this case, for Saint Croix we have the most influential

drivers are the need for education, hurricanes, sargassum blooms, climate effect, and discharge nonpoint. For Saint Thomas/Saint John we had the most influential drivers as sargassum, lithium-ion batteries, education and outreach, large vessel impacts and ballast water. And last, we have Puerto Rico which had the most influential drivers were marine habitats, effective management, pollution, sargassum, current intensity, hurricanes, aggregations, compliance with law, coral reefs, and illegal fishing.

So, these are just some preliminary easy analyses that we just could get out of the scores that we made for the DAPs. But we hope that with all the information we have, we can stack them together with the other groups that have already made their conceptual models. So, with that, I just leave you with questions and well, some of you may have seen the public painting that they have presented in some of the SSC meetings. So, I share this painting of my perspective with that.

With that, I conclude my presentation, and thank you very much. Happy to answer any question you have.

Questions

SENNAI HABTES: Thank you, Liajay. Let's open up the floor to questions. Do we have any in the room? Just as a reminder, since we're getting started again, if you do have questions, please raise your hand on the chat or in the room. I will identify you. And at that point, you can unmute yourself to go ahead and ask. So, with that said, any questions? Graciela, you're recognized.

GRACIELA GARCÍA-MOLINER: Thank you. Liajay, the District Advisory Panels are composed of representative from the various aspects of the of the fisheries. Did they give us information on the direction and the strengths of the connections that they were looking at?

LIAJAY RIVERA GARCÍA: Yes, they provided direction, positive and negative, and magnitude. And most of them, they provided rationale during the meetings. The ones that were not described with rationale though, just like automatically or indirectly associated with other components. So, yes to that question.

GRACIELA GARCÍA-MOLINER: So, that would be one big difference between the workshops that were held among the cohorts and the way that the District Advisory Panel looked at this issue. I wonder-- and the SSC actually started with the same idea of magnitude and direction but ended up doing absolute values for

the strength of the connection.

So, you know, these are bits and of differences that I don't know how important they'll be in the end. So, that's something that, you know, we need to talk about when we come to that actual comparison of the matrices.

SENNAI HABTES: Thank you, Graciela. J.J., you had a comment?

JUAN J. CRUZ MOTTA: Yeah. thank you. We are thinking to have a measure of strength by using the information provided by the different groups within each one of the stakeholders. So, I haven't thought about-- I mean, now that you mentioned it, it's just now that I remembered. But we will be able to handle that difference. Because what we have now, at the end, we will have a measure of strength as well. But, of course, coming from the opinion of different groups within the same stakeholder, which is slightly different from what happened in this case. Thank you.

SENNAI HABTES: Yep. Go ahead, Graciela.

GRACIELA GARCÍA-MOLINER: So, we do have a glossary of terms of what had been used but I didn't know if, and I don't think I heard it over the discussion, are we keeping track of what people mean for this, that and the other?

JUAN J. CRUZ MOTTA: Yeah. Sorry, somebody was trying to say something.

SENNAI HABTES: I see, Alida, your hand's up. Gimme one second. Let's finish with the comment from J.J. and Liajay. I want to allow her to answer and then I'll come to you. Okay?

JUAN J. CRUZ MOTTA: Yes, we do, Graciela. Actually, one of the last slides from Tarsila was that comparison. And actually, once we finish all the workshops the first task is to do the synonyms across groups within stakeholders and across stakeholders.

SENNAI HABTES: Okay. Alida, you had a comment or question?

ALIDA ORTIZ SOTOMAYOR: Yes, I do have a comment. I am used to working with conceptual models from the pedagogical standpoint. So, we take issues and materials that are very confusing or that they are complicated and with the conceptual model we get out of that initial presentation that I make for the students we take out those things that are most relevant, connected, or totally out of what we were discussing. To me, this idea of conceptual

models from the DAPs, from the SSC, we are talking about the same resource, but we are talking about very different ways of looking at it.

So, to me, the only way would be to get, from all that information and what Lenfest is doing, a conceptual model that some way or another sort of connects all this. Because we cannot look at the fishers, the DAPs as this is something else-- and the SSC, this is something else. They're talking about the same thing. At least I feel. That's my point.

Discussion - Plan Development Plan to Meld Conceptual Models

SENNAI HABTES: Did anyone want to comment? Are there other questions? If not, I can respond to Alida's point and move us on to our next subject. So, Alida, I think you're correct there are similarities amongst the conceptual models and that indicate needs across different sectors. I think the question becomes, what are we going to do to create a plan for how you use that information to inform the design of an ecosystems-based fisheries decision support system for the Council. And there are several options for how we can likely do that. That's part of what we need to spend the rest of the afternoon doing.

And so, with that, I'll say thank you to Liajay for that excellent presentation. And it was a great way to get us started on figuring out the things we need to figure out for the rest of the afternoon. I guess I can share the agenda again if I have it right-- Yes. Okay.

Okay. So, what we need to think about now-- sorry, I'm using two screens. I don't want it to-- Yeah, exactly. I did not want that to happen. One second. There we go.

All right. So, what we need to do is create either, at least a working framework for how we're going to move these things forward. And so there, you know, from now until 5:00 PM there are a number of bullet points that we need to discuss. I don't think we have other presentations, but it's more along the lines of creating frameworks for how we're going to move these things forward.

And so I think from, it is 2:00 PM now or 1:57. What I would like for us to do is spend from 2:00 to 3:00 on identifying either work groups of personnel within the EBFM TAP, along with partners that are going to take on the responsibility of each of these bullet points, meaning melding conceptual models,

ecosystem indicators, risk assessments, strategic objectives, operational objectives and data repository needs, or for us as a EBFM TAP to talk about a process by which we're going to do these things.

After we do that from, from 4:00 to 5:00, we can talk about those other bullet points below, which I think are additional things we need to discuss but are not pressing things that we need to create plans for immediately. So, with that being said, I'll open it up for questions, concerns, or comments from the other TAP members. I see Ori has his hand up, so we'll go to you first.

ORIAN TZADIK: Orian Tzadik, for the record, I think we can just start with some of the easy stuff here. Maybe J.J. could speak to it, but I know that J.J. and Tarsila and Stacey already have a plan in place for bullet one over there. And then, -- well, I was going to say, and then the same group and others have plan for bullet two. We lost the screen but-- so I think we can just start there and kind of tick those boxes really quick and then we can kind of-- So maybe J.J. could speak to that.

SENNAI HABTES: Hold on one second. Before J.J. speaks, can we do something. Sorry, Sennai Habtes, for the record. Before J.J. speaks, Liajay, can either you or Christina have like a, if you take the share and just opened up a blank PowerPoint, we can start putting down the ideas from them into, you know, the record?

Okay. J.J., if you want to go ahead, you can kind of start the preamble, but then when we have like clear bullet points, make sure Liajay is able to capture that on like a note taking PowerPoint. Apologies for the technical interruption, everyone online, we are restarting the projector and once that's up, we can reproject everything to you guys.

JUAN J. CRUZ MOTTA: Okay. Yeah. I'll just reiterate what I already said. We, out of the Lenfest project, we will produce that item number one and partially number two. Why do I say, partially, because we also will get an indicator out of the ESR. But definitely, yeah, count us in in number one and number two,

ORIAN TZADIK: Just to reiterate, J.J., that was then, the plan would be for conceptual models and indicators to be done by December of this year?

JUAN J. CRUZ MOTTA: That's correct.

ORIAN TZADIK: All right.

JUAN J. CRUZ MOTTA: And then you will have-- and we can bring to the TAP meeting the results of the quantitative approach versus the qualitative approach and then make a final decision, here, about the-- Ah, no. Yeah, I'm talking about the ecosystem indicators, right? Because we will have two sets.

SENNAI HABTES: One second. So, let's do this, Liajay, on the next slide you can put the title as the "meld conceptual models". And J.J. let's talk about these as two separate things. All right? So, we'll start with just "meld", or you can just put "conceptual models". I think we all know what we need to do with that.

With that, what I'd like for us to do is the first bullet point, I want it to be people. So, I want us to identify the group of us in the EBFM TAP that are going to be working on this specific thing. So right now, we have the Lenfest, which is J.J., Stacey and Tarsila. And then I would-- Put the names. Yeah. put J.J., Stacey and Tarsila.

And then I would like if we could put Seann and Kelly, if you guys agree to coordinate with J.J. and help out with the-- oh, actually, sorry. That's on the second one. So, we'll hold off on that. We'll leave conceptual models. For this one I think what we should try and do is have Ori and Michelle Duval, because she's written the report, but it would be good to have her there so we can reach out to her. I don't think she's on this afternoon, but I will send her an email to do that.

All right now. Yeah. Graciela.

GRACIELA GARCÍA-MOLINER: So, I would suggest that in all of these groups that you're going to create, let's have Liajay meet with you, I mean, to help out and to make sure that we follow. You know, bring all the process back into the Council. I'm offering her, because she would be really the one putting everything together on our side.

You can also count on me. I'm sure that, you know, the partners from NOAA's Regional Office or the Science Center would also like to be involved.

SENNAI HABTES: So, I see, Kevin, you have your hand raised. You can go ahead.

KEVIN MCCARTHY: Yeah. Thanks. Kevin McCarthy. So, two issues.

Two questions, I guess. One, is I'm going to put my Science Center hat on and say that to get the time of Science Center people, anybody other than me, we're going to have to have a request from the Council to the Science Center. Because we can't task Science Center people. This committee can't do that, but we can request their time. And that's just the proper channel. So that's just sort of to keep in mind as we work our way through this.

And the other thing that I am wondering about is, you know, we've got this list of tasks and we're going to try to sign people or get them to volunteer or however that's going to play out. But do we have the slightest idea of what kind of time commitment we're asking of people. You know, what do we actually see? How do we see these processes moving forward? And maybe we don't know the answer to that and that's fair, but we're asking of people time. We need to have some sort of bounds within which, you know, we're expecting, you know, how much of a commitment we're expecting.

SENNAI HABTES: All right, thanks for that, Kevin. J.J.?

JUAN J. CRUZ MOTTA: Hi, Kevin. Yeah, that's a very good point. The second one you raised. Because as I was looking through the points, I said, "oh, okay, these needs--" I mean, number six or seven, I don't remember, needs a lot of time, but I don't know who will have that time. So, I was thinking about the same.

Briefly, I mean, as I looked through those points you have, I identified three types of tasks. One, like this, that is already paid for. I mean, we are being funded to do this, so that's okay, no problem. The second category is the ones that are relatively easy to tackle. For example, the second point, because it's just a byproduct of this first one. Then, the third one, and perhaps this could be a, I don't know if a recommendation or of a motion. For some of those that needs a lot of time, but we don't have the people or the resources, perhaps request those funds for that task to be done. But I agree with your worry in some of those points. Thank you.

SENNAI HABTES: So, Miguel, I see your hand. I just want to make one comment. So that is what we are trying to discuss here, Kevin. So, each of these, some are already partially done we just haven't had a report out on them. And some of these we haven't started at all.

And so, what we need to do today is identify those things. What do we need to do? How are we going to do them? What type of time

commitment we're working? And for all of these assignments, the only names I'm asking for us to put up are EBFM TAP members. But I think we will have people who are working on current things that, that we can ask to give us, you know, help on data or pointing us in the right direction.

And so, I think we can, when we have the names, we can create another category that would say "requires a request to the Science Center through Kevin to get approval for them to work on it." And so now I'm going to turn it over to Miguel because he's been patient and has had his hand up online.

MIGUEL A. ROLÓN: Thank you. A couple of points along the lines of what J.J. was saying. We need to keep this simple. And at the same time, you cannot do everything at once. So, my suggestion is that you as a group have only the authority to create subcommittees of your own people. So, this one, meld conceptual models, is sort of an advanced. With the three people that you have here, if they have the time, you can do it. And then the staff, we will have Liajay working this with you guys and that can be done rather easy. Involving other people is more difficult.

Then, you need to identify those things that are needed to be done. And you probably will need to sit down, not today, but sometime between here and next meeting and put together sort of a proposal. "Okay, we need to do this. This is a recommendation of the group, and we need to do one, two, and three. For that we need this type of people and this type of money." So, the Council then can identify those needs, justify those needs, and if they're justified or unjustified, then we can ask the Regional Office and Clay Porch for assistance. And then, we can combine the monies that we have to do it.

But today, you need to identify the ones that are low hanging fruits that you can do, that the people around the table can identify with and can volunteer to do it. That could be one of the two that you're talking about, maybe merge them. But melding the conceptual model is probably the key product that we need to present to the Council because we cannot continue working with this model forever. Because every time you talk about the model, somebody else had some other factor or whatever. So, take any consideration of what J.J. is saying and the money they have, this is something that the Council truly will support.

So, my suggestion is that you consider today what are those actions that you can do with your own group and with those committees and then identify other actions that you may need to

broaden the scope. As Kevin said, if we present that to Clay, then they can figure out who can do it and when.

During this year, nothing will happen until the end of September 30th. So, if we need to add more money, it won't come from the federal government. We have been told that as of last week. We probably talking about the period of 2022- '23 federal, which is October 1st-September 30th. Anyway, thank you. That's my two cents worth.

SENNAI HABTES: Thank you, Miguel. I see Sarah has her hand up.

SARAH STEPHENSON: Hi, Sarah Stephenson. I just wanted to let you know that I am available to help from the Southeast Regional Office.

SENNAI HABTES: Excellent, thank you Sarah. I think what would be helpful is, on areas that you feel like you would want to participate with developing the plan development as well as, you know, working with either J.J., Orian or any of the members, Stacey, myself on those plans, just raise your hand and let us know and Liajay will add you onto the list for that plan development. Orian?

ORIAN TZADIK: Orian Tzadik for the record. Just really quickly, with regards to what Kevin and Miguel just both said. I think maybe we just start with the melded model ecosystem indicators and risk assessment and once-- because I think those are the low hanging fruit that Miguel just talked about, that we have the capacity currently and the funding and the people time to at least make a plan of what we're going to do with those things. And once we get there, then I think that'll be really instrumental in how we discuss the rest of the products.

SENNAI HABTES: Everyone on the TAP okay with that?

JUAN J. CRUZ MOTTA: Second. It was not a motion, but I agree.
[laughter]

SENNAI HABTES: Okay. I want to add, I do think that we need to go back and look at the outline for the plan. I think that is another one that we should probably look at and define today. I think we need to make a decision on risk assessment today as well. So, I would say if we do the plan to meld conceptual models, identify the ecosystem indicators, at least put a group and a plan in place for whether we want to decide on risk assessment or not, and then go through the FEP outline, refine it a little bit, it doesn't have to be definite, but we can just

at least work on that a little today. I think that would be fine. Is everyone okay with those four?

ORIAN TZADIK: I think it's a really good way to start and let's see where it takes us.

SENNAI HABTES: All right.

ORIAN TZADIK: Yeah.

SENNAI HABTES: Sounds good. All right. So J.J., if you want to discuss what the plan is for the meld conceptual model. And then Liajay, if you could just jot down as bullet point some of the important things. So J.J., why don't you start with a deadline with a date.

JUAN J. CRUZ MOTTA: December of 2022.

SENNAI HABTES: Maybe, J.J., if you could also discuss the process that we're going through, so we have objectives associated with the melding of the conceptual model.

JUAN J. CRUZ MOTTA: Okay. Let's say it like-- I'm going to phrase it so it's in that slide. So, the first step is to build melded conceptual models for each stakeholder. We have seven or six groups of stakeholders.

LIAJAY RIVERA GARCÍA: Seven?

JUAN J. CRUZ MOTTA: Six or seven, let's say. Stacey, go ahead please.

STACEY WILLIAMS: Really quick. I don't know how detail we want to get. Oh, sorry. This is Stacey to for the record. But before that, do we want to add that we are going to come up with a list of components that will carry across the different, before we do any type of melding like this in what you were mentioning before.

JUAN J. CRUZ MOTTA: Yeah, you're totally right. That's the first step. Sorry.

STACEY WILLIAMS: So, like trans-- So coming up with common terms between the different models before melding. I don't know if there's another way we want to state this.

SENNAI HABTES: Tarsila, you had your hand up. Did you want to add something to this? I saw that you put it down, but I want to

make sure if you had something--

TARSILA SEARA: I was going to make the same point that Stacey just made about the terminology.

SENNAI HABTES: Seann?

SEANN REGAN: Thanks. Seann Regan, NCCOS, for the record. Just really quick on the common terms, I don't know if you want to term it crosswalk file or something, but having that also-- not only the, the common terms, but the intermediary step for anyone who wants to go back to it. I know we've done that in the past. Thanks.

JUAN J. CRUZ MOTTA: Perhaps you put a period and then say, "including intermediate steps." Or something like that. You had a name for it.

SEANN REGAN: The crosswalk.

JUAN J. CRUZ MOTTA: Ah, the crosswalk. Yeah. "Including crosswalk." Okay. The third step is to validate number two with the stakeholders. Number four, compare across stakeholders. Oh, groups of stakeholders, yeah. So, and then 4a, meld if similarity is high-- we haven't defined what high or low is yet. And b, test different models with quantitative data if similarity is low. Same, we haven't defined what is high or low. But quantitative data is-- sorry, with quantitative models? No, no. Test different models with data. Yeah, with data.

SENNAI HABTES: J.J., before you go on to the next one, I'm going to interrupt you there because I want to discuss how are we going to get to a point where we define that process? Right. Identifying similarity is high or low, as well as the process by which we'll meld and decide on the process by which we're not.

JUAN J. CRUZ MOTTA: Okay. But that's a-- we have the quantitative tools to do that. You want me to go on the presentation here on the method?

SENNAI HABTES: No, I don't think it's necessary. I think if you just-- if we can check that off. It's already defined based on Lenfest as to the process by which you're going to do that. Correct? We've already identified that?

JUAN J. CRUZ MOTTA: Yep. Yep.

SENNAI HABTES: Okay. So, let's just put that on there. So, I

know, and I don't keep worrying about the fact that we haven't defined it.

JUAN J. CRUZ MOTTA: Yeah. This is basically a non-parametric multivariate correlations based on ranks.

SENNAI HABTES: Okay.

JUAN J. CRUZ MOTTA: And ranks it is because this group thinks seven times that this is important and this other group thinks it's five, so it's more or less. But yeah, the process is already in place.

SENNAI HABTES: Hold on, J.J., Stacey has a comment.

STACEY WILLIAMS: Do we want to put after building each of the stakeholder models to see like the spatial variability within those models to see if we want to then focus our efforts looking at regions and, like specifically Puerto Rico, and between islands? I don't know that--

JUAN J. CRUZ MOTTA: That's a very good suggestion and yeah, excellent. Let's add that as well, because that's very important, Stacey, thank you.

STACEY WILLIAMS: To see spatial variability within each model. Yeah. Then assess if we need to, I guess, focus our efforts within each region or something like that, or just see spatial variability within each model. I think that's-- That could be like two, I guess, 2a.

Yeah. So, after building each of the stakeholder, once we're compiling each stakeholder model, we're going to see that there's some variability within each model. So, once we know that, we can then decide if we need to break them down into regions, or it can be in just one say, like fisher model, or-- am I confusing?

ORIAN TZADIK: I think it's fine.

STACEY WILLIAMS: That's fine right there? Yeah, that's good.

JUAN J. CRUZ MOTTA: And that's a very good point, Stacey, because defining what is high or low depends on that variability. For example, if within a group you have like the models are similar in an 80%, then something 40% is become low. However, if the similarity within a group is 50%, so low will be defined in like 10% or 12%. You know, like what is high or low

will depend on that variability. So that's why important to have it there. Thank you, Stacey.

SENNAI HABTES: Graciela?

GRACIELA GARCÍA-MOLINER: So how do we foresee, including the DAP models, one of the seven? Or would they be the ones that Lenfest is working on and then the three DAPs? How do we do that?

JUAN J. CRUZ MOTTA: It's an excellent question, Graciela, because until two hours ago it was going to be part of the fisher stakeholders. However, you raise a very nice hypothesis that we can test with this, which is, let's see how this group relates in terms of similarity with the rest of the fishing villages. So now I have a-- I mean, we have a different way to approach the DAPs. Originally, fisher, but now you raise a very good point this morning and we going to do that analysis.

GRACIELA GARCÍA-MOLINER: So that would be something to do. So, do we want to include it here as a sub bullet or under two?

JUAN J. CRUZ MOTTA: Yeah, it could be like spatial comparison between DAP and Fishers. Oh, ah no. DAP--

SENNAI HABTES: Yeah, it would be four. It's a comparison across groups.

STACEY WILLIAMS: Yeah.

SENNAI HABTES: Just say your name it's open discussion.

STACEY WILLIAMS: Okay. Yeah, I believe that would be four because two is just looking at each stakeholder model and then we would be doing comparisons with four. Yeah.

JUAN J. CRUZ MOTTA: Yes, totally agree with that. Sennai.

SENNAI HABTES: Kelly?

KELLY MONTENERO: This is Kelly Montenero. Obviously, I'm not part of the TAP, but I was just thinking, when you were discussing meld conceptual models, are you going to discuss bringing in the SSC and the DAP ones or are we discussing the Lenfest melding first? Just for clarification.

JUAN J. CRUZ MOTTA: We're bringing together all the conceptual models. The only-- and we have talked about this only once, I

think, Stacey. The only model that we don't know what to do with it is the SSC because it has a different structure from the others. Because it has soup models.

So, when I was thinking about all this approach, you know, like trying to-- I create dummy data. You know, like trying to see how we will go about it. I say, "okay, let's try each of the soup models, like a different group of stakeholders." But they're not independent because it's the same people. Right? You're thinking about different aspects. So, to be honest, we don't know what to do with the SSC. Apart from that, everybody else will have a say.

GRACIELA GARCÍA-MOLINER: So 4c would be, test the Lenfest models or the-- how do you want to call them? The Lenfest models with the--

SENNAI HABTES: Just call it all models with the exception of SSC.

GRACIELA GARCÍA-MOLINER: Yeah. Test all models excluding the DAP. I'm just trying to write that there. And for the SSC, we have--test all models.

SENNAI HABTES: except SSC,

ORIAN TZADIK: against the DAP.

GRACIELA GARCÍA-MOLINER: Against the DAPs, right?

JUAN J. CRUZ MOTTA: May I suggest something?

GRACIELA GARCÍA-MOLINER: Mm-hmm.

JUAN J. CRUZ MOTTA: Can we put brackets, SSC, TBD. Instead of excluding that because we can come up with some, I might, may come across a paper that tells me how to do it. Yeah.

GRACIELA GARCÍA-MOLINER: So, Graciela, here. So, what I was going to suggest about the SSC is, I remember that this has a huge matrix behind it. So, it has all of the sub models against all of the sub models. So, it actually becomes a regular model. So how do we deal with that? That's a different story. But there is that matrix of numbers behind it.

JUAN J. CRUZ MOTTA: Yeah, that's correct. J.J. here. Actually, that's the matrix we're using to analyze that to do this similarity analysis. We're not using the graphic representation.

We are using that on-- the thing is, that matrix-- I mean, the SSC has colors on that matrix, right. This is the environment, this is the-- I forgot the-- the others don't have those.

So, one thing that that occurred to me, once we do the synonyms, then we impose those categories into what everybody else said. But that's saying like-- I don't know. It's imposing a view. I mean, like a structure on other-- but anyhow, I don't know. I don't know.

GRACIELA GARCÍA-MOLINER: So, you know, we have to think about it, but one of the things that it has is that it actually has that bigger picture and then all the smaller terms that are used by everyone else. You know, it has hurricanes, it has pelagics, it has something or other. So, the vocabulary to cross them is there.

I think that, you know, at this point we should bring Richard into the conversation and be part of-- you know, I don't know if you want him to be also part of this conversation. I think that he should be, because, you know, he's looked at all of the DAPs, the SSC was in the meetings with the DAPs when they began the process and everything else. So, you know, I think that probably we should include Richard in the people that need to be in this working group.

SENNAI HABTES: Orian?

ORIAN TZADIK: Just with regards to that SSC model. You know, there's a couple things here. One is that none of these models, unfortunately, even though it was our intent to do so, none of the models were created in the same way. We have groups of models that were created very similarly, but we don't have any stakeholder group that actually went around about the model creation in the same way. The SSC is the outlier in that the other ones, I think the methodology is like enough that it's not that big of a deal. But, you know, we're talking about, well, they created subgroups, and they had all this complicated, this and that. Well, they also took like 20 days to do it. You know, either the DAPs were the next longest and they took two days and most of the other groups took one day.

So, if we would've let those groups go on for 20 days, they might have come up with all those connections as well. So, I think that with all of these products, it's going to be very important to not lose any of the information. So, I think we need to have in the FEP somewhere, the SSCs model, in its entirety, it needs to be there.

Likewise, I think at least in an appendix, all of these models should be available and present. But, I think, after that, we do need to figure out a way to boil this down to the products that we need from it to inform the process as we go along.

SENNAI HABTES: J.J., I'm probably going to be sorry for asking this, but I need you to explain part of the process to me, because what are we doing with the data that goes into the models that is on the low end where there is not clear similarity? For instance, a good example of this is going to be the SSC. We have outputs that come out from it with rankings that are going to give us, you know, this is really important in the SSC model, whereas in the conceptual model for the DAPs, these are, and they're, you know, some are sub models, others are not.

Like, just gimme a quick, dirty explanation of how we're going to mix those and what do we do with all that information that we don't address?

JUAN J. CRUZ MOTTA: Okay. Perhaps I didn't explain myself and it's not there. Because it's actually a two-step process.

First of all, I want to compare the different groups, right? How similar they are. And that's one thing. The second thing is to create the combined model. That combined model will have all the boxes. We don't have a board here to draw. But let's say the first group had component A, B, and C, and the second group had A, B, and D, right? The melded model will have A to D. What's the difference that A and B will have a strength of two, and C and D will have a strength of one.

So, we start growing this up and then you will have that person that said, "lithium battery," I only heard that once. That will be in the model. But we'll have a very tiny gray line versus all the people that said coral reef. Coral reef will have 82 big, thick line. So, the model will contain everything. Everything that everybody said. The difference is how many people support that component and that connection.

Then the simplified model comes out of extracting only the thick lines. So, there are two pro-- and then you say, "okay, this model was created out of a group that shared 70% of similarity" in terms of presence or rankings they gave to the different connections.

Okay? So, it's two things. Evaluation of similarity and creating

the melded model that has all the boxes that were ever mentioned. The difference is how thick those components are on their relationship based on how many times different people--Actually, I have a--

SENNAI HABTES: J.J. I'm going to have you hold on just one second. Liajay, I'm going to have you add some things on there. So, add a five, which is going to be combined or melded model.

JUAN J. CRUZ MOTTA: That's 4a.

SENNAI HABTES: Yeah, I know, but I don't think it should be in four. Four is your comparison across group stakeholders. Your combined or melded model is a separate thing. It's a different outcome.

JUAN J. CRUZ MOTTA: Okay.

SENNAI HABTES: So, you still have to do your test, right? You still have to do a comparison across them. But your combined or final model, which is going to give us the importance of the indicators that we are going to put in into the FEP is a separate outcome.

JUAN J. CRUZ MOTTA: So, I would say then delete from 4a, because that's what I was thinking.

SENNAI HABTES: Yeah, I get that. I think it would be better to be in five. So, you can take 4a and 4b and move it under five for combined melted model. I think 4c can stay on compare across groups of stakeholders because you're still doing your comparison of the individual ones after you identify the validation from the stakeholders.

And then, yeah, that looks good, Liajay. I'd also like you to do a last big bullet, which is "Outputs."

LIAJAY RIVERA GARCÍA: I'll fix it now.

SENNAI HABTES: Yeah. And, I think, J.J., what I would like for you to do here is simply-- you know, it can be you, Tarsila, could be Ori, just someone on the EBFM TAP. I would like you to summarize the outputs that we're going to get from this objective by December 2022. And do it slowly, so Liajay can put it in bullet form on there.

ORIAN TZADIK: I'm happy to.

JUAN J. CRUZ MOTTA: Yeah, you go. And if something's missing, I'll--

SENNAI HABTES: While you guys decide that, Kevin has his hand up, so I'm going to let Kevin go and you guys can figure out who's going to answer me on this question.

KEVIN MCCARTHY: Yeah. Thanks, Sennai. This is Kevin McCarthy. So, I'm just wondering why the whole committee is getting into the weeds on the work of this subcommittee. Would it not be, in the interest of time, more useful for us to say to the subcommittee, "Hey, get back to the larger committee, get back to the entire TAP in two or three months with your plan." I mean, because we're going to spend a lot of time getting into the gory details of each one of these subcommittees as an entire committee. And if we think that's useful, then let's persevere. But if there's a faster way to do it, to just sort of charge these subcommittees-- you know, the first task of the subcommittee could be come up with a plan and get back to the larger TAP. So, I'm just, you know, spit balling here some ideas of how we might move along.

SENNAI HABTES: I appreciate that, Kevin. I think part of the issue is that for some of these plans that are in place, they just haven't been communicated to the rest of the group, which is why we're using this meeting to kind of do that. I want to clarify a lot of it and have it on paper. I think second, we've kind of collapsed it down to just four of these subgroups that we're going to be working on for the rest of the afternoon. So, I think there's enough time to get into a little bit of the weeds, especially for the ones that we have some of that information worked out. It just hasn't been communicated to the rest of the group so we can make sure that everybody's on the same page and doesn't have a problem with the direction that we're heading.

KEVIN MCCARTHY: Okay. Like I said, I'm fine with that if that's what the committee wants to do. But, you know, I'm also looking at the clock.

SENNAI HABTES: I hear ya. I was giving this one until about 2:45 and then we're going to move on to the next one, which is why I'm on outputs now. But this is one of the ones that is more well defined, so we really need to nail some of this down because it needs to be done end of this year. Some of the others have a little bit more time. And Stacey has her hand up. So.

STACEY WILLIAMS: Hi, this is Stacey. Wouldn't the outputs be

the second bullet point of like indicators and gaps would be identified. Those would be a couple of the outputs from all of this. So, basically, follow through with the second bullet. But we didn't mention gaps in that second bullet. Am I correct J.J.?

JUAN J. CRUZ MOTTA: I mean, we will then identify the gaps as those components or relationships are important, but we're not collecting data for those. So, we need also the outcome of the quanti-- no, sorry. No, no, no, no. No, you're right. It could be here. It Could be here. The gaps could be here. Yeah, you're right. So that will be--

SENNAI HABTES: So, you've got, let's say, indicators and gaps. I think you'll have a model framework, right? You'll also have an appendix with all conceptual models. And then you'll have comparative analysis across model types. Am I missing anything? There's indicators, there's gaps. What else? Oh, rankings. Indicator rankings. And I think that's really all we can say will come out of this.

GRACIELA GARCÍA-MOLINER: Yep.

SENNAI HABTES: Okay. So, is everybody good with the direction that this one's taking? Are there any other people either in the room or online that want us to put their names with this? Just to clarify, Kevin, we were not directing anyone, but they can be participants who can do correspondence and help us out with some things when they time. Graciela?

GRACIELA GARCÍA-MOLINER: So, we heard from Sarah Stephenson, she'll be in for the regional office. And Liajay Rivera for the Council. And I volunteered Richard Appeldoorn from the SSC. [laughter]

SENNAI HABTES: Ori, mic.

ORIAN TZADIK: Sorry. Orian Tzadik, for the record. Comparative analysis within and among model types because we had had that discussion that, you know, within the stakeholder groups we're going to want to know differences between the different groups that were surveyed.

SENNAI HABTES: Okay. I think that's good for that model. Let's move on to the next one. That was indicators, right? Yes.

LIAJAY RIVERA GARCÍA: Sennai.

SENNAI HABTES: Yes.

LIAJAY RIVERA GARCÍA: Miguel, raised his hand.

SENNAI HABTES: Ah, I apologize. Miguel, you're recognized.

MIGUEL A. ROLÓN: Would this be a report to the group and to the Council in December? Is that what you're shooting for?

SENNAI HABTES: I don't think it necessarily-- I don't think we need to have it as-- Sorry, Miguel, repeat that. I was talking over you. I apologize.

MIGUEL A. ROLÓN: Okay. Will this first one, the melded conceptual model, be a written report to the TAP and the counseling in December? Is that what you are shooting for?

SENNAI HABTES: No, I don't think for this one we're going to have anything written until we get it to the FEP stage. What we're going to have from this is like kind of an analysis that we can use to identify the strength of the indicators that will go into the FEP. We're also going to have to use this to create a decision-making framework. But, you know, I think the only written report that we're going to have from this is an FEP. Lenfest will have their annual reports, which we can always try and present and will have some of this information. But for us, I think, all of these aspects are just going to be data until we put them into the FEP. And I can always present to the Council.

MIGUEL A. ROLÓN: Yeah. Yeah. I was asking just to prepare for the meeting, but I agree with everything that you said. Yes.

SENNAI HABTES: Okay. Unless there are any more comments or questions on this one, I think we can move on to the next one, which I believe was the indicators, ecosystem indicators. Who wants to start with that one?

Ecosystem Indicators

ORIAN TZADIK: Well, again, we'll have the deadline as December of 2022. Right?

KELLY MONTENERO: Again, Kelly Montenero. Though I'm not a TAP member, I would like to volunteer that the ecosystem indicators from the ESR can contribute to this step and FEP development. From the ESR, at least, those indicators can be ready by August though I do know that we want to obviously incorporate the indicators pulled from the conceptual model process too, so Perhaps December is appropriate. Um, but again, not part of the

TAP, but would like to volunteer to contribute indicators from the ESR. Thank you.

SENNAI HABTES: Seann.

SEANN REGAN: Thanks Chair. Seann Regan, NCCOS. Yeah, I'd like to also volunteer to be involved. Maybe a clarifying question, there's, in some respects, sort of two ecosystem indicator efforts. So, I don't know if we need to break those out or not, or kind of have them all fold together. It's one clarifying question.

And then one other thing, and this is up to the TAP. Also, not a TAP member. Maybe we should assign a day and a month. I could just see as we get close to December, December 1st versus December 31st is different. I think we'll probably meet these, but--

SENNAI HABTES: Thanks, Seann. I think we can add those dates in later. For right now, I just want the framework and I will send this all back out to everyone, but that's why I want the names. And so, I think I'm going to open it up to J.J., but while J.J.s speaking, Liajay, if you could add all the same people from the first J.J., Kelly, Tarsila. Put Orian on this one and myself on this one as well. J.J. is recognized.

JUAN J. CRUZ MOTTA: Thank you. I see it more like a complimentary, so I foresee three types of scenarios in which the indicators are similar, so that gives even further strength to the selection of those. Sorry, all scenarios in which there is no coincidence in between those and the ones that are selected through the conceptual models. And then I guess that could be brought back to the group to decide, "okay, do we put them all or we settle for one or--" so I see it more like complimentary.

KELLY MONTENERO: Yeah, I definitely agree that they're, you know, we can look at how these are complimentary, where I know that they are, you know, just in looking at our preliminary results from presentations in this meeting. We can see a lot of overlap between the efforts. But I guess the question is, how many indicators do we need to make of this indicator suite? And like you said, so when there is overlap, that's a pretty simple answer that, you know. For example, I know that Sargassum was listed in all three efforts. That's an easy one to decide. But when they're not all three overlapping, we may need a decision-making process to decide what to include. I don't know that we need to decide that today, but just a thought that that

might be a step in refining the indicator suite. Thank you.

JUAN J. CRUZ MOTTA: Yeah, no, very good question. And actually, I asked you this morning about all the 35 with the strength is because to decide which one is based on that table that we can also have an indication of the strength on the exercise that I just mentioned before. So, if, basically, you have two tables rank, you know, like with support for those indicator over the different stakeholders, in your case it's only expert, right? And then you could see, like, for example, I don't know, let's say sargassum is in both lists, but in one is up here and the other is here. That's the scenario where I say, "okay," we will need to get back to the group, "do we put it in the FEP or not?" But then if both are ranked up, following two different processes, oh, that's amazing support for that indicator to the-- then there is another--

SENNAI HABTES: I'm going to hold you. We're getting a little, in my opinion, I think too far into the weeds on this one. What I would like us to do here is identify the process by which we're going to select that process, right? Like, who is in charge of identifying the way we are going to select and prioritize indicators? Are we doing it based on a qualitative analysis? Are we doing it as a quantitative analysis? Are we doing a mixed analysis? Are we going to follow the process by which they were ranked for, you know, Kelly and Seann's report? Or are we trying to reinvent the wheel and come up with a new one? Is there an existing process through Lenfest? These are the things we need to talk about now and then put down on this little PowerPoint to give us a guide for going forward. And I see a hand up, but I don't see who's. Oh, Tauna. So, Tauna, I'm going to open it up to you to comment and then we can come back to this conversation. Okay. J.J.?

TAUNA RANKIN: Thanks. Yeah. I was under the impression from J.J.'s presentation that they will be doing some analyses that would point to useful indicators, but I'll also add that I think the risk assessment will help with prioritizing indicators as well.

I've been kind of sitting back and silent over the discussion of the last two components because I'm not quite sure how I should engage best in this. I feel like it would benefit from me keeping up to date in tabs with these two different groups, but I don't know that how much value added in time I have to be a full-fledged member. So, it's kind of two different thoughts there. But I'll just say I'm happy to engage more than just at EBFM TAP meetings.

I'll put on the table that the risk assessment can help with identifying important indicators to track long term. But I think these two projects are identifying candidate indicators that we have suitable data for. Thanks.

SENNAI HABTES: Thanks, Tauna. I mean, I think if, you know, we'll put your name down in parentheses on both of these and you can let us know what kind of time commitment you're willing to make when you have time to work on these.

And then, I would say that what you're saying, you know, is something that we need to decide on. For instance, are we going to incorporate risk assessment into the process? Are we not? Right? And so, I think for indicators, I think it would definitely help. I'd like to hear, you know, J.J., if you want to identify some of the aspects of what we're doing with them in Lenfest that would iden-- obviously it's a similarity dissimilarity ranking, but, you know, is there another aspect? Are we just going to use that matrix to identify the most important risk assessments or is it something else? So maybe you can just do a quick description of that, so we can put some bullet points down.

JUAN J. CRUZ MOTTA: Okay. Yeah, I wanted to finish the previous point, address one quick, but now also-- I want to start from the latest point to the, to the old point.

First of all, Tauna, the risk, I mean, as I understand it, the risk assessment is to assess the risk of different factors to affect a management objective. Is that correct?

TAUNA RANKIN: So, sorry, I'm getting chit chatted here. Did you just ask, is the risk assessment assessing risk against risk of accomplishing management objectives?

JUAN J. CRUZ MOTTA: Yes.

TAUNA RANKIN: Can you hear me?

JUAN J. CRUZ MOTTA: Yes. I can hear you. Just to confirm that.

TAUNA RANKIN: Could you repeat your question?

JUAN J. CRUZ MOTTA: Okay. It is my understanding that the risk assessment is done towards the management objective, right?

TAUNA RANKIN: Yes. Correct.

JUAN J. CRUZ MOTTA: Okay. What I can see is that the result of this indicators, right, and actually something that we haven't mentioned is also identify indicators and threats if we follow the Lenfest manual. Perhaps, that could fit into the risk assessment. So, I see this as a second step. Right. Because what we're trying to assess are very different things. With this first exercise of the conceptual models, we're trying to understand how the fisheries system works and what are the indicators that we can follow to understand how that system is working.

With the risk assessment is basically, once we understand how the system works, what are the threats that I need to consider that will affect my management actions based on that knowledge of the system. So, if you ask me, and perhaps I'm missing the point here, the risk assessment comes after we have identified indicators and traits. I don't know, what's your take on this, Tauna?

TAUNA RANKIN: Yes, I agree with everything you said. Just to explain it more thorough and add on to what you said. We can develop indicators that help us sort of understand the dynamics of the system and they may or may not affect our ability to achieve our management objectives. Right. But some of them will and so I think the risk assessment will point us towards some that will be helpful, a sort of dashboard for things we need to keep an eye on because of the effect it could have on the fisheries.

So, yes, I think this is the next step to come up with a suite of ecosystem indicators and the risk assessment can help with pointing out ones that will be particularly relevant to management.

SENNAI HABTES: Okay. I know Kelly's had her hand up. So, it's a follow up and then we can go back to you.

JUAN J. CRUZ MOTTA: No. Sure, sure.

SENNAI HABTES: But as you're speaking, J.J., please, let Liajay know what bullets we can put down. Sorry to keep stressing on this, but I need a document that I can keep us on track with. That's why I'm asking for this.

JUAN J. CRUZ MOTTA: Yeah. At, at this stage, I'm just addressing people's question and concerns, I am not trying to populate that.

SENNAI HABTES: No worries. I'm just going to keep pushing us in that direction because we only have two hours left.

KELLY MONTENERO: I just wanted to respond to the points that Tauna and J.J. were talking about and also contribute to this plan here and reiterate that the indicators that were selected already for the ESR do have two different types. Again, those that track performance towards fishery management plan objectives and that was part of our decision matrix criteria process that we did with our expert working groups as well as those kinds of indicators that speak to the risks to meeting fishery management objectives.

Now, I'm not saying that that takes the place of a formal risk assessment, but I am saying that that can contribute to both of those ideas in that, you know, it does pull our proposed indicators from the DAP conceptual models as well so that that was a slightly different way to select indicators than some of the different processes that worked with overall components such as, you know, physical, environmental, things like that. So, maybe it's more complimentary than refining anyways, which is one last step that we have to do. Thank you.

SENNAI HABTES: Seann.

SEANN REGAN: Yeah. Sennai, going back to the point of the process of the process and building off of what Kelly just said. I think, in my mind, and this is a maybe a proposal to the group as-- much of the ESR indicator selection has sort of, more or less, sort of been done. Now, the next steps for that complimentary effort are really to finalize the report and then, you know, make those data available in whatever the easiest way is. I think we talked about just the GitHub repository or hosting them online. But those efforts are thru, I think. We may want to have sort of an [inaudible] deadline here in August for that to be done as something to build off of the other efforts.

SENNAI HABTES: Okay. So, let's do which. I want to separate between the two sets of ecosystem indicators. There's the group that was done by your report, and also the group that have been identified and data sets that have been identified by J.J., Lenfest.

Oh man! Apologies to everyone online. I was talking and no one could hear me. I would like for us to separate the distinction between the two sets of ecosystem indicators. So, there's Kelly and Seann's group and so that one's the Ecosystem Services

Report.

KELLY MONTENERO: Status Report.

SENNAI HABTES: Status Report. So, Liajay, let's do ESSR indicators.

KELLY MONTENERO: Real quick, just ESR.

SENNAI HABTES: So ESR and put, let's see, report completed August 2022,

KELLY MONTENERO: Tentatively, because of the approval process

SENNAI HABTES: Tentatively, right. Then we can have repositories for data December of 2022.

SEANN REGAN: Yeah.

KELLY MONTENERO: Yes, that sounds reasonable. And just wanted to note, Liajay, if you could add in the word "tentatively" for completed, just because it is subject to the approval process through NMFS and that's out of our direct control. But again, that, that sounds reasonable. December 2022, I believe is what we're saying.

SENNAI HABTES: Yeah. And I'll follow up with you guys and we will refine this, but I just need us to have something on paper because we have none of that right now. So, then J.J. and Stacey, or even Tarsila, maybe you guys can tell me about the indicators that we're looking at from Lenfest. At least the process or timeline or, you know, what we want to put as objectives for this goal. And then also I think we need to talk about our selection process for the indicators that we're going to recommend to the FEP, and I want us to have something in there for that. Or even Ori, you can talk about it too.

ORIAN TZADIK: I'd like to pose a question, which is, you know, what is our goal for these indicators? Because I've heard a couple things. One is their items that we can track and ask and put in the FEP that we recommend that these indicators be tracked over time. But I've also heard that these can be used to inform the risk assessment. And I'm just wondering, I think that that might shape what you're asking. What are we trying to get out of this?

SENNAI HABTES: So, risk assessment is another tab. Here, we're just talking about the indicators as they were designed within

Lenfest for what we're doing with the FEP. And for that it's taking the information from the conceptual models to identify, prioritized indicators that can be used to track ecosystems and be used in management. That's all we're talking about here. Unless I'm mistaken, and please correct me if I am.

ORIAN TZADIK: I would defer to J.J. on this, but I would encourage you to talk about the model you told me about, which was to use the conceptual model as the seed model against the-- and then back it up with data. That thing.

JUAN J. CRUZ MOTTA: Yeah. So, I'll get back to the first point that on the side of Lenfest, there are actually two suites of indicators, right? The ones that the people believe are important and we're extracting those out of the conceptual models. And also, the indicators that we can actually follow because we have the data and that will come out of the quantitative exercise. So, if needed, and perhaps point three will be, if you want Lenfest indicators, right? And then 3a will be qualitative indicators related to the conceptual models. Two, quantitative indicators extracted-- Sorry, no. Indicators extracted from the quantitative models.

The difference between one and two will give you the gap analysis that we have mentioned. Because then, of course, ideally, we have to choose an indicator that we can track, that we have data for, which is basically what the ESR is doing. However, we also consider important that if we identify an indicator with a lot of support on the 3.1, then that's not a mandate, but will be a very strong support for that type of data to be collected. So basically, that's the approach that we were trying to use. And then, whatever list comes of 3.1 and 3.2, can be complimented with the list that came out of one.

SENNAI HABTES: So, Liajay, let's add that as four. So, combined list of ESR and Lenfest indicators identified. Then, from the Lenfest group, can we just have a tentative date for three and four that we can put down?

JUAN J. CRUZ MOTTA: Same.

SENNAI HABTES: December?

JUAN J. CRUZ MOTTA: Same, December '22, because it's strongly related to the conceptual model. Actually, you could see that in the previous slide, it's one of the outputs.

SENNAI HABTES: So, let's do-- I mean, I think we need to have

three before we get to four probably. So, they should probably have different dates. We're talking about the Lenfest indicators identified by December 2022. So likely the combined list would not be possible until March of 2023 or longer than that? That would be three months to take the outputs and combine them into a single list of ESR indicators that we can put into an FEP.

JUAN J. CRUZ MOTTA: I don't know. I cannot foresee how long will-- Kelly, do you have an idea?

KELLY MONTENERO: This is related back to item number one. So perhaps finish your Lenfest timeline thought, and then I can add mine. Unless you're still working on your thought.

JUAN J. CRUZ MOTTA: Before coming to this meeting, I hadn't thought about combining indicators from different-- so when I was trying to reply your first question, it was some method that just came to my mind to do that. But since it's not the objective of this conversation, I can think about it and tell you a date later on. But I cannot put a date on number four.

SENNAI HABTES: I think that's fine. J.J. What I will say is, I think there are some interim steps that you just mentioned that we probably need to be put on here, meaning like, identify the way we're going to combine them, you know, that method that you're just talking about. So, let's maybe, Liajay, put that down as four and then make combined list five. And then Graciela and, I think, Orian you both had your hands up. Oh, Kelly. All right.

KELLY MONTENERO: Sorry. I just wanted to clarify quickly before we move on, because I believe Liajay is trying to go back to some of these items. So, for number four, Liajay, it looks like you're trying to say, "combined list of ESR and Lenfest indicators." So, "ESR and Lenfest." And then if I can request, if we go back to item number one, if we change the word from "report" to "suite of indicators." Thank you.

JUAN J. CRUZ MOTTA: I also would like to suggest a change instead of "Lenfest indicators," let's call it "CM" for conceptual model indicators.

GRACIELA GARCÍA-MOLINER: So, would that include, because I'm just reading the SSC report and the DAP models, we can, from the magnitude that they gave us, we can come up with the indicators like what Liajay presented earlier. So, would the "CM" be including the stakeholders and the DAPs and the SSC so we can make sure that they are all combined? We're not duplicating

efforts. Okay. Because then that I won't repeat this each time. So, DAPs and SSC, now we have CMs, and they're all included in that.

JUAN J. CRUZ MOTTA: Yeah, because Lenfest is a limited number of CM.

STACEY WILLIAMS: But why CM indicators when we have also the qualitative and quantitative together.

JUAN J. CRUZ MOTTA: Okay. Let's do concept model and-- sorry, CM and quantitative indicator. So, the same will go for number four.

GRACIELA GARCÍA-MOLINER: If I understand it correctly, one thing is that you will get the stuff out of the meetings, and this is what they say, these are the indicators that from their experience and their knowledge we're getting, but from the quantitative side of things, you are going to tell us what those indicators should be, right?

JUAN J. CRUZ MOTTA: Yes.

GRACIELA GARCÍA-MOLINER: So, in all the qualitative stuff, we include all the DAPs and the SSC which they have not looked at any data whatsoever. So, this is just expert opinion in all their cases.

SENNAI HABTES: So, I still think we need one bullet point where it's like the process, right? We don't need to know it now, but we need to have a deadline by which we as a TAP have decided on a process by which we're going to use to make that combined list of ESR and CM indicators. And so, I would like us to put that one down as four, Liajay, and make four, five. So, four will now be processed to prioritize combined indicators identified.

So, we don't need it now, J.J., but we do need to, like, we should start thinking about that and, like, you know, put it into a plan for how we're going to do this.

JUAN J. CRUZ MOTTA: Okay.

SENNAI HABTES: Is that okay?

JUAN J. CRUZ MOTTA: Yeah.

SENNAI HABTES: Alright.

JUAN J. CRUZ MOTTA: Yeah. I'll start thinking on the process. Yeah, sure. Sounds like a plan.

SENNAI HABTES: Well, that is why there is a group of us all on there and it just means that we're going to be working on this outside of when we're in the meeting. And so, I need this so I can organize all of us. So, I would like a date that we can think about putting down that we all agree on for when we will have that identified. Somebody can just throw one out and I'll fix it later. I just need something there. Sorry, I'm being OCD but that's what I need.

ORIAN TZADIK: I think the process could be identified prior to having all the indicators. Right? So couldn't we identify the process, let's say by September and then have bullet five, that's a different story. I don't know, March or whatever.

SENNAI HABTES: Yeah, I think that that's goods. Also, I want to say that we can adjust these. These dates are not set in stone. They can be moved. I just would like us to have things on paper, so we have a goal that we're working towards that we know when we have to have things done by. So is there-- Tauna, I see your hand up. Was that from before or did you have something that you wanted to say now?

And then, also I want to just make sure that there isn't anyone, like tap members, like Tarsila that we haven't heard from that want to add stuff to these things. Or if there's any other of our partners or colleagues that are working on this that want to add their name to this group or want to talk about things that you think need to be on this slide, please just raise your hand or put it in the chat and I will call on you to speak. Okay. Thanks, Tarsila. For the record, Tarsila, put in the chat, "looks good to her" and Tauna had forgotten to lower her hand. So, we're all good on there.

I don't see any other comments. Is everyone in the room okay with what we've put on that slide? Okay, so it's 3:15 now. I was thinking of doing a break at 3:30, but we might as well. There's no point of doing 15 minutes into the next slide, so you might as well take a break now and come back at 3:25. We'll do a 10-minute break and then we'll move on to that fourth slide. Liajay, could you put up the agenda for me? I forgot what the next one is that we needed to talk to.

I think it's slide number two. You could just click on that. That would work. So, the last two that we needed to discuss this afternoon was risk assessment and data repository needs. Were

those the too? All right. So, we'll come back and do those, and then we'll talk about the FEP outline, which we need to go back through and revise. Then, we can go through those bullet points at the end, if time is there, and talk about the things that need to be talked about in those.

So, it is 3:16 now. I'll let Orian speak because he has something to say and then we'll—

ORIAN TZADIK: Just very quickly, I'd like to just suggest that we do at least discuss strategic and operational objectives. We don't need to do a full slide and a plan for it, but it would be nice to kind of have it so that we all know what we're going towards and, you know, have a plan towards what we're going towards.

SENNAI HABTES: I'm fine with that. Does anyone have objections? No? Okay. Well, let's take our break. We'll be back at 3:27 to start again. Thanks all.

(Whereupon, a brief recess was taken.)

SENNAI HABTES: Okay. Good afternoon, everyone. It is 3:34 running a little bit late from the break, but we are going to try and get started. Liajay, I have one change I think that we, somebody recommended regarding number five. Ah, yeah. Okay. You already fixed it. Thank you.

If you could go back to the agenda for me. Apologies. This is Sennai Habtes, Chair EBFM TAP, for the record. It's 3:34, March 17th, 2022, and this is the second half of the afternoon for the Caribbean Fisheries Management Council, Ecosystems Based Fisheries Management Technical Advisory Panel. Thank you to all of you who are still with us and who have joined us throughout the day for all of your information, advice, and knowledge, it has been very helpful. Where we are now is we're working on plan development associated with specific things that we need to complete to get towards an FEP that can be useful for the CFMCs Council in their decision-making process.

So, we just got through melding of the conceptual models, ecosystem indicators. I think for risk assessments, strategic objectives and operational objectives, what I would like for us to do is at least put a goal associated with those three things. So do a summarization of the goal. They don't need to be as in depth as the other two because there's some things that need to get done before we can do that.

Um, so Liajay, let's start with risk assessment. Ori and Tauna, I'm going to ask the two of you to kind of lead this. So, I'm going to temporarily relinquish control of the meeting to Ori.

Risk Assessment

ORIAN TZADIK: Yeah, great. So, if we want to-- I don't think we can really follow the same template as the last two slides because the other two, you know, as was discussed already, we started with those two because they were the, you know, quote unquote "low hanging fruit." So, we could easily assign a deadline to those.

I think the question that we need to kind of address right now within this group, before we split into a smaller working group, is what we want this to look like. And so, it's been proposed that this would be an assessment that analyzes the risk from some of these indicators. Or we've talked about it being a risk assessment of the indicators onto a specific management objective. Or the risk of the indicators onto an overall management objective. And I think we have to kind of decide what we want to get out of this thing before we decide how exactly to develop it. Maybe pass it Tauna?

TAUNA RANKIN: Thanks Ori. I don't have a lot to add because this is a very flexible tool that can be used to do a lot of different things in terms of understanding risk and help and using it to help prioritize. I thought it would be a helpful way to narrow down the sphere of things the Council and all its stakeholders care about which is why I proposed for using it to help inform, I'll say, the strategic objectives. But like I mentioned earlier, Lenfest proposes using it to actually prioritize your strategic objectives. I think that's enough. I'm interested in hearing what the TAP members think.

ORIAN TZADIK: Yeah. Orian Tzadik, for the record. I agree with that, Tauna. One thing I found helpful when I was discussing this with Rich Appeldoorn before the meeting, is maybe we could walk through an example and what would the example look like? I mean, one of the components that's come out of-- you know, we can take any one of the components that we kind of have seen from the ESR, from the Lenfest stuff and walk it through and say, "Okay, well what is it going to look like if we turn this evaluation of risk into a strategic objective versus how we could use this evaluation of risk to prioritize strategic objectives." I'm happy to walk through it, or if you'd rather do it, you'd probably closer to the process.

TAUNA RANKIN: If you have an example in mind, go for it. I can't--

ORIAN TZADIK: No, I don't, but let-- I mean, I know that, for example, something that was brought up very-- well, I mean, we can point to hurricanes for example, right? We know that that's pretty common. I would guess it would be something that we would call an ecological indicator. We've seen it in the ESR. It is an indicator. So maybe we could start there, and we could say, what is the risk of a hurricane? And, you know, is that something that recognizing the high risk of hurricanes, we will then create strategies based on that. Or are we more interested in what is the risk of a hurricane to our strategies? And do we need to prioritize the strategy? You know, let's say the strategies have to do with, you know, some of the ones we have listed are recognizing, the-- what do you call them, the target points --reference points for the fishery, like the ACLs and, you know, not overfishing, things like that. So, the protection of the habitat that the fish live in. And so, maybe that's a one way to think about it. I'm interested to hear from the group what we think would be more useful, I guess.

SENNAI HABTES: I mean, I've only thought of using risk assessment as part of the prioritization for strategic objectives in the decision-making process that we would recommend to the Council. So, I'm still not sure on other ways based on the process we've identified for us to use it. At present, I would be fine with simply putting a goal of including risk assessment into the process for identifying strategic objectives for the FEP based on the ecosystem indicators and CMS that have been developed for the EBFM TAP. And then putting a timeline for when we would do that, which likely would have to be March through May of 2023 now, based on the timeframe we're at.

Now, if there are other ways we could do this. Someone, you know, Tauna, Ori, correct me, are there other ways to integrate it into things that we need to get?

ORIAN TZADIK: Yeah, I mean, it's either what you just said, or we derive the strategic objectives separately and evaluate how those components are harmful or threats to those objectives. I agree with you though. I think that it makes sense to derive the strategic objectives from the threats and say, when we recognize a high threat, we develop a strategy, or we have an objective of a strategy that we can then kind of turn into action and or suggestions to the Council. But it makes sense to me to go about it that way. Tauna, go ahead.

TAUNA RANKIN: Thank you. I'm already forgetting what I was about to say. Yeah. I think what's helpful about this tool is that it's clear from the conceptual models there are a lot of issues that stakeholders are concerned about. I think the ESR and the Lenfest project will help ground truth to some degree, whether a-- you know, which of those items are of the highest threat or of a high uncertainty. But I don't know that we have data for a lot of these things and the risk assessment will make sure that they're kind of dealt with in a deliberate fashion. And in the end, you will have what experts and the data suggests are the highest risks, and those are the areas that you should probably definitely have strategic objectives around.

ORIAN TZADIK: Yeah. Thanks, Tauna. I definitely agree with that. You know, particularly due to the nuances of this region. I think, like you expressed, you can use the risk assessment for other reasons, but validating a lot of these points I think would be very helpful for this region, because that's what we have to go on, quite frankly.

So, I'm not hearing any opposition from the other TAP members. I mean, does this seem reasonable to everybody? Because if it does, we can go ahead and create a goal and a timeline and move this thing forward.

Okay. Hearing none. Sennai, you want me to keep rolling or--

SENNAI HABTES: I can take back, don't worry.

ORIAN TZADIK: Okay, great.

SENNAI HABTES: I would also say if there's any other-- oh, I see Kevin has his hand up. So, Kevin, go ahead.

KEVIN MCCARTHY: Yeah, thanks. Orian, can you restate that so that we're all clear on what you're proposing?

ORIAN TZADIK: Yeah. without, you know, fancy, streamlined words, but the idea is to use the indicators as components and threats that we can evaluate in a formal risk assessment. to really validate what the threats are in a lot of instances without, you know, because we don't necessarily have all the data available. And so, we would evaluate what those threats are and the risk of those threats and develop strategies to then combat those threats.

SENNAI HABTES: Let me help refine that for Liajay. So, let's do, use the indicators as components and threats to evaluate strategic objectives. Or was it strategic actions? What was the word? There were two things. We had strategic objectives and strategic something else. Operational objectives. So, to evaluate-- leave it as strategic objectives via risk assessment process to inform operational objectives in DSS-- which is the decision support system. So just put DSS for now, we'll fill that in. --for the Council. Or CFMC. Whatever we want to put there. Liajay, you're the word smith. You can do that. And then I think underneath the goal, you can just put something as a bullet that says what we need to do this. What we need.

Yeah. And so now, Tauna, Orian, J.J., Kelly, I would like for you guys to just throw up the things that we need to get done. Oh, Kevin has his hand up. So, Kevin.

KEVIN MCCARTHY: Yeah, I dropped a link in the chat. This is courtesy of Mandy, that might help folks wrap their head around a risk assessment. It's a pretty straightforward example. So, I know that this can, certainly for me, this risk, the whole notion of a risk assessment can-- you know, we want to make sure that we're all on the same page by what we mean by risk assessment and what we're trying to do. And I get that that's what you're trying to do here, Sennai but if we don't have a good example in our heads, it might be hard to do that. So anyway, I dropped that example and like I said, it's something that Mandy has offered up as a reasonable example. So, it might be helpful for everyone. I don't know that we want to work through it now or take a look at it quickly. I don't know how you want to proceed, but it might be informative for this discussion.

SENNAI HABTES: So, it's a paper. I'm not sure we're going to want to go through all of it. Maybe Mandy, if you're on, if you wouldn't mind just giving an overview, like the 10,000-foot view of implementation of this. If you have the time.

JUAN J. CRUZ MOTTA: Table number one.

MANDY KARNAUSKAS: Yeah. Yeah, sure, I'm here. I could give the 30 second description. So essentially this paper it took a dozen species and asked questions like, is the species overfished? Does it play an important trophic role? Is it likely to have, you know, a rain shift with climate change? is it at risk for high discards? And, and there're a series of about 10 questions. And then it basically used expert opinion to categorize those responses into high, medium, low.

And then you can scroll down and there's a couple key tables. I think it's table three where you can just get a real quick view of which species are kind of high risk across the board. Yeah, one of those guys. That's, yeah, table three. So, then you can see from here, okay, the species across the rows that are all green, you probably don't have to worry about too much. Whereas the species, which have a lot of red in the rows would be other species that you would be concerned with.

And of course, you could do this with species complexes or ecosystem components. You see, they've got unmanaged forage and deep-sea corals in there as well. So, this is one of the more straightforward examples of risk assessment that I've seen.

SENNAI HABTES: Thank you, Mandy. So, Liajay. If you want to go back to the PowerPoint. Okay. Oh, Kelly or Stacey, sorry, has a comment.

STACEY WILLIAMS: Yeah, this is Stacey. I'm kind of lost in like, maybe I'm hung up on the first couple words because the components are indicators. We use components as indicators, but not all indicators are threats. I think that needs to be defined, like to identify which indicators are threats and those threats can be used to evaluate strategic objectives. But the whole indicators as components and threats, I'm hung up on that and maybe it's just me, but it's quite confusing.

SENNAI HABTES: So J.J. is in indicating, he is also confused on that point. So, let's refine.

JUAN J. CRUZ MOTTA: Yes.

SENNAI HABTES: So, the way I was looking at it when I had stated this was that all of the indicators are going into this. They can be either components or threats and we are going through this process. And so, I think part of what we need to do is, one, identify components, identify threats that we're going to use in this system.

So first, we need to have the indicators identified, the strength and the prioritization of the indicators done, so that we know how we can use them in the risk assessment. So, you know, all of the indicators, I think, have to be specified as the way they will be used in a risk assessment prior to doing it. You know, because we do have both quantitative and qualitative. So, we have some that there will be data for, and those are ones that you can actually use levels of that data to

identify how it can inform operational objectives. Others will be ones, you know, that we're going to say we can't use because we don't have the data for. Or we have to create some sort of qualitative measure that we have to use.

And I know that's getting into the weeds a little bit. But it just depends on the process we identify for the risk assessment, which I don't think we're there yet. So, Kelly. First, Stacey.

KELLY MONTENERO: Yeah, that's okay. Stacey again. So, I think it's because when we've been building these models, we're saying components and there are a lot of components, not meaning that they're all indicators. So, I think what we can do is just say, use component and indicators and evaluate those and see which ones are threats, something like along that line. And I think that is what I'm hung up on.

SENNAI HABTES: J.J. then Ori.

JUAN J. CRUZ MOTTA: Yeah. I just want to mention, this risk assessments are very flexible, but what they have in common are two things, which is the risk of A affecting B. And then on Tauna's approach, A is what we have defined an indicator. For example, degrees heating week. What is the risk of the increase degrees heating week affecting, and in this case of Tauna, B is achieving OI for managed species. In the paper that you saw, right? It-- huh? In terms of-- yes, the B are species. So based on that ranking species A is in more risk than species C and so on.

So, I'm saying this because perhaps the first step we should do is define, in our case, what is B. A is more or less defined. It will be a group of indicators that we believe will become risks for affecting. So, we need to define B. So, B is going to be some management objective. It is going to be perhaps the strategical objective or the operational. So, perhaps we should define B first.

SENNAI HABTES: Orian.

ORIAN TZADIK: Yeah, that's exactly what I was about to say, J.J. is that what is that in-- I was going to call it the column. What is that first column that we just saw as species in that table? We're not using species because as you pointed out, there's 80 plus managed, plus another couple hundred in the system. So, we're not going to, you know, go through each one of those.

What we did the first time around, if some of the people in the room might recall, is we split it by kind of habitat, fish community by habitat. Right? We did the mangrove community, the shallow water, and-- it doesn't matter right now. But that was the idea and I think what we're getting at now, J.J., you just touched on it and Tauna had it in her presentation. There were what? There were four or five?

JUAN J. CRUZ MOTTA: In the example, yes. Climate, there are like 12 risk elements. And then you have ecological, there are like 12 again. Then fishing, eight. Then I cannot read because it's a present-- but you know, they have like risk elements affecting some management objective.

ORIAN TZADIK: Right. So, I think we need to refine those management objectives and see what we're evaluating the risk against. As you put it, what is column B? What's category B? And I think that if we get that through this meeting, then we'll be able to move forward with a smaller working group to figure out the details.

SENNAI HABTES: So, I think in the paper that Mandy put in the link, or that Kevin put in the link from Mandy, they used two terms. They used factors, which are what we're kind of talking about as indicators. And then they used elements, which are the things that the factors through the risk assessment will affect. So, factors were A, elements were B, in the example that J.J. just used. And then you use the information on how factors affect elements to define operational objectives.

So, I think we could use that same framework if that works for everybody. So, we can change the goal, Liajay, to define indicators from conceptual models. Oh, okay. I needed some of that wording. Sorry. So yeah, just put in front of that, define indicators from CMS into factors and elements. And in parentheses, you can just put the Gaichas et al., whatever year this paper was, 2018, as components to evaluate. So, delete, use the indicators as components. Yes. To evaluate. Then just go strategic objectives. There you go. Exactly. Yeah. Like that.

So, if everyone can take a look at what the goal is for risk assessment, see if that works. And that clarifies things. J.J.

JUAN J. CRUZ MOTTA: Yeah. It's looking really good. The only question that I would have is, the last part of that goal, which is to inform operational objective, what about if we leave it until, I mean, like, just delete that "to inform" or rephrase it.

SENNAI HABTES: So, make it "to inform the decision support system for the Council."

JUAN J. CRUZ MOTTA: Ah, okay. Yeah.

SENNAI HABTES: Everybody okay with-- Kelly?

KELLY MONTENERO: Again, I'm not on the TAP, so this is just a question for those that are on the TAP. But perhaps should we change it to saying, "define indicators from the master indicator list" rather than from CMs? J.J. is pointing at me, it sounds like he likes it. Thank you.

SENNAI HABTES: Ori.

ORIAN TZADIK: Question. So does this mean that the indicators that are derived from the conceptual models and the ESR could either be factors or elements, or are they all-- you know, I'm just still thinking about this column A and column B or whatever, category A and category B. Are they all category A and then we're ranking them against something else, or are they a combination? I mean, how is this playing out?

SENNAI HABTES: I think that's identified from the list that we create from the CM. So, in the conceptual models, they are separated into those two groups. There are things that are factors that inform other things, and there are-- that inform elements. In some cases, there are elements that act as factors on other elements and in other cases they're not. And so that is what the master list needs to identify. What are the factors or--

ORIAN TZADIK: Drivers and receivers they called them in the-- Yeah.

SENNAI HABTES: Yeah. So, what are the drivers and what are the receivers? Or what are the factors and what are the elements? And we have to prioritize the most important ones in that master list that we are going to then use in the risk assessment process to define the objectives. That is my understanding of the process that we spoke about earlier, which was the melding of the conceptual models to create this master list.

ORIAN TZADIK: Yeah. So that makes sense to me. We were having a bit of a side conversa-- I wanted to clarify that. Okay.

SENNAI HABTES: Okay. Is everyone good with the structure?

ORIAN TZADIK: Can we ask for Tauna's input on that? What does she think?

SENNAI HABTES: Yep. Tauna, comments, concerns, questions. Does this look like a system that would work within the risk assessment model that you had kind of discussed with us?

TAUNA RANKIN: Overall, yes. I'm a little hung up on factors versus elements, but I am not going to let those terms keep me from suggesting we move forward.

SENNAI HABTES: Okay. Again, this is just a placeholder we can redefine within the working group. Yeah, Stacey?

STACEY WILLIAMS: I mean, we've been using this throughout the meeting. What about drivers and receivers? I don't know if that would clarify this with factors and elements. I mean.

SENNAI HABTES: That is fine with me. J.J. Concurs. Orian?

ORIAN TZADIK: Yeah, I'm okay with that. I just want to leave-- Well, no, that's fine. Yeah.

SENNAI HABTES: So, Liajay, you would change-- Yeah, exactly. For elements. Yes. You can just delete "for elements." You can just leave "receivers."

ORIAN TZADIK: So, can I just-- Okay. So just to kind of help me, and I hope this, you know, if I'm going off here, somebody just stop me. But I hope this helps visualize it for everybody.

So, this means that we would see something like a driver of water quality, and we would ask high, medium, or low, the effect on the receiver, which is coral reefs. Okay. And then using that information, we would derive strategies, strategic objectives, that would say programs to improve water quality, for example. Our strategic objective is that the Council, you know, prioritizes strategies to improve water quality. Everybody's on the same page with that. Is that what we're looking for here from a risk assessment?

ALIDA ORTIZ SOTOMAYOR: To me that sounds correct.

SENNAI HABTES: J.J. is recognized.

JUAN J. CRUZ MOTTA: Yeah. Yeah. Totally Right. The only thing that I will add is that you will do that for a lot of the relationships and then using those eight elements that are

included in Tauna's two, then you will say, "okay, this is highest, this is lowest." And then you prioritize. That's all. But basically, I have the same understanding, Ori.

SENNAI HABTES: Stacey.

STACEY WILLIAMS: Yeah, I just wanted to support J.J.'s comment. It's just, I see it as another dimension to what we are creating from the models to give more information. So, it's just another layer.

SENNAI HABTES: Okay. I see that, Tauna, has her hand raised. So, Tauna, you're recognized.

TAUNA RANKIN: Thank you. Yeah, I just, going back to the strategic objectives briefly. One thing that I mentioned in my presentation earlier is that these objectives need to be unambiguous. They need to be measurable. And so, if they're being developed in advance of the risk assessment, those kinds of things need to be kept in mind. Which is what it looks like based on the goal here.

SENNAI HABTES: Thanks, Tauna. I agree. I think that's part of the conceptual model melding process that we're going to do to create the master indicator list and I think we can refine that going forward. So, I think maybe we can add your comment into the, what we need to do to do this, which is "define measurable and quantifiable indicators," or, I'm sorry, "drivers." No, no. Liajay, you can put that under the next bullet down. Yeah. You could do "quantifiable indicators to be used for drivers." Yeah. "To be used as drivers" or "for drivers." So, Stacey, go ahead.

STACEY WILLIAMS: So, I agree with Tauna as the statement shows, like the goal. It sounds like we already have strategic objectives, and once we have all the indicators and components and threats, then those strategic objectives are going to be evaluated. And I think it should be like saying, maybe "develop" as "component to develop strategic--" "to develop or assess strategic objectives."

SENNAI HABTES: You mean in the goal we should put that? Okay.

STACEY WILLIAMS: Yeah. In the goal.

ORIAN TZADIK: instead of "evaluate," put "develop,"

STACEY WILLIAMS: Yeah. Put "develop."

SENNAI HABTES: So, Ori, just a reminder, use your mic.

ORIAN TZADIK: Sorry, sorry. In the original goal after "Gaichas" "as component to." And then instead of "evaluate," put, "develop."

SENNAI HABTES: So, Stacey?

STACEY WILLIAMS: And then a bullet point would be after that, you know, under the goal would be "assess the strategic objectives" or "evaluate." I think that would be the process afterwards.

SENNAI HABTES: Tauna, you're recognized.

TAUNA RANKIN: Thanks. I have some suggestions for additional steps. I don't want to get ahead of everything, but it seems like Stacey's suggestion could be a step, and so is "to define measurable and quantifiable indicators." So is it okay to add a few more steps in here in front of those.

SENNAI HABTES: Yeah, absolutely. So, I'm going to recommend, Liajay, instead of what we need to do this, right after the Council period, hit enter. Put a new bullet and hit tab in. Now put "steps," s t e p s. Column. Then go down to "assess" and tab over. Then go down to "define measurable and quantifiable indicators." Tab over twice. All right. And then after "define," put another bullet and then-- All right. So, Tauna, go ahead with your additional steps.

TAUNA RANKIN: Well, the one in the forefront of my brain is form the working group. And I was thinking that that could be done before the other projects are completed, but maybe around August, September of this year.

SENNAI HABTES: Okay. So, Liajay, put "form working group" and then put a dash. Then put-- Yeah, exactly.

TAUNA RANKIN: The next would be "adopt approach" or "finalize approach." And maybe that would be around the December timeframe.

The "defined measurable and quantifiable indicators" I think would be next. And this might be optimistic, but I was thinking April, because that would be shortly after the indicators would be compiled.

SENNAI HABTES: So, Liajay, if you could move that one down to

under "adopt approach."

TAUNA RANKIN: And then "identify thresholds." That might be a "where needed," but maybe June of 2023 with a plan to have draft result hopefully shortly thereafter, maybe August. That would be, I guess, the "assess/evaluates strategic objectives" would be the next under "identified thresholds."

SENNAI HABTES: Tauna, can you repeat the date for the draft?

TAUNA RANKIN: These are very shot in the dark.

SENNAI HABTES: Nope, totally fine. It's just good to have a metric. So, I think there was before "assess/evaluate the strategic objective" was "draft results." So that should be after "identify thresholds."

TAUNA RANKIN: Yeah.

SENNAI HABTES: And what date did you give for that, Tauna?

TAUNA RANKIN: August. August-September.

SENNAI HABTES: Okay. And then for the "assess/evaluate the strategic objective" December 2023. Is that what we were thinking?

TAUNA RANKIN: That sounds good.

SENNAI HABTES: Okay. All right. In the interest of time, I'm going to shut down discussion on this one. Last thing, instead of what we need to do on this, Liajay, if you could just change it to working group members and I'm going to just throw people's names on there.

So, we will formalize this prior to August, but I just want people to raise your hand if you're in the room and are willing to be on this working group. And those of you that are online you can just put your name in the chat if you're willing to be on this working group.

So, I've got Ori. You can put my name down, Liajay. Tauna, if you're okay with me putting you on there we would appreciate that. Are there any other TAP members or participants that are willing just to—So, Kelly.

KELLY MONTENERO: In a limited ESR related capacity?

SENNAI HABTES: All right, so Kelly. I will bear that in mind.

KELLY MONTENERO: I'm getting nervous.

GRACIELA GARCÍA-MOLINER: Even when Liajay will be lead, I'm going to sign up for this one and the data repository thing. And I'm going to volunteer Richard, right? Because he's been very much involved in-- He can designate someone later in the SSC meeting.

Strategic and Operational Objectives

SENNAI HABTES: Thank you, Sarah. Okay, I think we're good. If there are others, we can, you know, add you later. For now, let's move on to the next one. So, Liajay, if you could go back up to slide two, which is the agenda, just so I can refresh my memory of what else we need to talk about.

Okay. So, we've got strategic objectives and operational objectives for those. I think we can just put a goal and leave it at that. So why don't we--

ORIAN TZADIK: Sennai? Orian, for the record. I think we discussed to my point, earlier, if this is just with regards to my point earlier, I'm happy with where we are with that, because I think we discussed it in the risk assessment process.

GRACIELA GARCÍA-MOLINER: I suggested to move the data repository as the number four in the list of things that we needed to do today.

Data Repository/Needs

SENNAI HABTES: Yeah. So, let's leave-- Thank you. That was, Graciela, for the record. We'll leave strategic and operational objectives defined as in part of the risk assessment and let's create a new slide for the data repository needs. Let's discuss that and then we can move on to the rest of those topics and hopefully get through as much of that as we can prior to the five o'clock adjournment.

Okay. So, as I've mentioned before, we tried to create a subgroup with outside members. That's a no-go. So, what we need to do is come up with another strategy or we need to create a way of telling the Council the needs for this and a justification.

So, what I would like to do is within the EBFM TAP, create a

working group that we can create either a letter that we can draft to the Council, justifying this and work with Graciela to create a framework for how we can go about doing this. Because I think it's very clear, to manage all of this data going forward we currently do not have the infrastructure within the EBFM TAP to do that. Is everyone okay with this?

ORIAN TZADIK: Just quickly, didn't we already create a working group? I'm trying to look back at my notes, but I believe we already discussed one of the old meetings.

SENNAI HABTES: We have a list of names. There were three members from the EBFM TAP that are on it. You, myself, and Edwin. The rest were outside members which we are not allowed to do.

ORIAN TZADIK: Right. Okay. Okay.

SENNAI HABTES: So, Liajay, if you could just do "working group members" and you can just put Orian, Sennai and Edwin. And then I am looking for, again, partners or EBFM TAP members that are willing to work on this with us. So, Kevin, has his hand raised. So, Kevin, you're recognized.

KEVIN MCCARTHY: I'm volunteering.

SENNAI HABTES: Oh, excellent. Thank you, Kevin. Stacey is volunteering as well, so you can add Kevin and Stacey. Is there anyone else?

Okay, so I think-- Who did? Is that from before?

GRACIELA GARCÍA-MOLINER: Sarah?

SENNAI HABTES: I think that was Sarah was raising her hand on the previous one.

Yeah. All right. So, let's just create a goal then for this group and then the rest of us in the working group will meet at a later date to discuss and prioritize and identify a plan.

Okay, I'll do it. "Draft a strategy for developing data management and coordination policies and infrastructure necessary for EBFM operational management in the U.S. Caribbean through the CFMC." How's that, everybody?

Okay, good. So, Liajay, underneath that, just put a bullet and we're going to do three bullets. One will be "regular working

group meetings," "justification of need to Council," "identify similar systems in region." Everybody okay with those? Graciela is recognized.

GRACIELA GARCÍA-MOLINER: So, I will suggest Sarah just sent a chat to write her up for that and she's very good at organizing things. I think that she would be a real asset to this group. And also, I might volunteer either Julio Morrell or Patricia from CariCOOS, because they already told us yesterday's "don't reinvented the wheel."

SENNAI HABTES: So just as a reminder, we aren't really able to add them as working group members, but we can always invite them to come and talk to us to discuss aspects. So, I, yeah, if you can Liajay, you can add Sarah to the working group members. And then you can under that another bullet and just do "guest speakers."

GRACIELA GARCÍA-MOLINER: So, can I just add a bullet after that, invite-

SENNAI HABTES: "Julio and Patricia as guest speakers." Okay. Is everybody all right with what we have for Data Repository/Needs?

All right let's shut that one down. Liajay, if you can go back to the agenda. All right. At this point there are a host of things that we have listed there. These were all meant with the exception of the outline review to be bullet points for discussion. So, I'm going to ask generally in the group if there are aspects of these bullets that we need to talk about. I'll go through them one by one and if there are people that want to discuss or bring up aspects about that, either raise your hand in the chat or raise your hand in here and I will call on you.

I see Graciela has something prior to that. So, Graciela, you're recognized.

Legislative Update-Atlas (Marine Protected Areas, Area Based Management

GRACIELA GARCÍA-MOLINER: Thank you. So now in relation to the bullets below, specifically the legislative update. I was talking to Miguel, they do have an area-based management group within the CCC, the Council Coordinating Committee. So, they will be discussing that at the May meeting. So, that update will be after that. So, those are, you know, executive order one for-- I don't see Miguel. I asked him to be on this section.

LIAJAY RIVERA GARCÍA: He is on his way.

GRACIELA GARCÍA-MOLINER: Okay. So, the idea would be to have an update at the next meeting after the CCC and then see where that it's going to take us.

SENNAI HABTES: Thank you, Graciela. So just to clarify, there will be an update on creating an atlas of the MPAs and area-based management, or it's an update from that group that was created at the Council meeting.

GRACIELA GARCÍA-MOLINER: So, it will be an-- There you go.

SENNAI HABTES: Thanks. Miguel is recognized. Go ahead.

MIGUEL A. ROLÓN: Thank you. The CCC created subcommittee this month. Not much in terms of regulation, but actually what we are looking for is to, number one, include the Marine Reserve that are implemented or have been implemented through Magnuson-Stevens Act and harmonize those MPAs that have been created under the Antics Act with Monuments and Sanctuaries another Act and the Department of Interior. As you know, they're different. We can update, for the next meeting, we can bring you any decision made by the CCC, regarding the MPAs. Basically, what they're looking at is too close. As you know, 30% of all the marine waters and include also land, but marine water by 2030.

The issue is the definition of conservation. Conservation for the Department of Interior and IUCN is a little bit different from conservation under the Magnuson-Stevens Act. On one hand you can say that around 72% of all the waters around the United States or under the flank of the United States are being protected. But the executive order pursued a spatial definition. So, you are not talking about just managing the fisheries, but also you want to use marine, actually they call it now area-based management, approach which you look at the geographical areas that you can manage close, or whatever, to protect the marine resources of the United States. By 2030, 30% of those areas should be under protection. And again, the conservation is different. What you mean by protection to close those areas, 30% off every marine area closed year-round, [inaudible] as a sanctuary, as a monument. Those are the issues that we'll be discussing now.

So, we are going to also push for the preparation of an Atlas. It will be a national effort. The Atlas will include all areas that we have in the United States that will be considered for

this action or initiative of the Act 30 by 30 we call it. People call it now "America the Beautiful" also.

So, probably about the next meeting you will have a clear picture of what the National Marine Fisheries Service, Department of Commerce and the Department of Interior will decide. They are supposed to have some definitions agreed on by summer this year, and you will receive that information. Maybe the tools that you are developing as a group will be used in the future to monitor, assess, the status of those areas. But for the time being, that's an open discussion.

We also are going to provide the report to all of you that will be submitted to the CCC in May, but you will be able to see around the nation what are the different considerations that they are looking at regarding marine protected areas. On the international level also, the United States may join efforts with some other organization to promote conservation by establishing marine protected areas, but at this time it's still working process. And that's all we have, Graciela, unless you have a question, or you want to add something else.

SENNAI HABTES: Thank you for that update, Miguel. That sounds great. Are there other questions or comments that anyone wanted to make on that topic? Graciela.

GRACIELA GARCÍA-MOLINER: So, just one additional comment and that is really when Miguel mentioned the international aspect of things. So, we've been working on connectivity issues and that's something that also needs to be included in what this group is looking at. So, at some point, I'm just going to make a note here that for that aspect we need to look at, you know, you Miguel Canals, etcetera, the work that's been done locally and what work is being done in the region that might have a direct impact on our fisheries here.

SEAMAP-C and Other Data Sets

SENNAI HABTES: Great point, Graciela. Thank you.

Okay. With that, I'm going to just kind of go through the list and see if we have updates. So, the first one was the other data sets from SEAMAP-C. That's Orian and J.J. There have been a couple, I think recently, that have come out that I've forwarded to both of you guys. I think, you know, the ambient water quality is a good example of one that I found for the U.S.V.I. I believe that the EPAs store website also stores that data for Puerto Rico. So, we may want to look at trying to get that

included in indicators that we're developing, because those are direct measure of, you know, anthropogenic impact via fecal coliform and others. So J.J. If there are other ones that I'm missing, anyone on the call or Lenfest, please bring those up so we can have at least a list of other data sets that we need to incorporate.

JUAN J. CRUZ MOTTA: Yeah, thank you for the links you have already sent. Also, I'm aware of the equivalent for Puerto Rico. The thing is to extract the data is really painful because you have to click all the way down to each one of the individual files and then you have to compile, I mean, like to put together all those. But yeah, thank you, Sennai.

SENNAI HABTES: So that's another great point that J.J. is bringing up about creating the infrastructure for a data repository. If we are going to use indicators like this, you know, luckily enough during this process we had the Lenfest project ongoing, so there were resources dedicated to doing that. But moving forward, you know, we have to identify personnel, funding, time associated with creating a process for getting these data sets, QA/QCing them, and putting them into a format where it can be used to create ESRs that can be used for operational decision making.

And we currently don't have anything like that in the U.S. Caribbean. So, we need to bear in mind that that's something that we're going to need to do and develop if we're going to actually use this for operational decision making. Graciela.

GRACIELA GARCÍA-MOLINER: So, on that note I do have a request. For any of the projects that are ongoing regarding, you know, Lenfest, the ESR, etcetera. If there is somewhere, a table of the data sets that you have been identified-- I think Kelly and I were talking about this before --and it has a link to those web pages where the data might be available, we would like to start bringing those to the table because that would give us at least the beginning of, you know, how are we going to do this? Who would be the person to talk to? in terms of putting all this data together and also starting to identify the people from the other agencies or the other local governments or the other university, whatever it is, that might be hosting a lot of data. And that's where, you know, CariCOOS would come in in that aspect, because it might not be a huge amount of data, it might just be a whole bunch of little pieces of data that, you know, in the end it might be more difficult to assess and to have in one place than if it's one big set. So, if you can start sending me that kind of information, we can start looking to see, you

know, where to go to, who to talk to, etcetera.

SENNAI HABTES: Yep. Stacey.

STACEY WILLIAMS: So, I can contest for like the environmental data that we extracted for the Lenfest project. All that data was really compiled from satellite imagery. So, it's not one particular website, but all the biological data, like the NCMP data, all those data points, SEAMAP, the Puerto Rican monitoring, U.S.V.I. monitoring, they all have data, environmental data associated with those points. And we have that compiled into an Excel spreadsheet that I'm guessing will be shared at the-- Yeah.

So, I could give you the list of indicators that we have-- or not indicators, lists of factors --that we have right now. We were just talking about building on some of them, like with the sargassum hotspots and additional information. But yeah, to say that we have a particular website that you could go to to grab that data, for us, I don't think that that is actually the case. Yeah.

GRACIELA GARCÍA-MOLINER: So, I mean, wouldn't that be the ideal situation? That you could go to one platform. I know that there have been efforts, I know, that CariCOOS had prepared a platform for everyone to input a project, etcetera, and do a GIS. I mean, that's not exactly what we're looking for, but it would be really nice to go to the one place where you can just, at least get the basic information in just one place.

STACEY WILLIAMS: I totally agree. And something like what they've done with PRCRMP data, where you can go to a map and click on that point and then see what have been the trends in coral cover. With that point, it can also, we could include that data for the environmental factors or social economic factors, all those factors. Maybe we could just add onto that.

I know that they've been using a platform, I forget what it's called, MBON. Yeah. So, I don't know what's the limitations of that, but something like that, I think if it's possible, would be really cool. Yeah. And useful for many things.

GRACIELA GARCÍA-MOLINER: So, there are two things. One, it's availability for the scientific users and managers and that kind of thing. And that's where MBON gets complicated. It's okay for someone who's used to getting the data and looking around and doing queries, but it's not easily accessible for anyone who wants to go in and see, you know, what's being caught here and

why the river you know, came out 30 kilometers from the shoreline.

So, there are two things then that we need to talk about. One, the actual database, or mapper, or viewer that you want to do for this science. And the other one is the one that you want to have available for the public. Because we cannot forget that most of this effort really, it's leading toward the information that the stakeholders have provided for us to work with. So, I'll make that distinction and, you know, then we would have to think about who's the expert on the social side of producing science dashboards or whatever they're called. Thanks.

SEFSC-Caribbean Branch Data Sets

SENNAI HABTES: Okay, thanks all. I think let's move on. Kevin, I know we had you down here for the SEFSC Caribbean branch data sets, but I think you've discussed that already in your previous presentation. So, I'll open up the floor to you if there was anything you wanted to add on that, but if not, we can move on.

KEVIN MCCARTHY: Um, yeah. Thanks, Sennai. Yeah, I would say that I don't really have a lot to add. You know, most of our data is landings data, so that's things like the CCL data, so the fisher logbook data. That's confidential data. That's stored in an Oracle database at the Science Centers. But because it's confidential, you know, it's not open for everyone to see.

There's also Puerto Rico MRIP data, which we do have stored in files at the Science Center. Those are not considered confidential. However, they're only from 2000 to '16. The last full year is 2016. 2017 is a partial year, and it is finfish only because MRIP doesn't collect data on inverts. So, no conch, no lobster. So, kind of a data hole there for the Caribbean.

There's also the Puerto Rico electronic logbook data. Those are also confidential, but those are currently stored on the Shellcatch, so the vendor's cloud storage. We've got length composition data that's also stored at the Science Center both from the TIP trip interview program which is confidential data and from the reef visual census and from MREP. Both of those are not considered confidential. You can actually get access to the reef visual census data, the RVC data. That's the diver survey. So, I can share those links with people so you can go get those data.

And then on GitHub, there is an R package for exploring those data. I haven't ever used the, the R package for the RVC data,

but it's, it's available on GitHub. So, I can-- I don't know what the best way is to get that information out there. Maybe, Graciela, you and I can chat about that, and we can get those links out to the panel and the participants.

Um we've also got abundance data that would also be from the CCL through the commercial logbook data. Again, that's confidential data. MREP can give you abundance but that is not confidential, so you can get ahold of some of those data. The RVC data also has abundant data, and again, you can directly go to that. Life history data typically comes from individual researchers, so we don't house those data at the Science Center, or we get life history data from literature reviews. And then there's a whole slew of projects that are ongoing that will eventually be housed at the Science Center in an Oracle database.

Rachel told you the other day about the Caribbean projects inventory that's on the online data manager at the Science Center. Right now, that's sort of, as she mentioned, kept in house for Science Center and SERO staff. But there, there may be ways to get that more available. And then there's bunch of other projects that'll eventually make it into an Oracle database. But a lot of the projects are in progress. So, things like the deep-water snapper survey that's happening out on the West coast of Puerto Rico, those kinds of projects, they're still in developmental stage or very early preliminary stages. So, there's not a lot of data to be shared at this point.

And then there's a management history database, which does include management histories for the U.S. Caribbean [inaudible] is on that online data manager and that could eventually be made available.

So, that's my quick update.

SENNAI HABTES: Thanks Kevin. I might recommend when you have some time, if we could all coordinate, maybe there's a way to get a lot of those data sets you mentioned with the websites into an Excel file that you can share with Graciela that we can put up on our Google Drive so that the EBFM TAP has a quick resource to identify them and compare it to what data sets we've already used to create the indicators.

KEVIN MCCARTHY: Yeah, we can do that.

Other EBFM Project Incorporation

SENNAI HABTES: All right, thanks Kevin.

Okay. with that, I believe the only thing that we have left is Other EBFM Project Incorporation. So that would be anyone either online or here that has aspects of ongoing work in the U.S. Caribbean that they feel should be incorporated into the projects that we're currently doing through the EBFM TAP. I will leave it open for people to comment or question on that for a little while. If I see none, we'll move on to the next thing.

Quiet room. All right. So, the next one is the—Oh, yeah. Orian, go ahead. You are recognized.

ORIAN TZADIK: I would just say that I think that this-- I want to thank Graciela, for doing a really good job over the course of the last couple years directly on this bullet. And I think we've had a lot of good presentations and information directly on this topic that have come to our table. And it's been, it's been a great effort. Thank you.

SENNAI HABTES: I mean, you, you can clap J.J., you can like put on the mic and do that.

JUAN J. CRUZ MOTTA: No. These days you don't know if its rude and—

**Other Territorial and Federal Agencies About Impacts to Marine
Environments that Affects EBFM.**

SENNAI HABTES: Okay. So last but not least would be Outreach to Other Territorial and Federal Agencies About Impacts to Marine Environments that Affects EBFM. So, this was the operational strategy that we had brought up, thanks to the chair of the CFMC Marcos Hanke. He brought it to our attention and was gracious enough to come and present and attend all of the EBFM TAP. So, I want to say thank you to Marcos for being willing to come and join us for this.

What I do need to do is ask the EBFM TAP members for us to vote on this so that we can include it and I can present it up to the Council as a recommendation for us to include in the FEP as we are drafting it. So, I'm going to need a motion and a second to bring it to the floor. Before we do that, I'll just leave it open for anyone if we wanted to have a quick discussion on that. Ori is recognized.

ORIAN TZADIK: Orian Tzadik, for the record. Just question of whether we want to do that now or wait until we have a slew of things that we're going to bring to the Council.

SENNAI HABTES: Graciela.

GRACIELA GARCÍA-MOLINER: I would say that we should just discuss it a little bit. The reason for that is because, you know, while some of you that have been to the SEAMAP meeting, U.S. Fish and Wildlife, for example, it's part of the SEAMAP steering committee. They would want to, but they can't really participate in the SEAMAP. So, I think that we should go through the things that we have, like SEAMAP or other projects that involve other collaborators and start identifying those that might be because they don't have the staff or they don't have the funding, but that they might have some information that we could bring out of them.

So, you know, how are we going to do it? We discussed writing a letter. Well, we have an example of the EFH letter that was written to everyone so that they know that there is this policy out there that they have to comply with. We are requesting information, etcetera. So, you know, let's see how that plays. But I would like to have from the group, you know, something to bring back that we can discuss again.

This is something also that the stakeholders have talked about. You know, all of the conceptual models of the Clean Water Act, the EPA, USGS that has the things that they look at the sediment that comes out of the rivers, the gates, the whatever they're call. So, yeah. I think that we should at least three more minutes.

SENNAI HABTES: So, Sennai, for the record. This is just to clarify. So, what we were proposing within this strategy was that, as part of the FEP, we would include an operational objective that on an annual basis, as part of the ESR, we draft a letter to federal and territorial agencies connected with ecosystem services trends that are not necessarily managed directly by the agencies that are included in the Council. And so, my purpose for this was, having us motion and vote so that we would take it up to the Council so they would approve it and we would know, now it's part of those outlines that we're putting into the FEP. That was the only purpose for this. Kelly is recognized.

KELLY MONTENERO: This is Kelly Montenero. So, sorry if I misunderstood, but did you say annual ESR?

SENNAI HABTES: Yeah. So that is yet to be decided.

KELLY MONTENERO: Okay. Okay. Thank you.

SENNAI HABTES: So that is an idea if we ever get to the point where we have the data management system in place--

KELLY MONTENERO: Right. And capacity and funding.

SENNAI HABTES: --and capacity and funding to do so.

KELLY MONTENERO: Thank you. I got a little nervous there. Thank you.

SENNAI HABTES: Yeah, it's not, that wouldn't be related to your project. That would be under what we're dealing with here for the EBFM TAP.

KELLY MONTENERO: Okay. Perfect. Thank you.

SENNAI HABTES: Yeah.

ORIAN TZADIK: But to clarify, the letter would be annual.

SENNAI HABTES: Correct.

ORIAN TZADIK: Right. And were we discussing a single letter or was the idea to have multiple letters?

SENNAI HABTES: That is yet to be defined.

ORIAN TZADIK: Okay.

SENNAI HABTES: My understanding from what we proposed, was for there to be a single letter that could be sent out from the Council either as part of a report that the Council does or directly to agencies.

ORIAN TZADIK: Right. Okay.

SENNAI HABTES: And I think that is a decision better left to the Council and not to us.

ORIAN TZADIK: I agree.

GRACIELA GARCÍA-MOLINER: So, you know, I can tell you right now that in some cases we've been completely successful and others we have completely failed to receive anything. But we have been able to, like, for example, the old habitat maps from USGS. So, we sent letters out and actually Iris us a lot of calling and

sending emails and trying to track down who the person to contact is, because that's the other issue get the information that we need. So, you know, we'll see how successful this one would be.

SENNAI HABTES: Marcos is recognized.

MARCOS HANKE: Thank you. Thank you for the opportunity. One thing, the reason I came is because over the time the Council has been requesting actions to round up the whole system that you are creating around our ecosystem-based management, right? This is a very simple one in which, I highlight this word now, an informative letter to the agencies that are identified through the Council process and records. And every year, every two years, you guys can determine that that letter would go out to those agencies to inform them that through the process that you guys are creating, those issues were identified.

One of the main reasons for why it has to be recurrent, you know, every year or every two years, is that it will not depend on Marcos, it will not depend on the Chair of the TAP or the executive director. It is a system that over time we're going to have a track of what we have requested and the problematic on our region to be effective on ecosystem-based management. Otherwise, we are going to have a good intention of Graciela or somebody personally, which is great, but we should go a little step forward and create a system to register the great job that you guys are doing and the desire and expertise of the Council members. I'm pretty sure that the Council members will appreciate this effort from this group. Thank you.

ORIAN TZADIK: So, I like the idea that Marcos just proposed. One thing I would just say is to reiterate the need for some sort of-- what's the word? Not a power map, but a map of how the different agencies contribute, what is that they contribute to the marine environment.

It's a great idea and it's really straight forward when it's something that's easy that we can say, "oh, this needs to go to, you know, Puerto Rico Water Authority" or something like that. But sometimes it's not so straightforward.

SENNAI HABTES: So, motion and vote. Are we there or do we want to continue? Graciela, do we want to con discuss this further and hold off or no motion? Okay. So, if I can get a motion and a second to take to the Council the recommendation that we create an annual letter to federal and territorial agencies that are addressing issues related to ecosystems-based fisheries

management, as well as develop a resource for stakeholders in how they can better reach or communicate with those agencies.

ORIAN TZADIK: And that would need to come from the stakeholders directly. Right? Like it's a stakeholder forum. That's the idea.

SENNAI HABTES: So, it's creating an avenue at the Council annually for them to do that and us to provide them with the information on how to contact them.

ORIAN TZADIK: Right.

SENNAI HABTES: That's overly complicated.

ORIAN TZADIK: Not sure we need to repeat that.

SENNAI HABTES: So, let me just rephrase.

JUAN J. CRUZ MOTTA: Shouldn't we write.

ORIAN TZADIK: Yes.

SENNAI HABTES: Yeah.

STACEY WILLIAMS: I just have a question for Marcos. How do you perceive or see, like you say this to be annually or biannually, and like say fishers being involved. Do you see like fisher leaders or like the president of the Congreso, or how would it be organized to where they would approach us with, I guess their issues or concerns?

SENNAI HABTES: That was Stacey for the record.

MARCOS HANKE: Thank you, Stacey. It is much more simple than what you guys are perceiving probably. We have ten meetings of the Council, five meetings of the Council. It happened that on the record and of the issues that are related to management, we are going to discuss things that are going to come up where other agencies have something to do, or they are related to these issues that we don't have communication with. We don't have that channel to transfer those concerns that are probably very valuable to the agency to know. Right.

After a year passes, we use the record, we use what we already discussed and said, and make a list of agencies that we identified that should be informed about issues that we identify using the guidance of what you guys have been discussing for the last two days and inform them. It is not that we are going to

create a big monster that we are going to start to make meeting extra meetings or anything. It is just giving an extra voice from the Council to the agencies and to the community and register periodically, systematically what is going on. What is needed for our region.

ORIAN TZADIK: So, Marcos, there's no forum to formally request from stakeholders, say, "Come August 5th, whoever wants to make a statement come at that time." Is that also part of it or is that not a part of it? Am I understanding?

MARCOS HANKE: Yeah, actually, I'm addressing the lower bottom layer that I think is a low hanging fruit on this discussion. If the Council-- because I am part of the Council, but I cannot talk for them, they can add to this discussion. Maybe this is something that they want to pursue, but at minimum that we don't have on hand right now, we can do what I'm saying. Just using the things that are meaningful related to the record and the Council discussion and produce this letter.

I can do example. For example, over the years, always, a few things are brought to the table, right? Let's say, the need of a fishing license for recreational fishermen. Right now, we're going to have a venue facilitated by the Council on producing a letter to whoever has something to say about that to say, "Listen, we identified the need for this because of this, this, and this that was discussed on the Council to inform you." I want to stress out that this is to inform them because we are not requesting action or anything from the agency. We are just being a facilitator and responsible to our words and our actions in a systematic way. I don't know if I answer your question.

SENNAI HABTES: Miguel has this hand raised. I'm going to open the floor to Miguel.

MIGUEL A. ROLÓN: Yeah, I guess that we are getting ahead of ourselves. Number one, the Council cannot go to any other agency except to the local government representative, the Commissioner of the Union Islands and the Secretary of the Department of Natural Resources. So, when this committee tells the Council that we are ready to connect these other agencies and work with them, we will do so. But in the meantime, we need to really choose our timing for sending letters to anybody regarding anything that we're discussing this last two days.

We already engaged other agencies through Lenfest and other NGOs and the Council and when we started working with developing these models. We have the DAPs; we have the local government.

So, everybody that has something to say about this modeling etcetera has their opportunity. So, once we have something concrete from the DAP that we can share with the other agencies, we will do so.

Also, if you identify a need to contact them before that, then we'll do it. But aside from advertising our meetings and telling them, we're going to discuss this or how much you want to, or if they're interested, we cannot do much else. So, we have to be very careful with this bause the lawyers jump on me every time that somebody start mentioning other the agencies. Thank you.

SENNAI HABTES: Again, just to clarify, everyone, the purpose for this motion would be for us to include this in the FEP. Meaning, when we get to the point of drafting an FEP, part of the operational mandates that we are putting in is to recommend that the Council would create a letter summarizing how these other agencies are connected with the EBFM indicators that we are measuring. That's all that we are recommending here. It's not to draft a letter. It's not to send out any letters currently. It is to put in an operational framework within the FEP that we are developing, and we just wanted to create a motion to take that to the Council to make sure that they would approve of us, including that, as an operational mandate in the FEP as we drafted.

JUAN J. CRUZ MOTTA: Okay, so perhaps instead of a motion is just another bullet point for us to include that in the FEP. Because at the end of the day, the Council will have to approve everything in the FEP not only that operational, that specific thing. It's like, let's say with 10 objectives, right? It's like sending 10 individual objectives like a motion instead of sending the document. So, my recommendation, if that's okay, is used to leave it as a bullet point, like we did with the other stuff, to make sure we include that in the FEP, which I think is very important. Yeah, in our proposed FEP, which I think is very important.

SENNAI HABTES: I think that would be fine with me. Liajay, would you be able to bring up the draft FEP outline that we created? So, we'll kill two birds with one stone. We'll review that quickly in the last five or 10 minutes that we're over time. And the second. While Liajay is finding that, why don't we just do a motion and a second. Marcos, would that be okay with you if we just add it as a bullet point into it? Okay. All right.

So, what I need then is just a motion and a second and we can

vote on it to include this as an operational framework in the FEP draft outline. So let me, let me just rephrase that.

What I need then is a motion and a second from members of the EBFM TAP to include a recommendation for a letter that can be sent or some-- I don't, I don't know how to say that. It's past five, so my brain's kind of fogging on me. Give me one second here. Let me think about it.

GRACIELA GARCÍA-MOLINER: Kevin raised his hand so maybe he has a—

SENNAI HABTES: Yeah. Okay. Kevin.

KEVIN MCCARTHY: Are we not being overly, I don't know, litigious is not really the right word. Are we not being overly formal? Do we really need a motion for this? We stuck in all these other bullet points without motions, so I think it's fair to just stick it in as a bullet point and move on.

ORIAN TZADIK: Agreed.

KEVIN MCCARTHY: We don't need to be so terribly formal in just adding a note into our lists. Do we?

MIGUEL A. ROLÓN: I agree. You don't need that motion.

SENNAI HABTES: All right. Sounds good. I only do that cause I got in trouble for not doing that before.

KEVIN MCCARTHY: I'm suggesting we could step back from that.

Overall FEP Outline (Review)

SENNAI HABTES: I appreciate the suggestion. I will go with it for now until I get told not to.

All right. So, let's quickly review what we have. There's introduction, background, purpose, and need, goals and objectives. I'm going to go through this quickly, so as we go through it, if there are other things that people want to add in or feel that there are things that need to be changed, please stop me as we're going through it, by either raising your hand or simply unmuting yourself and interrupting me so we can do this quickly.

All right, next is section two, which was going to be defining the-- hold on, Liajay --defining the interface between Fishery

and Ecosystem Management and that. There's section A, which is jurisdictions. B, which is the Magnuson-Stevens Act. C, which is other federal law and guidance. Under that there are NOAA obligations. And two, other federal agencies, which I think maybe here is where we could add in the bullet point for this.

So, under "ii", you can put "iii". And put "operational objective to notify other agencies with informative letter on EBFM indicators associated with those agencies."

Marcos, does that fit? Okay. TAP members, is everyone okay with that? Other members and people on here? Does anyone have suggestions, changes to the wording? Are we all okay with that?

ORIAN TZADIK: Looks good.

SENNAI HABTES: Okay. I see no hands or no comments. We're going to move on. D is local regulations. E is FEP development process and reassessment. F is the local interface between fisheries, fishery communities and ecosystem management. Chapter three would be the environmental setting. Society and culture for each of the districts. B, the economics of each of the districts; in economics is connectivity.

I feel like. Oh, okay. Yeah, we did, we distinguished between economic connectivity and ecological connectivity. And then fisheries would be the regulations for each of the districts. And again, the section on connectivity. And so, I think, I'm not really sure how we want to do this, but in section three, I think we can reference the ESR being created by-

JUAN J. CRUZ MOTTA: That's number five.

SENNAI HABTES: That's number five?

JUAN J. CRUZ MOTTA: Mm-hmm.

SENNAI HABTES: Okay. Thanks J.J.

JUAN J. CRUZ MOTTA: But perhaps it would be a good idea to merge those two things. I don't know what you think. Number two and number five.

Sorry, number three and number five.

SENNAI HABTES: Graciela is recognized.

GRACIELA GARCÍA-MOLINER: So, some of the items that you have

here will be incorporated, a lot of them by reference, because the island-based FMPs have just recently reviewed the economics and social issues, etcetera. That's why they were separated into three FMPs. So, you know, it's a lot of work that has already been done in terms of the basic information that will go into this section. So, I'm hesitant to say, to put them together because you five will be all new, really.

SENNAI HABTES: I'm in agreement with that. So, let's leave it as is. Then, Liajay, if you could just put a note on the top of chapter three, put a dash, say "reference IBFMPs."

Thank you, Mandy. So just those who aren't monitoring the chat, Mandy put a note indicating that "the Gulf of Mexico Fisheries Management Council recently completed its draft FEP. It will be presented to the Council during their April meeting (morning of April 4th, I believes) TAP members might be interested in seeing how the Gulf went about their process." So, I recommend all EBFM TAP members when you have some time to review, either that process or that FEP and it'll help us inform how we can develop ours.

Okay, next down is the Conceptual Models. That has the SSC, DAPs, and other Council body conceptual models. Any other conceptual models developed by independent researchers. Stack conceptual models under Council's guidance or by independent researchers. And then, D, applications.

Section five is the present status. So there, Liajay, if you could just put a dash after "present status" and put a note to reference-- Kelly, how would you like us to make note of the report from your project?

KELLY MONTENERO: I mean, I see it already listed as B. To me that seems all right, but I can think about it and get back to you if you need a better wording.

SENNAI HABTES: I think that's fine. So, delete, leave it as is. Section six are Future Prospects, which are quantitative models, restoration and mitigation. Section seven, assessing fishery and ecosystem conditions. That includes data availability, needs strategies; assessment within an ecosystem context; developing group (e.g., biomass based) assessment approaches; assessing EFH; understanding the uncertainties and variability of environmental changes and human activities on ecosystem and fisheries resources.

Section eight is the coordination of ecosystem approaches to

fisheries management in the U.S. Caribbean. So that includes a consideration for management, which should include any MSA revisions; FMP amendments; and CFMC policy statements. Section B includes a process for bringing the EBFM to the Council which is to convey the notion that TAP is still in discussion on this. The EBFM might inform management decisions made by the Council. C is to identify potential management strategies. D is integrated ecosystem assessment. We have a note there that we may not have one for a while, but this outline includes not just what we have, but what we need.

Nine is research needs, which we have nothing in there. So, if anyone has subsections that they want to add in as bullet points as placeholders for now, I think it would be a good time to discuss.

GRACIELA GARCÍA-MOLINER: For research needs. Okay. So, the CFMC has the five-year strategic plan in place. There is the development of the implementation plan. So, at some point we-- and we should put this in the next agenda for the TAP meeting --need to actually go through the strategic plan, with the implementation plan, with the suggestions that you might have to do specific research for any one of those items in the plan. Not for the FEP, but if I don't say it now, I will forget. But that's where that should be filling out this outline.

SENNAI HABTES: Okay. So Liajay, just put a note in "A", to merge identified research needs from EBFM TAP with CFMC five-year strategic plan.

LIAJAY RIVERA GARCÍA: Okay. Identify?

SENNAI HABTES: Research needs.

LIAJAY RIVERA GARCÍA: Mm-hmm.

SENNAI HABTES: From EBFM TAP.

LIAJAY RIVERA GARCÍA: Mm-hmm.

SENNAI HABTES: With identified research priorities.

LIAJAY RIVERA GARCÍA: Mm-hmm.

SENNAI HABTES: In CFMC five-year plan.

Is that good? Graciela. Okay. Kevin, I see your hand is raised.

KEVIN MCCARTHY: Yeah. Thanks, Sennai. So, what is our goal here in this last bit? We're sort of very quickly going through this outline of the FEP. Are we going to make a decision here? Because I feel like this, if that's-- well, let me just ask that. What's our goal here? Are we just reviewing the outline of the FEP?

SENNAI HABTES: That is correct.

KEVIN MCCARTHY: Or we're going to take some action?

SENNAI HABTES: We're not going to take action at this time. This is a reminder for all the EBFM TAP members that this is in our drive, that we need to take a look at it and continue adding to it and working on it. But I wanted everyone who's at the meeting to be aware of what we have in it and that if there are recommendations to include anything on it or others that want to look at it, discuss it and add things to it, that they should contact me or one of the Council staff, like Liajay, Graciela. And we can take that and add it to this temporarily for our next meeting when we can discuss it more in detail and make decisions and recommendations on it.

KEVIN MCCARTHY: Okay, great. Great. Because I was hoping we weren't going to rush this. So, it sounds like we will not. So, I'm going to recommend in the interest of where we are on the clock that we not spend a lot of time wordsmithing this right now. We all have an opportunity to look at it. We've all got access to it. We can then look at it at our leisure and add in suggestions or edits at that point. But I feel like I'm feeling really rushed to go in here and put together a list of research needs, for example. And I don't think that that's necessary at this moment.

I think we can all add to them in a more thoughtful way than to try and rush to put some things on here when we've all been on a very long two-day meeting.

SENNAI HABTES: No. I don't disagree with you. I think it's more along the lines of, I just want everyone to see where it is. If there were things that came to people's mind immediately that they felt they wanted to throw up there, that's fine. And then we can go back to it at a later date, particularly at the next meeting. But I want us to get through things, so we are reminded of the aspects of the EBFM TAP that we need to pay attention to as this process continues going forward. Does that make sense, Kevin?

KEVIN MCCARTHY: Yeah. Agree, [inaudible] thing on that.

SENNAI HABTES: Okay. So, I think 10 is the last section, right, Liajay?

LIAJAY RIVERA GARCÍA: Yes.

SENNAI HABTES: Yeah. So, if anyone had any comments on research needs, just feel free to add them in the chat or send an email to me. And then the last section was performance evaluation, which was creating a performance measure; a management strategy evaluation; and a review and revision schedule for the FEP.

Okay. And so, just again, as a reminder, purpose for this is so we're all aware. This is in the drive. EBFM TAP members you all have access. If you don't, please email me and let me know, and we'll make sure to get you access. Those of you that are partner or that we're just joining for the meeting, if you have questions on any of the materials that we are going through for EBFM TAP require more information, please feel free to contact myself or one of the Council's staff and we will get you what you need.

Okay. with that, I'm going to close this section and I'm just going to open up the floor for five minutes for other discussion. If I hear none or see none, then I will ask for us to motion second and adjourn the meeting.

Okay. I am not seeing any indication—

ALIDA ORTIZ SOTOMAYOR: Motion to adjourn. [laughter]

SENNAI HABTES: All right.

JUAN J. CRUZ MOTTA: Second.

SENNAI HABTES: So, who seconded? Just for the record.

JUAN J. CRUZ MOTTA: J.J. Cruz. Second.

SENNAI HABTES: All right. Thank you J.J. and thank you Alida.

With that, I want to thank everyone for their participation. I know that today was a long day, but I think we got a lot out of it. As always, thank you to all of our EBFM TAP members, to all of our participants from NOAA who are partners on the project with us, and most importantly, to our CFMC staff who always do so much work to get all of this put together, handled and

managed in a very professional and amazing setting. So, thank you to all of you for all the work you do. We appreciate everyone's time and efforts in this process. Thank you again to everyone for your participation.

With that, it is 5:20 PM on March 17th, 2022. At this time, we will adjourn the CFMC EBFM TAP meeting that ran from March 16th to 17th in 2022. Thanks all and have a good rest of your day.

(Whereupon, the meeting adjourned on March 17th, 2022.)