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2  
3 **CARIBBEAN FISHERY MANAGEMENT COUNCIL**  
4 **SCIENTIFIC AND STATISTICAL COMMITTEE**  
5 **Webinar**  
6

7 July 27-28, 2020  
8

9 The Scientific and Statistical Committee of the Caribbean Fishery  
10 Management Council convened via webinar on Monday, July 27, 2020,  
11 and was called to order by Chairman Richard Appeldoorn.  
12

13 **CALL TO ORDER (8:55)**  
14

15 **RICHARD APPELDOORN:** Let's do the roll call with the SSC members  
16 first. I am Rich Appeldoorn, SSC Chair. Churchill.  
17

18 **CHURCHILL GRIMES:** Churchill Grimes, SSC, present.  
19

20 **RICHARD APPELDOORN:** Walter.  
21

22 **WALTER KEITHLY:** Walter Keithly.  
23

24 **RICHARD APPELDOORN:** Doug.  
25

26 **DOUGLAS GREGORY:** Doug Gregory is here. Good morning, all.  
27

28 **RICHARD APPELDOORN:** Tarsila.  
29

30 **TARSILA SEARA:** Hello, everyone. Tarsila Seara, SSC.  
31

32 **RICHARD APPELDOORN:** Juan.  
33

34 **JUAN CRUZ-MOTTA:** Good morning. Juan Jose Cruz, SSC.  
35

36 **RICHARD APPELDOORN:** Joe.  
37

38 **JOE KIMMEL:** This is Joe Kimmel, SSC.  
39

40 **RICHARD APPELDOORN:** Vance.  
41

42 **VANCE VICENTE:** Vance Vicente, SSC.  
43

44 **RICHARD APPELDOORN:** Kevin.  
45

46 **KEVIN MCCARTHY:** Good morning. Kevin McCarthy, SSC.  
47

48 **RICHARD APPELDOORN:** Jason.

1  
2 **JASON COPE:** Jason Cope, SSC.  
3  
4 **RICHARD APPELDOORN:** All right. Now everybody else. Liajay.  
5  
6 **LIAJAY RIVERA:** Liajay Rivera, council staff.  
7  
8 **RICHARD APPELDOORN:** Graciela.  
9  
10 **GRACIELA GARCIA-MOLINER:** Graciela Garcia-Moliner, council staff.  
11 Buenos dias.  
12  
13 **RICHARD APPELDOORN:** Julian.  
14  
15 **JULIAN MAGRAS:** Julian Magras, DAP Chair, St. Thomas/St. John.  
16  
17 **RICHARD APPELDOORN:** Thank you, Julian. Orian.  
18  
19 **ORIAN TZADIK:** Good morning, everyone. Orian Tzadik, Pew  
20 Charitable Trusts.  
21  
22 **RICHARD APPELDOORN:** Vanessa Ramirez.  
23  
24 **VANESSA RAMIREZ:** Good morning, everyone. Vanessa Ramirez, council  
25 member and commercial fisherman, Puerto Rico.  
26  
27 **RICHARD APPELDOORN:** Marcos.  
28  
29 **MARCOS HANKE:** Marcos Hanke, Council Chair. Good morning,  
30 everyone.  
31  
32 **RICHARD APPELDOORN:** Cordero.  
33  
34 **BILL CORDERO:** Good morning, everyone. Bill Cordero, and I'm  
35 calling myself the staff interpreter this morning.  
36  
37 **RICHARD APPELDOORN:** Iris.  
38  
39 **IRIS OLIVERAS:** Iris Oliveras, council staff.  
40  
41 **RICHARD APPELDOORN:** Sarah Stephenson.  
42  
43 **SARAH STEPHENSON:** Sarah Stephenson, NOAA Fisheries.  
44  
45 **RICHARD APPELDOORN:** Nelson.  
46  
47 **NELSON CRESPO:** Good morning, everyone. Nelson Crespo, DAP Chair,  
48 Puerto Rico.

1  
2 **RICHARD APPELDOORN:** Christina.  
3  
4 **CHRISTINA OLAN:** Good morning, buenos dias. Christina Olan,  
5 council staff.  
6  
7 **RICHARD APPELDOORN:** Jocelyn.  
8  
9 **JOCELYN D'AMBROSIO:** This is Jocelyn D'Ambrosio, NOAA Office of  
10 General Counsel.  
11  
12 **RICHARD APPELDOORN:** Julie.  
13  
14 **JULIE NEER:** Good morning. Julie Neer, SEDAR.  
15  
16 **RICHARD APPELDOORN:** Mandy.  
17  
18 **MANDY KARNAUSKAS:** Good morning. Mandy Karnauskas, Southeast  
19 Fisheries Science Center, NOAA Fisheries.  
20  
21 **RICHARD APPELDOORN:** Lastly, Maria del Mar.  
22  
23 **MARIA LOPEZ:** Good morning. This is Maria Lopez, NOAA Fisheries.  
24  
25 **RICHARD APPELDOORN:** Thank you, everybody.  
26  
27 **GRACIELA GARCIA-MOLINER:** Richard, I have a couple of housekeeping  
28 items.  
29  
30 **RICHARD APPELDOORN:** Okay.  
31  
32 **GRACIELA GARCIA-MOLINER:** But, first, you have to say the date and  
33 the time of the SSC meeting.  
34  
35 **RICHARD APPELDOORN:** I did do that, but I'm willing to do it again.  
36  
37 **GRACIELA GARCIA-MOLINER:** Please.  
38  
39 **RICHARD APPELDOORN:** All right. Again, this is the SSC meeting,  
40 and it's now 10:17, and it's still July 27, 2020. You're going to  
41 get a lot of noise here from my phone, probably.  
42  
43 **GRACIELA GARCIA-MOLINER:** The housekeeping item is that we do have  
44 simultaneous translation, and we were asked to have the SSC meeting  
45 with this interpretation available in English and Spanish, and so  
46 what you should be seeing on the screen are the instructions. If  
47 you know of anyone who might want to join us, please pass along  
48 the information, and it was in the Federal Register notice.

1  
2 I will put up the Federal Register agenda for you, and so give me  
3 a second. You have on the screen now the Federal Register notice  
4 of the agenda.

5  
6 **RICHARD APPELDOORN:** As everybody can see, the agenda is fairly  
7 fluid, and we will need to, as our primary task, try to complete  
8 the sub-models and all the connections within those, and then there  
9 is what I will call some housekeeping issues that we will then  
10 have to make sure that we've covered, and so that's our real goal  
11 for this meeting.

12  
13 **GRACIELA GARCIA-MOLINER:** If there are no modifications, let me  
14 know now, and, secondly, the only thing is that you have started  
15 the meeting, but you are, as Chair, able to change -- If you want  
16 to extend the meeting past 5:00 p.m., or, if you want to start  
17 earlier tomorrow, that's your prerogative, and so just let us know,  
18 so that it can be either modified on the agenda or told to everyone  
19 who is online to be aware of that change.

20  
21 **RICHARD APPELDOORN:** Okay. I don't see a real need to change  
22 anything on the agenda, but, if somebody on the committee has an  
23 issue, let me know. Hearing nothing, I would say that we could  
24 then move to the first item on the agenda.

25  
26 **GRACIELA GARCIA-MOLINER:** I believe Liajay has your presentation,  
27 the one that you sent us today.

28  
29 **RICHARD APPELDOORN:** Let me know when that's up, because,  
30 obviously, I can't see it, but I have the presentation.

31  
32 **GRACIELA GARCIA-MOLINER:** Okay. It's up, and it's on the first  
33 slide.

34  
35 **OVERVIEW SSC ECOSYSTEM CONCEPTUAL MODEL AND SUB-MODELS (16:14)**

36  
37 **RICHARD APPELDOORN:** Okay. Our purpose here is continue the  
38 ecosystem conceptual model, and I'm going to give a little review  
39 as to where we ended up and what we're looking forward to, both in  
40 this meeting and beyond.

41  
42 This is a reminder that we have eight sub-models in the conceptual  
43 model, and the sub-models have variable numbers of components, and  
44 these are all listed here. The numbers in the parentheses are the  
45 number of components at the moment, and this provides us with over  
46 64,000 potential connections, which is why we've been working on  
47 this for a long time.

48

1 This is the steps that we need to go through within the course of  
2 this meeting, and so we need to finish, first of all, the competing  
3 use of resources sub-model, and that was the last one we were on,  
4 and I think we've gotten through the first three rows of that, and  
5 so the first item will be to finish that.

6  
7 Then we need to revisit the sub-model, because there are a number  
8 of remaining issues, some of which have notes on from the previous  
9 meeting, but some of the issues then are make sure we have a  
10 definition of the components, and the poster-child for this, in my  
11 mind, is highly migratory species, but there may be others that  
12 are an issue.

13  
14 We want to see whether we want to add, delete, or move components  
15 within each of the sub-models, and there were a number of issues  
16 that came up when we were going through these. I think we were  
17 using zeroes at some place in the matrix as placeholders that we  
18 could not decide what we wanted to do there, and we had issues  
19 with non-linear responses, where something could either positively  
20 or negatively affect another component, and how do we deal with  
21 that within the matrix?

22  
23 Then our next step, after we finish all of that, will be to look  
24 for the connections between the sub-models, and we're not actually  
25 going to do that at the meeting, but there will be a homework  
26 assignment, and I will touch on that a little bit here, and then  
27 we'll bring that up at the end of the meeting, and the committee  
28 will be asked to attend to that on their own and send in their  
29 responses.

30  
31 This is just an example of one of the sub-models, and this is the  
32 marine ecosystem components. The blue lines are positive, and the  
33 reddish lines are negative, and, again, this is actually one of  
34 the more simple ones that we had gone through, and the next slide  
35 shows the matrix of those lines in the Excel spreadsheet, and you  
36 will see here -- I think, Liajay, you used the coding that anything  
37 in red was a change or addition that we made in the last meeting  
38 from what we had at the previous meeting, and so it's those  
39 matrices that we're going to be going through.

40  
41 A more complicated example is the socioeconomic and cultural  
42 drivers sub-model, and we had some -- We spent a lot of time on  
43 this, and we did have some issues with this. For example, the  
44 regulatory structures box, we had talked about perhaps moving or  
45 deleting, but there's a lot of lines that go to it and come from  
46 it, and so we'll have to see, and that's the box in the lower-  
47 right, and so we'll have to see how we want to handle that.

48

1 Again, on the next slide, this is the Excel spreadsheet matrix for  
2 that sub-component sub-model, and you can see, again, there's lots  
3 of connections here, and we had made a number of additions here,  
4 but I think there were also some questions that were pending, in  
5 terms of directions of connections.

6  
7 Moving forward, just as what we're going to be seeing and where we  
8 are, we'll eventually be working towards making the connections  
9 between sub-models, and this is one place where we were back in  
10 2019, where we did draw some connections here between components  
11 within sub-models to other components, or components to just the  
12 sub-model without a specific component within that.

13  
14 If we look at the entire matrix, on the diagonal, you are looking  
15 at the boxes of the sub-models, and all that white space outside  
16 of that is where the connections between the sub-models occur, and  
17 anything that's in green is where we had a line drawn on that  
18 previous slide, just as an indicator of kind of we have looked at  
19 some of this, but we have a lot of open space here, and so we need  
20 to be able to address that.

21  
22 I would also point out that, when we start looking at these  
23 connections, we should keep in mind the presentations that were  
24 given to us by both Vance and Reni, looking at kind of doing a  
25 different approach how to group things, and my take on this was  
26 that this might inform us about how we're going to have connections  
27 between the sub-models, and here was another one on the next slide,  
28 and the simplification of that is on the next slide.

29  
30 Just to briefly introduce to you where we're going to go with this,  
31 the next slide, and, as I said, we'll come back to this toward the  
32 end of the meeting, refresh everybody's memory, but this is a  
33 matrix that encompasses the future SSC assignments, and what we  
34 will want to do is identify, for each potential connection between  
35 sub-models, the three most important components.

36  
37 I, obviously, can't use a cursor here, but, if you go down the  
38 fishing column to the first open area, which is the socioeconomic  
39 and cultural drivers box, you can see there's actually three rows  
40 in that, and so what we want are the top three connections, and so  
41 we would say, as socioeconomic affecting fishing, what particular  
42 driver components would be the first column in that, that affects  
43 fishing, and what would be the response component, and so where  
44 does the arrow go to, if you will, which direction is it going  
45 from, and, in this case, it should go from socioeconomic to  
46 fishing, because there's a separate place to do the opposite, and  
47 the strength of that characterization. The third column is whether  
48 it's a plus or minus.

1  
2 That is what we're looking for. The last slide is kind of an  
3 example of that, and this is the socioeconomic sub-model, and I  
4 somewhat arbitrarily drew three ovals around three separate  
5 components of that model that might be important. We might say,  
6 for example, these are the most important things that affect the  
7 fishing sub-model, and so those could be the three things we would  
8 enter, and we would say those three things go to a specific  
9 component within the fishing sub-model.

10  
11 It's also possible that we might say actually fishing regulatory  
12 structure is the most important, and it goes to three different  
13 components in the fisheries sub-model, and so you're not restrained  
14 to have three different things when you talk about the three most  
15 important connections between socioeconomic and cultural drivers  
16 and fishing, in this example, but we'll go back to that again at  
17 the end of the meeting, so everybody is refreshed about what we're  
18 expecting from that and how it will be used, and I think J.J. will  
19 be able to give us a little bit of background about how that will  
20 be useful to him in dealing with some aspects of developing the  
21 larger-scale ecosystem component plan, and also as it relates to  
22 guidance for us to really deal with all of the connections that we  
23 need to deal with. That's my presentation, and are there any  
24 questions?

25  
26 **JUAN CRUZ-MOTTA:** Richard, I wanted to just clarify that, about a  
27 month ago, we had a conversation with Jocelyn, who is the legal  
28 advisor for the council, and it was stressed, and it was strongly  
29 suggested, that the activities of our research should be kept  
30 totally independent from the activities of the council, including  
31 the SSC, and so I cannot like hint where the models should go or  
32 what we should do, within the context of the research.

33  
34 I mean, I was advised not to give any direction to our discussion  
35 whatsoever, only because whatever -- The research we're doing has  
36 to be totally independent from what we're doing here. When it's  
37 complete, the research, the SSC might want to hear about it, and  
38 the council might want to hear about it, but, during the process,  
39 it should be a totally independent process, and I don't know, but  
40 Jocelyn is on this call, and she could report further on this.  
41 Thank you, Richard.

42  
43 **GRACIELA GARCIA-MOLINER:** Jocelyn, are you online?

44  
45 **JOCELYN D'AMBROSIO:** I was dealing with something else for a  
46 moment. Can you repeat the question?

47  
48 **JUAN CRUZ-MOTTA:** I was saying that like Richard -- I don't exactly

1 -- Now I don't remember the exact words, but he was suggesting  
2 that I give a bit of model background on these conceptual models  
3 and where we should be heading with those, and so, in order to be  
4 beneficial for the research we are conducting, and I just clarified  
5 that we had a conversation, a call, about a month ago where you  
6 stressed the need of the research activities to be totally  
7 independent from the activities of the council, including the SSC,  
8 and so I was saying that I cannot direct the development of the  
9 conceptual models based on what we want from them and that I was  
10 not going to be able to fulfill Richard's request. Then I don't  
11 know if you wanted to add something on that or have a comment on  
12 that. Thank you.

13  
14 **JOCELYN D'AMBROSIO:** Thank you. In terms of keeping the different  
15 processes separate, I think we just want to make sure that the  
16 different roles and responsibilities -- So we understand what the  
17 SSC is doing and what the Technical Advisory Panel is doing and  
18 what Lenfest is doing, but I think, if the Lenfest research is  
19 used by any of those bodies when it's completed, or if you have  
20 ideas that you're bringing to the table, given your research, you  
21 can do that.

22  
23 I think we just don't want, like we said, for Lenfest to direct  
24 these bodies, but it becomes just trying to parse out what role  
25 you're filling, and so, if you're saying I've been doing this, or  
26 thinking about this in this way, and I'm just sharing this  
27 experience, and then whichever body you're sharing it with takes  
28 that into account, I think that's one thing, but, if you're sort  
29 of directing it so that it's coming from Lenfest, then that would  
30 be more problematic, but it's just finding that line, given that  
31 there's a lot of persons that are working on the different  
32 projects, and there's a lot of overlap, and so I think, if you're  
33 sharing your research and sharing your understanding, I think  
34 that's fine, but, as you're sort of distinguishing, I think  
35 directing might be a little bit different, but sharing is okay.

36  
37 **JUAN CRUZ-MOTTA:** Thank you, Jocelyn. I was saying that, that, if  
38 the SSC wants to know about my research, once it's completed, that  
39 would be fine, but, at this moment, provided that the research has  
40 not been finished, I cannot direct where our models could go.  
41 Thank you, Jocelyn.

42  
43 **RICHARD APPELDOORN:** Thank you, all, for that clarification, and,  
44 yes, I had understood that is the case, but that, for this  
45 approach, this homework assignment is going to be useful, I think,  
46 in helping us to focus our discussion on the connections across  
47 sub-models, and that was the initial rationale for coming up with  
48 this assignment.

1  
2 **VANCE VICENTE:** Richard, I'm not very clear of what J.J. is trying  
3 to say. I mean, I can hardly think of any research that would not  
4 fit into one of the sub-models or the general conceptual model,  
5 and I don't understand what J.J. is trying to say.  
6  
7 **RICHARD APPELDOORN:** The issue is that the research that J.J. is  
8 doing, which is funded by the Lenfest Program, should not be  
9 directing what the SSC is doing. It does not mean that the SSC  
10 cannot use research that is available to us. It also does not  
11 mean that Lenfest cannot use information that's available to them,  
12 but it does mean that the SSC is driven by its own needs and not  
13 by the needs of anybody else's research program.  
14  
15 **VANCE VICENTE:** Okay. Thank you.  
16  
17 **JUAN CRUZ-MOTTA:** Thank you, Rich. That's a very good summary of  
18 what I was trying to say. Thank you, Rich.  
19  
20 **RICHARD APPELDOORN:** Okay. Graciela, how do we want to proceed  
21 here, because I still don't have an internet connection. I think  
22 I can call up the matrix that we're going to discuss first, so I  
23 can have it on the screen.  
24  
25 **GRACIELA GARCIA-MOLINER:** I think that Liajay can pull up the one  
26 that you left over at the last meeting, and so Joe was directing  
27 this, and you can follow on your own screen. We will make sure  
28 that Joe mentions the column and the row, so that we can direct  
29 you of where we're heading. Is that okay?  
30  
31 **RICHARD APPELDOORN:** Yes, I think so. I have it up on my screen,  
32 and I just want to make sure it's the same thing that you guys  
33 have. This is the one that you had sent out to everybody?  
34  
35 **GRACIELA GARCIA-MOLINER:** Yes, the most recent one, and so the  
36 matrix itself is what we need on the screen, and so, Liajay, if  
37 you can just move the sub-model, the graphic, out and just make  
38 bigger the matrix. It is the one -- It is called  
39 SSC\_submodels\_for\_review\_July23\_20 Excel file. There we go.  
40 That's what everyone is seeing on the screen right now.  
41  
42 **FINISH THE COMPETING USE OF RESOURCES SUB-MODEL (38:00)**  
43  
44 **RICHARD APPELDOORN:** Okay, and my understanding is that we finished  
45 the first three rows. Do we need to pick it up from the fourth  
46 row? Joe, do you want to go ahead and lead this discussion again?  
47  
48 **GRACIELA GARCIA-MOLINER:** Before you go on, there are three colors

1 on the screen right now. There is a red, and there is a blue, and  
2 that has been the issues, and then there is the black, the ones  
3 that Joe will be going over to decide if there is going to be any  
4 change or not.  
5  
6 You also should have, on your own screens, on the right-hand side  
7 of your screen, probably, there is a little camera and a plus and  
8 a minus, so you can have your own zoom-in and zoom-out capability.  
9  
10 **JOE KIMMEL:** Where is that again, Graciela? On the right-hand  
11 side?  
12  
13 **GRACIELA GARCIA-MOLINER:** On mine, it's on the right-hand side.  
14 It should be a little black label type of thing that has a little  
15 camera on top and a plus and a minus.  
16  
17 **LIAJAY RIVERA:** I can put it over the shared screen, and then the  
18 plus and minus sign will show up, and that's the zoom options.  
19  
20 **JOE KIMMEL:** Okay. I can see it okay, so that I can start the  
21 discussion, if you like. Okay. We are starting on, I guess, noise  
22 generation, and I guess it's Row Number 5, and, with regard to  
23 noise generation and coastal development, I had put down a  
24 positive-one for noise generation and coastal development,  
25 figuring that coastal -- I am still sometimes confused with the  
26 direction that I'm thinking here, but it's either a plus-one or a  
27 minus-one. Has anybody got any comments on that one?  
28  
29 **RICHARD APPELDOORN:** Well, first, I would like -- Mine has the  
30 first column of marine development and then coastal development,  
31 and you had noise generation comments for both of those, and so I  
32 am not seeing --  
33  
34 **LIAJAY RIVERA:** I just fixed it. Can you see it now, the marine  
35 development, Column B?  
36  
37 **GRACIELA GARCIA-MOLINER:** Richard, you were correct, and so there  
38 was one additional column. It's marine development first and then  
39 coastal development, B and C.  
40  
41 **JOE KIMMEL:** Okay. So I had a one in both of those columns, marine  
42 development and coastal development, and so does anybody want to  
43 discuss either one of those? I think, if there's marine  
44 development or coastal development, there is going to be noise  
45 generation associated with it, whether it's positive or negative.  
46  
47 **RICHARD APPELDOORN:** All right. I thought we were going the other  
48 way, and so anybody can correct me if I'm wrong, but the first

1 column would be does noise generation affect marine development,  
2 or does noise generation affect coastal development, and not the  
3 other way around, and so does somebody have a better memory than  
4 me?

5  
6 **TARSILA SEARA:** That's how I remembered that we were doing it,  
7 too.

8  
9 **JOE KIMMEL:** Okay. So I guess noise generation won't affect either  
10 one of those, and so that should be a zero there in both of those,  
11 and in the coastal development column as well. Will noise  
12 generation affect military uses? I would say no.

13  
14 **JUAN CRUZ-MOTTA:** I agree.

15  
16 **JOE KIMMEL:** So that should be a zero as well, or nothing. Noise  
17 generation affecting large-vessel shipping activity, no. Large-  
18 vessel shipping activity would affect noise generation, but not  
19 the other way around, and so I guess that's a zero as well. Would  
20 you agree, Rich, or anybody?

21  
22 **RICHARD APPELDOORN:** I would agree, and I am actually checking the  
23 other direction, and we seem to have the scores appropriate, and  
24 so, yes, we're in a good spot so far.

25  
26 **JOE KIMMEL:** Okay. Then noise generation affecting waste, and I  
27 would say no, and that should be a zero as well. Noise generation  
28 and artificial reef is the same, and it's already a zero. Noise  
29 generation and the energy sector, no.

30  
31 **VANCE VICENTE:** Well, maybe I'm looking at it the other way, but  
32 if a project, a proposed action, does involve generation of noise,  
33 there is very specific decibel limits which the proponent has to  
34 adhere to, and so, in that respect, the noise generation would  
35 affect the power line sector, et cetera.

36  
37 **JOE KIMMEL:** The energy sector you're saying, Vance?

38  
39 **VANCE VICENTE:** Yes.

40  
41 **JOE KIMMEL:** Isn't that going in the direction the opposite way?

42  
43 **VANCE VICENTE:** All I'm saying is they have to comply with very  
44 specific noise standards, depending on the decibels generated by  
45 a given industry, and that's my point, and that's all.

46  
47 **JOE KIMMEL:** Okay.

48

1 **WALTER KEITHLY:** Well, let me ask Vance a question. Is that true  
2 just with the energy sector, or might that also be true with  
3 military use, or even coastal development, where there has to be  
4 a permit where you pre-specify your decibel level and the activity  
5 is granted or rejected based on the permit that may say how many  
6 decibels will be --  
7  
8 **VANCE VICENTE:** It's an air quality standard, and so it would be  
9 across the board.  
10  
11 **WALTER KEITHLY:** Well, if that's the case, I think you may need to  
12 reconsider the other columns that we've already discussed.  
13  
14 **VANCE VICENTE:** Yes, I think exactly.  
15  
16 **RICHARD APPELDOORN:** I would disagree with all of that. The energy  
17 sector is the one that's generating noise. If there's a cap on  
18 how much they can do, it isn't coming from noise generation.  
19 That's coming from regulatory structure, and so that would be an  
20 arrow coming in from the other sub-model.  
21  
22 **JOE KIMMEL:** I see your point. Vance and Walter have got good  
23 comments there, but it shows how you can get really confused about  
24 the direction on these things. Is everybody happy with where we  
25 are now?  
26  
27 **RICHARD APPELDOORN:** Well, I don't know where you are now. If it  
28 was a blank, it would be happy.  
29  
30 **WALTER KEITHLY:** I am happy, but I think what Rich just said on  
31 regulatory structure, that basically affects everything that I'm  
32 looking at on these columns. I think, if we start going to that  
33 level -- Well, let's proceed. I am going to think about that as  
34 we proceed, but, if we say we're giving these all zeroes on this  
35 column, noise generation, because the regulatory structure  
36 determines the amount of noise that can be used or given, that  
37 seems like regulatory structure would probably affect everything  
38 in a similar manner, coastal development and marine development  
39 and so forth, but let's continue, and I will think about it some  
40 more.  
41  
42 **JOE KIMMEL:** Okay. Well, we're on the row of Row Number 5 still,  
43 noise generation, and we're out here to -- We just finished the  
44 energy sector, which was a zero, and then light contamination is  
45 a zero, and I don't know if anybody has a problem with that one.  
46 Then, would noise generation would affect mariculture, I don't  
47 know. For some animals, maybe, or plants, but I don't think it  
48 has a major effect, and so I might put a zero there as well.

1  
2 I don't see where -- Well, noise generation and research.  
3 Depending on the research, it might be important, and I would put  
4 a red one there. Red is what now? Is that positive or negative,  
5 or are we talking about positive and negative?  
6  
7 **RICHARD APPELDOORN:** Red is it has been edited already.  
8  
9 **JOE KIMMEL:** I am going to suggest a one for noise generation and  
10 research.  
11  
12 **RICHARD APPELDOORN:** That sounds good to me.  
13  
14 **JOE KIMMEL:** Okay. Noise generation and boating, I don't think  
15 noise generation affects boating. It's the other way around, and  
16 so I would put a zero there. I had a three there before, because  
17 I was thinking about boating causing noise generation, but anyway,  
18 and, for marina activity and noise generation, I don't think that  
19 has an important impact either, and so that should be another zero.  
20  
21 **RICHARD APPELDOORN:** A question. Going back to mariculture, would  
22 noise levels affect where mariculture activities might occur, or  
23 not might occur, but -- Well, yes.  
24  
25 **JOE KIMMEL:** Well, that's what I was saying. Depending on what  
26 you're trying to mariculture, noise might be a factor, but it would  
27 have to be one heck of a noise, and, unless the mariculture was  
28 situated very close to the source of the noise generation.  
29  
30 **RICHARD APPELDOORN:** Well, I could think of situations where noise  
31 would affect your ability to culture things, but this is a  
32 competing uses issue, and I don't think it's going to affect  
33 mariculture as a competing use.  
34  
35 **JOE KIMMEL:** Okay.  
36  
37 **RICHARD APPELDOORN:** Correctly so, I guess I would agree with  
38 having this be blank.  
39  
40 **JOE KIMMEL:** Well, what do you think about -- We've put a one down  
41 under research, which is the next column, and I thought that that  
42 might -- Noise generation might affect research.  
43  
44 **RICHARD APPELDOORN:** It might even be higher than a one.  
45  
46 **JOE KIMMEL:** It might be.  
47  
48 **RICHARD APPELDOORN:** Depending on the nature of the research.

1  
2 **JOE KIMMEL:** So what do you think? Should we put a two there, or  
3 just leave it as a one?  
4  
5 **GRACIELA GARCIA-MOLINER:** I have a comment from Michelle Scharer,  
6 and so, in the case of passive acoustic research, it would affect.  
7  
8 **JOE KIMMEL:** I agree with that too, and so why don't we put a two  
9 there?  
10  
11 **RICHARD APPELDOORN:** Okay.  
12  
13 **JOE KIMMEL:** Okay. Boating, no problem there. Marina activity,  
14 no effect there. Recreational diving, I wouldn't think it has an  
15 effect there. Conservation and restoration, maybe that needs a  
16 one. What do you think?  
17  
18 **RICHARD APPELDOORN:** Yes, I would agree with a one. By the way,  
19 these both would be negative, right? There's a negative impact on  
20 conservation and restoration and negative impact on research.  
21  
22 **JOE KIMMEL:** Okay. Yes. So negative-one, and back on research  
23 would be a negative-two, I guess. Moving down to the next row,  
24 Number 6, large-vessel shipping activity and marine development,  
25 I've got a two there, and it's been a long time since I looked at  
26 this one. I think it probably -- Large-vessel shipping activity  
27 might affect whether you want to have marine development or coastal  
28 development, but I think maybe they should be ones. What do you  
29 think?  
30  
31 **TARSILA SEARA:** Is dredging included as marine development?  
32  
33 **JOE KIMMEL:** I would think so. The same for coastal development,  
34 dredging and that sort of -- Building docks, et cetera. Large-  
35 vessel shipping activity -- Should we move on to the next row,  
36 military uses? Has anybody got any problems with the first two  
37 rows? Okay.  
38  
39 Large-vessel shipping activity and military uses, I put a one there  
40 as well. The military usually uses large vessels when they're at  
41 sea, or relatively large vessels, compared to outboard motors and  
42 such, and so that's why I say large-vessel shipping activity and  
43 marine uses should have a one, but maybe that's not a good enough  
44 reason. What do you think, everybody, anybody? Do you agree or  
45 not agree?  
46  
47 **WALTER KEITHLY:** I certainly agree that large vessels constitute  
48 a large part of military uses, and so I don't know where it stands

1 in the scheme of thing, and I don't like deciding numbers anyway,  
2 but I agree that it ought to be positive.  
3  
4 **JOE KIMMEL:** Okay. Well, let's just leave it as a one, and, if we  
5 need to, we can come back to that.  
6  
7 **RICHARD APPELDOORN:** Wouldn't it be that military use generates  
8 large-vessel shipping activity?  
9  
10 **JOE KIMMEL:** So that's the opposite direction, you're saying, than  
11 what I was proposing.  
12  
13 **RICHARD APPELDOORN:** Yes.  
14  
15 **JOE KIMMEL:** Well, I have no feeling of pride for any of these  
16 numbers, and I'm kind of like Walter. I am willing to change it  
17 to a zero there, if everybody thinks that the best one. We are  
18 looking for the best model here.  
19  
20 **KEVIN MCCARTHY:** It seems to me that it should be the other  
21 direction.  
22  
23 **JOE KIMMEL:** Okay.  
24  
25 **CHURCHILL GRIMES:** It does seem to me that the large-vessel  
26 shipping activity could interfere with the military's use of it.  
27 If they're trying to move military vessels in and out of a base or  
28 something, and there's a lot of shipping activities, that could  
29 definitely be an interference for them.  
30  
31 **JOE KIMMEL:** You're right, and I'm sure there is some scheduling  
32 issues, if you have that situation, and so I don't know. Anybody  
33 else have comments on that? I would put a one there.  
34  
35 **KEVIN MCCARTHY:** Is it a one, or is it negative?  
36  
37 **JOE KIMMEL:** Yes, a negative-one.  
38  
39 **RICHARD APPELDOORN:** My feeling is that I would just leave it  
40 blank, and it's not that big of a deal.  
41  
42 **JOE KIMMEL:** I agree with that.  
43  
44 **RICHARD APPELDOORN:** I am not disagreeing with the discussion, but  
45 it's not that big of a deal.  
46  
47 **JOE KIMMEL:** Okay. Wishy-washy, here we go. Anyway, large-vessel  
48 shipping activity and the next column, noise generation, I put a

1 negative-two there, because large vessels and shipping activity  
2 generate a lot of noise.  
3  
4 **RICHARD APPELDOORN:** Yes, and so this is a resource issue, and so  
5 I think the negative-two there is you were looking at it the other  
6 way, but now it should be a positive-two.  
7  
8 **JOE KIMMEL:** Okay.  
9  
10 **WALTER KEITHLY:** I'm at a point that I need some clarification  
11 here, and I'm getting confused. Which direction are we looking  
12 at? Are we looking at the row causing the column or vice versa?  
13 Does large vessel generate noise, or does noise generation -- That  
14 doesn't make sense, but does noise generate or impact large-vessel  
15 activity?  
16  
17 **RICHARD APPELDOORN:** Well, that's the question that I asked  
18 earlier.  
19  
20 **WALTER KEITHLY:** Well, I think we need to answer this precisely  
21 before we even continue, because I've been hearing it both ways  
22 now.  
23  
24 **JOE KIMMEL:** Walter, that was my primary problem with putting any  
25 of these numbers here.  
26  
27 **WALTER KEITHLY:** I understand, and I think this needs to be  
28 resolved at this point though. We had this issue at the last  
29 meeting, too, and, until it's resolved, I don't think there's any  
30 use in even continuing.  
31  
32 **RICHARD APPELDOORN:** Well, I recommend that maybe we all go to the  
33 fishing matrix, which is simple, and we can see what we did there.  
34  
35 **GRACIELA GARCIA-MOLINER:** Richard, that's what is on the screen  
36 now, and so Column A is derelict fishing gear, towards B, C, and  
37 D.  
38  
39 **RICHARD APPELDOORN:** All right, and so, for example then, derelict  
40 fishing gear, Row 3, has a positive relationship to fishing  
41 mortality, and so then the row is affecting the column. Discards  
42 and bycatch, Row 5, affects also fishing mortality, Column D, and  
43 so that's how we were doing it here.  
44  
45 **WALTER KEITHLY:** Thank you.  
46  
47 **JOE KIMMEL:** So, let's see here. Large-vessel shipping activity  
48 and noise generation, we have a two, and wouldn't that be the

1 correct -- A positive-two there, right?  
2  
3 **RICHARD APPELDOORN:** That's what I would do, yes.  
4  
5 **VANCE VICENTE:** It would increase noise generation, and so that  
6 would be a positive-two, to my understanding.  
7  
8 **JOE KIMMEL:** Yes. Okay. Moving on to large-vessel shipping  
9 activity and the waste column, they are always throwing stuff  
10 overboard, and so I would have to give that a two as well, a  
11 positive-two.  
12  
13 **VANCE VICENTE:** I agree.  
14  
15 **JOE KIMMEL:** Okay. Moving to artificial reefs and large-vessel  
16 shipping activity affecting artificial reefs, not generally. I  
17 can't see how that would have any effect, and so I've got a zero  
18 in that column.  
19  
20 **VANCE VICENTE:** Well, artificial reefs need to be constructed as  
21 a specific depth that doesn't affect shipping activity, according  
22 to the U.S. Army Corps of Engineers.  
23  
24 **JOE KIMMEL:** Yes, I agree, but I think most people -- Most of the  
25 artificial reefs are created by some governmental entity, and those  
26 know those rules, and so they put the reefs in the proper depth of  
27 water, so the large vessels won't crush them or run into them or  
28 ground on them. Isn't that the case? That's the case in Florida  
29 anyway.  
30  
31 **VANCE VICENTE:** Yes, that's the case.  
32  
33 **JOE KIMMEL:** Okay. Then large-vessel shipping activity affecting  
34 the energy sector, and I've got a one, but, frankly, I don't know  
35 what I was thinking about there.  
36  
37 **RICHARD APPELDOORN:** I think that goes the other way.  
38  
39 **JOE KIMMEL:** Yes, and so that should be a zero in that one. Large-  
40 vessel shipping activity and the light contamination column, that  
41 should be a zero as well. The same for large-vessel shipping  
42 activity and mariculture. That should be a zero.  
43  
44 **WALTER KEITHLY:** I am looking at a number of these, starting with  
45 the artificial reefs, I guess, and I have a question. Are we  
46 talking about quantities of artificial reef or quantity of  
47 mariculture or just location? Certainly we just discussed that  
48 shipping activities will affect the location of some of these other

1 activities, I would assume, and, again, artificial reefs is a  
2 rather general term. Again, I think something specific ought to  
3 be given on what we're talking about.

4  
5 **RICHARD APPELDOORN:** If I can, the issue here is competing uses of  
6 space, right, that would -- The goal here, in the end, is fishing,  
7 and so we're talking about a mariculture operation that would  
8 basically displace fishing out of an area, because it's now some  
9 kind of commercial activity going on there, and so that's how at  
10 least I'm viewing it, and so some of these things might be  
11 interactions there, but they're not really important relative to  
12 the issue that we're involved with of how it's affecting the  
13 displacement of fishing activity.

14  
15 **WALTER KEITHLY:** Well, Rich, you bring up a point there. First of  
16 all, let's ask this question. Might shipping activities compete  
17 with artificial reefs for space? If the answer is yes, and, again,  
18 I'm not an expert on this, I would say that, yes, the siting of  
19 artificial reefs likely depends on whether it's in a shipping lane.

20  
21 Certainly artificial reefs would hopefully not be placed in a  
22 shipping lane, or mariculture, and so then the next question comes  
23 down of is that a fishing location, and, again, we're talking a  
24 lot of generalizations here, with probably very specific areas for  
25 fishing, or shipping lanes, for that matter, and I just think we're  
26 trying to answer a lot of questions that we don't have a lot of  
27 information on. Thank you.

28  
29 **JOE KIMMEL:** I don't disagree, Walter, and I look at it as the  
30 artificial reefs, while they may be fairly large, and, what I'm  
31 talking about in our area here, that's about maybe half-a-mile in  
32 diameter or something, and they're within, I would say, five miles  
33 of the shipping lanes, and so, if a large vessel got pushed way  
34 off into the so-called shallows, because these reefs come to about  
35 fifteen feet or so from the surface, they might have a problem,  
36 but that would be a very rare event. I mean, either the captain  
37 would have to have some medical problem or be drunk or something,  
38 and I don't know, but I don't think that happens in -- It has never  
39 happened in our area, as far as I know.

40  
41 **VANCE VICENTE:** Joe, this is Section 7 and Section 10, the river  
42 and harbor act. I mean, any type of structure cannot affect the  
43 ability of the U.S. navigable waters, and that's very clear.  
44 Regarding reefs, well, there are deepwater artificial reefs and  
45 very shallow ones, for example, those proposed to enhance shoreline  
46 protection, as well as well as very shallow reef structures, such  
47 as those that they have been building in the estuary programs, and  
48 there is different types, but, as long as an artificial reef

1 doesn't affect the navigability of the U.S. navigable waters, the  
2 issue would be okay, right, including shallow reefs constructed  
3 for shoreline protection and the like.

4

5 **JOE KIMMEL:** I agree, Vance, but I still think it's a very, very  
6 minor problem in the overall looking at things, and that's why  
7 it's a zero there.

8

9 **WALTER KEITHLY:** Also, I guess -- Thank you, Vance, because then  
10 it suggests that it's the regulatory structure, based on what Rich  
11 said earlier, that we're looking at, and so it's the regulatory  
12 structure that dictates the placement of artificial reefs, or at  
13 least precludes artificial reefs being built in shipping lanes, if  
14 they at least impede the movement of vessels.

15

16 **JOE KIMMEL:** Walter, are you suggesting a different number besides  
17 zero in the large-vessel shipping activity and artificial reef  
18 relationship there?

19

20 **WALTER KEITHLY:** I don't suggest numbers. I would have to say  
21 though that it's probably minimal, given the discussion. I would  
22 put a zero.

23

24 **JOE KIMMEL:** All right. I think we are down actually at the -- I  
25 think we covered mariculture. Research, that's another one that's  
26 kind of fuzzy. I don't know, and I guess there are large-vessel  
27 shipping lanes and stuff that research is conducted into, but I  
28 think most researchers try to avoid that situation, so they don't  
29 have to interrupt their geological coring or their seismic  
30 whatever, or maybe they have permits for doing that for a certain  
31 period of time during a certain part of the year, but I would keep  
32 that as a zero as well. Any comments?

33

34 **WALTER KEITHLY:** Again, what you just said is they try to avoid  
35 the shipping lanes, and that means it does have an influence on  
36 research. If it did not have any influence on research, there  
37 would be no need for them to avoid it.

38

39 **JOE KIMMEL:** Okay. Well, I'm not opposed to --

40

41 **WALTER KEITHLY:** I am just trying to make sense of it, and I'm  
42 still confused by this, but, based on what you just said, the  
43 research is impacted from vessel activity, shipping activities.

44

45 **JOE KIMMEL:** I agree, and so I would put a negative-one there.  
46 Any comments, besides Walter and Vance?

47

48 **CHURCHILL GRIMES:** I hate to admit it, but I agree with Walter.

1  
2 **WALTER KEITHLY:** Good thing it's being recorded.  
3  
4 **JOE KIMMEL:** Are you okay with a negative-one in that column?  
5  
6 **CHURCHILL GRIMES:** Yes.  
7  
8 **VANCE VICENTE:** I feel a little uncomfortable with a minus, but I  
9 would like some explanation. Like, for example, you're conducting  
10 plankton work, an oceanographic study looking at the water column  
11 and things like that, and I can see where some shipping activity  
12 may impair, temporarily, an oceanographic sampling program, but  
13 how serious is it? I don't know.  
14  
15 **JOE KIMMEL:** I don't know either, Vance, and that's why we put a  
16 negative-one there. It's the smallest number we can deal with,  
17 but, if we don't think it has very much effect at all, then maybe  
18 we should put a zero, but I'll stick with a negative-one. I think  
19 there's enough discussion to support it.  
20  
21 **RICHARD APPELDOORN:** Well, I like Vance's critique, and, for the  
22 same reason that we didn't put anything for mariculture, I would  
23 not put anything for research.  
24  
25 **JOE KIMMEL:** That's fine with me. Okay. Let's see. Where do we  
26 go from here? Large-vessel shipping activity and boating. Well,  
27 I know, when I take my boat out, I avoid large-vessel and shipping  
28 activity. I don't go into the shipping areas, and I don't think  
29 that most people do. They may cross over the shipping lanes, but  
30 they certainly keep an eye out for the activities.  
31  
32 **VANCE VICENTE:** Joe, I disagree. I mean, I come in and out of San  
33 Juan Bay like every other week to do my sampling work, and there  
34 is a conflict. I mean, when vessels are coming out, all these  
35 touristic boating activities, such as jet-skis and some other new  
36 types of vessels, inflatable vessels and small sailing vessels,  
37 with fifteen or twenty kids on there, they interfere. I mean,  
38 they have to adjust their schedule with regard to the shipping  
39 activity occurring in San Juan Bay, and so there is a direct  
40 relationship, at least from what I have seen in the industrial  
41 embayment. That's my opinion.  
42  
43 **RICHARD APPELDOORN:** All right. Let me give a counterargument,  
44 along several lines. One, again, we're talking about, eventually,  
45 how this affects fishing, and so is large-vessel stuff displacing  
46 -- Not interfering with, but actually displacing, in a spatial  
47 sense, boat activity, such that that displaces fishing activity,  
48 and so that's the competing use, and the other line is, yes, I

1 don't disagree with what Vance said for San Juan Bay, and I'm sure,  
2 in the Virgin Islands, there's a couple of places where the ships  
3 are going out, Charlotte Amalie for sure, but, you know, is this  
4 a big impact in the nature of what we're trying to really grab  
5 with these models?  
6

7 I would argue that the answer is no, and there is also a temporal  
8 component, and so it's only going to shift coming in and out that  
9 you have these issues, and so I would think, if you think down the  
10 line, where we're trying to think about this, this is not a big  
11 effect.  
12

13 **VANCE VICENTE:** The type of recreational boating activity that  
14 occurs in San Juan Bay is continuous, and so it's not like a  
15 temporary -- I mean, they are being interfered by cruise ships  
16 coming in and out, by cargo vessels coming in and out, by ship  
17 container vessels coming in and out, other large shipping vessels  
18 also coming in and out. I mean, there is an effect on recreational  
19 boating activity, in specific environments, of course, but not all  
20 around the island.  
21

22 **RICHARD APPELDOORN:** I know there's an effect, but is it displacing  
23 that activity, so it goes someplace else, or do they just have to  
24 navigate around that activity, in which case there is no  
25 displacement going on?  
26

27 **VANCE VICENTE:** Well, they have to adjust their schedule and their  
28 activities, and insignificant ways, but I will leave it there.  
29

30 **JOE KIMMEL:** I wonder if we could get a comment from Marcos Hanke.  
31 He's out there all the time.  
32

33 **JULIAN MAGRAS:** Can I comment?  
34

35 **MARCOS HANKE:** I would prefer Julian to go first, and then I will  
36 make my point. Thank you for asking.  
37

38 **JOE KIMMEL:** Okay. Julian.  
39

40 **JULIAN MAGRAS:** Here in -- I am going to speak for the St.  
41 Thomas/St. John District, and we don't have any shipping lanes  
42 that -- The fishers here avoid the areas, especially where the  
43 harbor mouth is between Frenchmen's Reef and Hassall Island and  
44 then Hassall Island and Water Island and then the Gregory East/West  
45 Channel, and so there are three areas where the large container  
46 ships come in and the cruise ships come in, and they avoid those  
47 areas, especially for line fishing and trap fishing, because it  
48 makes no sense to even attempt to fish in those areas, and we would

1 lose our gear, and, for the line fishers, they would always be on  
2 the run, and so we avoid those areas.

3

4 **JOE KIMMEL:** Good comment, Julian. I think that's a good point.

5

6 **MARCOS HANKE:** Just to complement what Julian says, very often,  
7 yellowtail fishermen, at night, because of their safety, they have  
8 to stop fishing and move away when the ships are approaching.  
9 Also, there is problems with the trap buoys, and that's one of the  
10 reasons why some fishermen prefer not to use the buoys, and this  
11 is what we hear from the industry, because they lose the traps  
12 because of the big ships, and, also, another consideration that is  
13 fish related is the FAD locations. They avoid to be deployed,  
14 even if it's a desired place for a FAD, fishing aggregator device,  
15 because of the shipping lane, and there is many other examples.  
16 Thank you.

17

18 **JOE KIMMEL:** Thanks, Marcos.

19

20 **GRACIELA GARCIA-MOLINER:** Mr. Chair, if I may say something. There  
21 are really no established shipping lanes in Puerto Rico or the  
22 Virgin Islands. However, the U.S. Coast Guard does have marker  
23 buoys for vessels to come in, but Puerto Rico, St. Thomas/St. John,  
24 and St. Croix all suffer from the same impact of large vessels  
25 just moving anywhere in the area without really following  
26 structures, and, in St. Croix specifically, there have been -- I  
27 think there was an accident a few years ago regarding one of the  
28 container ships coming into St. Croix and actually, if not running  
29 over, almost running over a vessel over Lang Bank.

30

31 We also have one comment from Michelle that large vessels that  
32 anchor offshore to wait for entry to port could be an impact that  
33 affects recreational diving, for example, if that area is no longer  
34 feasible for diving operations and not only during passing by.  
35 Those are the comments that you have in the chat.

36

37 **JOE KIMMEL:** Okay. I haven't looked at the chat, and so thanks  
38 for that, Graciela. So, getting back to large vessel activity and  
39 boating, we have a zero, because the general feeling was that it  
40 wasn't a major impact to fishing, but it sounds like there's a lot  
41 of comment here that might justify having a negative-one there.

42

43 **RICHARD APPELDOORN:** Joe, I haven't heard anything that changes my  
44 mind. These are competing uses, and they were -- We came up with  
45 these components because we felt that there was an impact of these  
46 on fishing, and that's not what we're talking about here.

47

48 We're talking about boating, recreational boating, in fact, and

1 the only comment that you heard was really Michelle's, and divers  
2 will go to where there is anchoring activity to support things  
3 like that, where these type of activities can interfere, but the  
4 question is do they go -- Have the divers designated areas away  
5 from those that are now diving areas that are now avoided by the  
6 fishers? That would be the displacement. I haven't really heard  
7 anything that pushes that argument very strongly.  
8

9 **JOE KIMMEL:** So you're suggesting that we go back to the zero  
10 there?  
11

12 **RICHARD APPELDOORN:** Yes.  
13

14 **JOE KIMMEL:** Okay.  
15

16 **VANCE VICENTE:** I disagree. I think that if you have to restrict  
17 the area where you're going to be performing recreational boating  
18 activities, just the fact that they're being restricted from large  
19 shipping lanes or whatever you want to call it, but just the fact  
20 that you are restricting the area, the area of recreation, that is  
21 an effect, and I agree with you that it's maybe not as drastic as  
22 to have a minus-two or a minus-one, but there is some interaction  
23 there, and so just putting a zero means that there's nothing  
24 happening, nothing significant, and I have to disagree with that,  
25 but that's not what I have seen.  
26

27 **RICHARD APPELDOORN:** I will yield to Vance.  
28

29 **JOE KIMMEL:** Okay.  
30

31 **JUAN CRUZ-MOTTA:** I would agree with Vance about the relationship.  
32

33 **JOE KIMMEL:** Okay. I guess we're back to a negative-one. We've  
34 got a negative-one in the boating. All right. Marina activity,  
35 large-vessel shipping activity and marina activity, I would say  
36 that's a zero, which is already there. Large-vessel shipping  
37 activity affecting recreational diving, you know what came to my  
38 mind first when I was thinking of this is some of the large vessels,  
39 and not necessarily shipping vessels, but some of the large vessels  
40 are the cruise ships for divers.  
41

42 I remember, in the U.S. Virgin Islands, they would come out and  
43 anchor up, and, depending on -- The anchors would drag everything,  
44 and so the government got involved and tried to get the cruise  
45 ships, diving cruise ships, from coming into that area, and so  
46 maybe it does have a negative-one impact to recreational diving.  
47 Has anybody got any comments on that?  
48

1 **VANCE VICENTE:** Joe, I would like to go back one step to marina  
2 activities. Marina activities are so closely related to  
3 recreational boating and boating activities in general that  
4 leaving it blank -- If you're going to leave that one blank, leave  
5 boating activities blank too, because they are so linked that at  
6 least there should be a minus-one. There should be some  
7 compatibility in the analysis, in the analytical process, I think.  
8 That's my opinion.

9  
10 **JOE KIMMEL:** Well, you know, I'm looking at it from the aspect of  
11 large vessel and shipping activities, and large vessels don't go  
12 into marinas, do they? They go into shipping docks, and, in my  
13 mind, a marina is a place for sailboats and recreational boats,  
14 and small fishing boats might go, but there is no big shipping  
15 vessels there.

16  
17 **VANCE VICENTE:** No, I'm talking about the activities involving the  
18 marina and just not the marina itself with the boats all nicely  
19 tied up there, but marina activity, I mean. That implies that  
20 those boats are going to be coming in and out, and, if there's a  
21 lot of shipping traffic of large vessels, depending on the season  
22 or depending on where, there is some impact. Different things  
23 will go to different places, where large vessel shipping activity  
24 -- There is some, and, I mean, I cannot quantify it, but, again,  
25 just leaving it as zero is not -- I don't think it's correct.

26  
27 **JOE KIMMEL:** Well, what do you think is correct, a minus-one or a  
28 zero?

29  
30 **VANCE VICENTE:** At least a minus-one.

31  
32 **JULIAN MAGRAS:** I've got a comment.

33  
34 **JOE KIMMEL:** Go ahead, Julian.

35  
36 **JULIAN MAGRAS:** One of the big issues that we see here is the  
37 larger vessels, and not only the cruise ships, because the cruise  
38 ships don't anchor --

39  
40 **GRACIELA GARCIA-MOLINER:** Julian, you are breaking up, and we  
41 cannot follow your train of thought.

42  
43 **JULIAN MAGRAS:** (Some of Mr. Magras's comment is not audible on  
44 the recording.) -- which also affects our fishing production for  
45 recreational and commercial, because they just anchor up at the  
46 different keys, or south of the island, and they are doing a lot  
47 of havoc with their anchoring.

48

1 **GRACIELA GARCIA-MOLINER:** You are still breaking up.  
2  
3 **JULIAN MAGRAS:** Did I lose you guys?  
4  
5 **GRACIELA GARCIA-MOLINER:** No, but you are breaking up. Try again.  
6  
7 **JULIAN MAGRAS:** That's what I was hearing earlier coming from you  
8 guys. Is it better now?  
9  
10 **GRACIELA GARCIA-MOLINER:** Yes.  
11  
12 **JULIAN MAGRAS:** As I was saying, the larger vessels, the big  
13 problem that we are having is they are anchoring outside of the  
14 shipping areas that they come in, and that is --  
15  
16 **GRACIELA GARCIA-MOLINER:** You are gone again.  
17  
18 **JOE KIMMEL:** I can't hear Julian.  
19  
20 **JULIAN MAGRAS:** Can you guys hear me now?  
21  
22 **GRACIELA GARCIA-MOLINER:** Yes. Go ahead, Julian.  
23  
24 **JULIAN MAGRAS:** Let's try this again. One of the big problems  
25 that we are --  
26  
27 **GRACIELA GARCIA-MOLINER:** You are really, really breaking up, and  
28 I believe that you just got cut off. Mr. Chair, if I may, I have  
29 a couple of comments in the chat that I would like to read for the  
30 record.  
31  
32 **RICHARD APPELDOORN:** Go ahead.  
33  
34 **GRACIELA GARCIA-MOLINER:** From Vanessa Ramirez, damage on the west  
35 side of Puerto Rico, they have already experienced with impacts  
36 from large vessels. They do not respect the small commercial  
37 fisher boats, and the environment received a big impact, and divers  
38 see this every day.  
39  
40 Marcos Hanke says that the regattas are cancelled and/or restricted  
41 because of large-vessel traffic. Nelson Crespo says that waste  
42 discharge and anchoring activities from large vessels cause a huge  
43 negative impact on the reef and the ecosystem. Those are the  
44 comments that I have regarding the issue of large vessels.  
45  
46 **VANCE VICENTE:** One more thing that we are missing is we haven't  
47 spoken, and maybe it's not falling within this category, but the  
48 grounding of large vessels do have a significant impact, at least

1 in the areas that have I studied in Guayanilla Bay, groundings of  
2 LNG vessels and other types of vessels. The extent of damage and  
3 affecting the recreational value is quite significant, and,  
4 indirectly, diving activities and maybe some other marine-related  
5 activities.

6  
7 **JOE KIMMEL:** Vance, what do you suggest for a score for large-  
8 vessel shipping activity and marina activity? Right now, I have  
9 a zero there.

10  
11 **VANCE VICENTE:** Like I said, I think at least a minus-one, because  
12 of its direct relationship to boating activities. I mean, the two  
13 are so tightly linked that, if we're going to be putting a  
14 negative-one or one, let's have a negative-one or the other, or  
15 just have a zero on both of them, but they are just too linked to  
16 have separate values.

17  
18 **RICHARD APPELDOORN:** This is really directed to spatial, because  
19 you have the boating activity, and that's after the boats leave  
20 the marina, but the marina activity is the activities right around  
21 the marina that is the boats going in and out, in terms of that  
22 specific location, and so if -- That's what displaces fishing.  
23 That's what is competing with fishing.

24  
25 Are we saying that the boating activity will affect where the  
26 marinas will be located? That's really kind of the issue there,  
27 and then that activity will then -- Are we having a spatial  
28 displacement of activity is the question, and, in this case, it's  
29 spatial displacement of where the marina would be located.

30  
31 If that's the case, if then large ships affect where the marinas  
32 are located, they affect that marina activity around that, which  
33 then displaces or affects fishing activity, and so that's the  
34 connection they're looking for.

35  
36 **VANCE VICENTE:** I look at the marina activity, and that's such an  
37 ample term, and they also include also includes maintenance of the  
38 marina or expansions of the marina, the boats coming in and out,  
39 and, I mean, this is a very ample term. I don't know, and I just  
40 -- My main point is, if you're going to put a value on boating, it  
41 should be similar, or the same, as marina activity, because much  
42 of the boating activity is related to where marinas are, where the  
43 marina presence may enhance the boating activity in an area, and  
44 I see such a linkage there that should be some compatibility in  
45 the assigning of a value, and that's my main point.

46  
47 **JOE KIMMEL:** Vance, I don't disagree with that, but we had a zero  
48 there for boating at one time, and, with all of our discussion, we

1 decided to put a negative-one there, because zero meant zero, and  
2 there was some effect on boating, and so we gave it a negative-  
3 one, but, if we're talking about marina activity as being zero, I  
4 kind of think they both should be zero, myself. What do you think?  
5

6 **RICHARD APPELDOORN:** I disagree with that. Again, it's two spatial  
7 scales. Marina activity takes place right around the marina, boats  
8 going in and out and, as Vance said, maintenance and those kinds  
9 of thing. Everything he said, that's marina activity.

10  
11 The boating is when the boats are out, and that's a whole different  
12 spatial scale, and so there will -- You obviously need a marina to  
13 have boats, or at least ramps, but the spatial scale at which these  
14 interactions occur are very different, and so, as long as that's  
15 the scale you're seeing, if you want to have a negative-one, I  
16 don't have a problem with that.

17  
18 **VANCE VICENTE:** Richard, in relooking at it, I think that you're  
19 right, and so let's leave it blank.

20  
21 **JOE KIMMEL:** Let's move on to the next column, which is  
22 recreational diving and large-vessel shipping activity. Right  
23 now, there is a negative-one there.

24  
25 **RICHARD APPELDOORN:** I see that being the same as boating.

26  
27 **JOE KIMMEL:** Okay. Moving on --

28  
29 **VANCE VICENTE:** I agree.

30  
31 **JOE KIMMEL:** Moving on to large-vessel shipping activity and  
32 conservation recreation, I don't know. I think maybe large vessels  
33 and shipping activity, like I said before on one of the other  
34 categories, is large vessels are always throwing trash off the  
35 back, and I don't think that's very conservation minded, or  
36 restoration minded, and so I think that should be a negative-one  
37 there. I think that affects the fishing, the trash on the bottom  
38 and the fish and turtles eating plastic bags, et cetera. I think  
39 it affects the marine environment when they do that.

40  
41 **RICHARD APPELDOORN:** I would agree there is definitely a negative  
42 interaction there.

43  
44 **JOE KIMMEL:** Yes. A one or a two, I don't know, but, anyway, is  
45 there any more comments? Is that the end of the table, or do we  
46 have another column there?

47  
48 **GRACIELA GARCIA-MOLINER:** No, that's it.

1  
2 **RICHARD APPELDOORN:** Since I can't see, what value did you put in  
3 there?  
4  
5 **JOE KIMMEL:** We put a negative-one in there. I could argue that  
6 it should be higher, but we stuck with a negative-one. Okay.  
7 Let's go back to the other end, waste, Column Number 7. Does it  
8 affect marine development? I put a two there that, yes, it did.  
9 I was looking at coastal development too, and I have a two in that  
10 as well. Again, waste is a large category of things, from trash  
11 to runoff to sewage disposal to hot-water disposals to you name  
12 it, and so I would think it affects marine and coastal development.  
13 Does anybody have comments on that?  
14  
15 **VANCE VICENTE:** As you said, waste is such a wide spectrum of  
16 factors, but maybe we should reconsider putting solid waste versus  
17 discharges, point source discharge and the like, from other  
18 industries. I don't know, but I'm just rethinking it. What's  
19 your opinion?  
20  
21 **RICHARD APPELDOORN:** I think that was the context within which we  
22 were considering waste, and so relabeling it to make it more clear  
23 would be a good idea.  
24  
25 **JOE KIMMEL:** Graciela, can you --  
26  
27 **GRACIELA GARCIA-MOLINER:** So that would be solid waste, actually?  
28  
29 **JOE KIMMEL:** Yes.  
30  
31 **RICHARD APPELDOORN:** Well, it might not be just solid waste. It's  
32 point source pollution of whatever kind, and so in the sense of  
33 it's all waste products, and so sewage is certainly one of those  
34 things, but I don't think we have any kind of industrial  
35 contamination, other than the waste category, and so that might be  
36 an issue, too.  
37  
38 **GRACIELA GARCIA-MOLINER:** Do you want something more general, like  
39 -- I don't know, but maybe non-point sources of pollution or -- I  
40 mean, the other thing that you can do is just define, under waste,  
41 everything that you want to include in that category, and, in your  
42 glossary, once upon a time, you had the following, that it includes  
43 mechanisms for disposal and dump sites, and it could refer to  
44 industrial solid waste, e.g., litter, plastics, consolidated or  
45 unconsolidated, e.g., sediment, waste. It's a very ample category.  
46  
47 **RICHARD APPELDOORN:** That sounds good, to me anyway.  
48

1 **GRACIELA GARCIA-MOLINER:** If we take out the word "solid" and just  
2 refer to waste, if you have anything else to add to the definition,  
3 we can edit that glossary that we have been creating on the side.  
4

5 **VANCE VICENTE:** I agree.  
6

7 **JOE KIMMEL:** Does anybody have any real feelings about the two  
8 that I put in under marine development and coastal development?  
9 Okay. Hearing none --  
10

11 **RICHARD APPELDOORN:** I have something about that, Joe. I am just  
12 wondering whether anybody would stop development because there was  
13 a pipe setting someplace, and I am not sure, having maybe a bad  
14 opinion about the way development has gone, but I don't think  
15 having -- Well, I will go with a two. If you're talking about  
16 where are you going to site your regional treatment plant, that  
17 means you're not going to build condominiums on the same site, and  
18 so there has been a displacement there, and so, yes, I will accept  
19 the two.  
20

21 **JOE KIMMEL:** Yes, and that's what I was thinking about, Rich. I  
22 mean, I bet you there won't be any condos built along the south  
23 coast of St. Croix, where that rum slop effluent comes out.  
24

25 **RICHARD APPELDOORN:** That's where I might disagree, but they're  
26 not going to do it right on the pipe, and they're not going to do  
27 it at the distillery, which is what is producing that.  
28

29 **JOE KIMMEL:** Yes. Okay. Then let's move on to waste as it affects  
30 military use. I have got a one there, but I can't imagine how I  
31 got there.  
32

33 **RICHARD APPELDOORN:** Before we get there, just so I'm clear, for  
34 the first two, is this a negative-two? Is that correct?  
35

36 **GRACIELA GARCIA-MOLINER:** You had them as positive.  
37

38 **JOE KIMMEL:** Yes, and that's what I was thinking, a negative-two  
39 for both of those. Then waste and military uses, and somehow I  
40 don't think there's a whole lot of interaction.  
41

42 **VANCE VICENTE:** I see it the other way. I mean, like military  
43 uses, that would generate ordnance-type of waste, and it would  
44 create waste, but, does waste affect military uses, I don't see  
45 much relationship there.  
46

47 **JOE KIMMEL:** I agree, Vance. Let's put a zero there then. Okay.  
48 Waste and noise generation, and that's Column E and Row 7.

1  
2 **VANCE VICENTE:** Can we come back a little bit? I am thinking now  
3 that a category of waste -- I mean, there are some areas that have  
4 been designated by the U.S. EPA as so toxic that no type of  
5 development can occur unless the area is remediated, and it's  
6 called the Super Fund, I think, Super Fund type of areas or  
7 territories, which that type of classification would impair any  
8 further development, industrial or the like, in a given area, and  
9 so just to think about, again, how we're going to be defining waste  
10 in the long run.  
11  
12 **RICHARD APPELDOORN:** (Dr. Appeldoorn's comment is not audible on  
13 the recording.)  
14  
15 **VANCE VICENTE:** Pardon?  
16  
17 **RICHARD APPELDOORN:** -- in the marine environment, and I know we  
18 have some on the land.  
19  
20 **VANCE VICENTE:** Historically, there has been in the marine  
21 environment, specifically in -- Bay, where there was a leak of  
22 some type of hydrocarbon, and I can't remember the type, but the  
23 area was designated as a Super Fund site. However, these Super  
24 Fund sites are supposed to be restored, and so it's nothing  
25 permanent, but there are cases in the marine environment.  
26  
27 **RICHARD APPELDOORN:** Is there no fishing going on in that area,  
28 just out of curiosity?  
29  
30 **VANCE VICENTE:** Can you repeat the question?  
31  
32 **RICHARD APPELDOORN:** Because of that contamination, is there no  
33 fishing going on in that area?  
34  
35 **VANCE VICENTE:** (Dr. Vicente's comment is not audible on the  
36 recording.)  
37  
38 **JOE KIMMEL:** Let's go to the next column of waste and large-vessel  
39 shipping activity. I've got a minus-two there, but that was  
40 looking at it from the other way around, I think. I don't think  
41 waste affects large-vessel or shipping activity. Large vessels  
42 and shipping activity produce a lot of waste, and I agree with  
43 that, but maybe that should be a zero in that column.  
44  
45 **VANCE VICENTE:** Well, some plastic waste can clog the cooling  
46 system of vessels, and at least that's some linkage there.  
47  
48 **RICHARD APPELDOORN:** It's too esoteric.

1  
2 **JOE KIMMEL:** I agree. That probably does happen at times, but I  
3 don't think it's a big deal in the whole concept of things here.  
4 Then, going from waste to artificial reefs, I guess the guys that  
5 produce a lot of waste also go to artificial reefs, throwing their  
6 soda cans and sandwich wrappers and whatever else into the water,  
7 and so I don't know, but it's probably a minor effect, and maybe  
8 that should be a zero there as well. Has anybody got any comments  
9 on that point?  
10  
11 **RICHARD APPELDOORN:** I would think that point source pollution and  
12 sewage usually has some kind of area around it, where you can't do  
13 things, like put up an artificial reef, or even go diving, unless  
14 you're somebody like Reni, who actually has to take measurements  
15 there, and so I would think that kind of waste has a significant  
16 impact on where you can have artificial reefs, which is the issue  
17 here.  
18  
19 **JOE KIMMEL:** So that would be like a negative-two, you mean?  
20  
21 **RICHARD APPELDOORN:** Yes, that's what I would think.  
22  
23 **JOE KIMMEL:** I am good with that.  
24  
25 **VANCE VICENTE:** What Richard is referring to is there are  
26 designated uses, depending on the classification of the water which  
27 is being regulated. For example, there are areas that you can  
28 have indirect contact, and you can do shipping and fishing and  
29 everything, but you cannot have direct contact, which is like  
30 diving, and that's a Type 3 type of water, and so, in that respect,  
31 there is a relationship there.  
32  
33 **JOE KIMMEL:** Well, Vance, are you okay with a minus-two there?  
34  
35 **VANCE VICENTE:** Maybe not as a minus-two, but maybe at least as a  
36 minus-one. These areas in which direct contact is not allowed are  
37 very, very restricted areas.  
38  
39 **WALTER KEITHLY:** Again, this comes back to what came up almost at  
40 the beginning of the meeting. Is it the regulatory structure that  
41 prohibits the artificial reefs in those locations? If it is, then  
42 we go back to saying it's the regulatory structure that impacts  
43 artificial reefs.  
44  
45 **VANCE VICENTE:** I don't know. The only restrictions, at least  
46 that I'm aware of, regarding construction of artificial reef is  
47 the depth, and I don't know of any examples where water quality  
48 standards preempt the construction of artificial reefs, and so I

1 don't have an answer for that.

2  
3 **RICHARD APPELDOORN:** Artificial reefs are constructed for usually  
4 one of three purposes, and one is cynical, that we just want to  
5 dump waste, and the other two are either you're going to harvest  
6 something from the natural environment or you're going to actually  
7 grow something, and both of those require -- They would be  
8 associated with people in the water. Yes, you could just do line  
9 fishing, I suppose, but would you really want to eat fish that  
10 you're taking out of those areas? I think there is an impact.

11  
12 Relative to the question of regulatory structure, that's an issue  
13 that we have not dealt with yet, and the argument was made, when  
14 we were dealing with the socioeconomic sub-model, that regulatory  
15 structure should be either removed or moved to another location,  
16 and so that may be -- You know, you could just have a box here,  
17 and a lot of lines go to it here, and we take it out of the other  
18 one, and there are a lot of lines that are connected to that box,  
19 and so I'm not sure what we're going to do with that yet, but I  
20 think it's something that we should not worry about right now, and  
21 I think that's going to come into play when we talk about how we're  
22 linking everything up, and so that would be something that  
23 hopefully we would get to later today or tomorrow.

24  
25 I wouldn't want us to stumble on it now, because it's obviously  
26 something that does affect everything, and not just everything  
27 here, but also everything, or a lot of stuff, in the socioeconomic  
28 sub-model as well, and so I would rather not get hung up on that  
29 point now, but, even so, the way it works is, if there are  
30 restrictions on where you can put an artificial reef, those  
31 restrictions are relative to the activity, in this case the waste,  
32 and, therefore, the linkage, to me, would always go to regular  
33 activity affects waste, which affects artificial reefs and not  
34 activity directly affecting artificial reefs, but I do see the  
35 point that there are regulations that say artificial reefs can  
36 only be put into these kinds of areas, and, therefore, it is  
37 directly linking to artificial reefs.

38  
39 It's a difficult problem, and it's one that I am suggesting maybe  
40 we postpone a little bit, until we can get through this box, but,  
41 otherwise, I know we're going to have to scrap a lot of stuff,  
42 rather than just figuring out how to connect it all.

43  
44 **JOE KIMMEL:** Rich, you brought up a point that I, for some reason,  
45 had totally forgot. Waste, does it affect artificial reefs, and  
46 we have a negative-one there, and I understand our rationale for  
47 getting there, but every artificial reef that I know in Florida is  
48 made up of waste, usually bridge waste, old concrete slabs that

1 came from tearing down a bridge and they wanted to get rid of them,  
2 and so they made artificial reefs out of it. I am wondering if  
3 that minus-one shouldn't be a plus-one. What do you think?

4

5 **VANCE VICENTE:** That's a good one, Joe.

6

7 **RICHARD APPELDOORN:** I don't think that's what we want to do. I  
8 thoroughly agree with what you said, but our waste category is  
9 fairly broad, and to take one aspect of that and say it's positive,  
10 while we're saying lots of other aspects are negative, that creates  
11 a problem, and it's really kind of where do we want to emphasize  
12 -- Again, the impact that we're really interested in capturing is  
13 the impact on fishing, eventually, and, therefore, what can be  
14 caught during fishing.

15

16 We have had other cases where we've had things that could go either  
17 way, and we really haven't come up with a way to deal with that  
18 yet, and so, if you want, we could put a placeholder there, which  
19 would be -- I think we were using an actual value of zero as a  
20 placeholder.

21

22 **GRACIELA GARCIA-MOLINER:** Or blue, if you have a pending issue  
23 with the magnitude and direction.

24

25 **RICHARD APPELDOORN:** Yes, and so --

26

27 **VANCE VICENTE:** Richard, I think also we have a pending issue with  
28 trying to define "artificial reef". I mean, Joe has a point. The  
29 same thing happened with a pier in St. Croix, where it was  
30 destroyed after Hurricane Hugo, and they disposed of all the  
31 pilings and et cetera, but then there is also a different category,  
32 which are reef balls, which are artificial structure, and not  
33 related to waste at all, and it's a total different function.  
34 Shipwrecks is another type of artificial reef, and so there's such  
35 a broad spectrum of things that fall under artificial reefs, and  
36 that needs also to be cleared up at some point in this discussion,  
37 or in another discussion.

38

39 **JOE KIMMEL:** Yes, I agree, Vance, and that's why we gave it a blue  
40 color there, so we could come back to it. Okay. Now waste and  
41 the energy sector. I have a one there, but I don't see the one is  
42 -- I think it's a very minor sort of impact, if any at all, and so  
43 I would change that to a zero, unless somebody has a strong  
44 feeling.

45

46 **RICHARD APPELDOORN:** Well, the impact would be heat, yes, and  
47 entrainment.

48

1 **JOE KIMMEL:** Yes, that's exactly what I was thinking of.  
2  
3 **VANCE VICENTE:** And entrainment. If you're looking at it from the  
4 point of view of waste, definitely heat is one.  
5  
6 **RICHARD APPELDOORN:** We have a separate category for the energy  
7 sector, and so, why don't we remove that from this consideration  
8 of waste?  
9  
10 **VANCE VICENTE:** Okay. Got it.  
11  
12 **JOE KIMMEL:** Okay, and so we're going to put a zero under energy  
13 sector and waste. Okay. Waste contributing to light  
14 contamination, I can see where that happens, depending on what  
15 kind of waste it is, and I know it's a large category, but, if  
16 it's a liquid sort of waste, or a runoff, or even river runoff  
17 sometimes is considered a waste, and I think of some of those  
18 rivers that flow out into the ocean on the north coast of Puerto  
19 Rico, and some of them have a lot of pharmaceuticals and that kind  
20 of stuff in there, and they're supposed to carry those offshore  
21 and dump them, but a lot of it gets into the rivers and goes out,  
22 and it does create a diminished light capacity, and so I would put  
23 a one in that category.  
24  
25 **VANCE VICENTE:** Joe, I think, with light contamination, we're not  
26 talking at all about light transmission in the water column. I  
27 think we're thinking more of terrestrial upland and aerial type of  
28 illumination. I mean, that's what I think.  
29  
30 **JOE KIMMEL:** You mean like affecting turtles and that kind of  
31 stuff?  
32  
33 **VANCE VICENTE:** Correct, and I don't think this light contamination  
34 has to do with non-point sources and turbidity and things that  
35 affect water quality. I think that, with light contamination,  
36 we're talking about lights for marking navigation channels and  
37 lighthouses and things like that, and I think that's the type of  
38 contamination that we're thinking of in this category, and I don't  
39 know, and I may be wrong.  
40  
41 **JOE KIMMEL:** No, that's a good point, and has anybody else got  
42 some comments about that?  
43  
44 **RICHARD APPELDOORN:** I agree with Vance that that's what we're  
45 really talking about, and so I don't really see a connection.  
46  
47 **JOE KIMMEL:** Okay. Waste and mariculture. I think, if there is  
48 waste, that would affect where you might locate a mariculture

1 operation, and so it would have an impact. I don't know if it  
2 would be as big as a three, but it would have some impact. Has  
3 anybody got any comments on that sort of thing?  
4

5 **VANCE VICENTE:** I am thinking of the other way around, how  
6 mariculture makes waste, generates waste, and that's the reason  
7 why the mariculture project in Culebra was shut down, because of  
8 the waste generated by the mariculture project.  
9

10 **RICHARD APPELDOORN:** We will get to that further in the matrix.  
11

12 **JOE KIMMEL:** So what are you suggesting as a value? You don't  
13 think the value here should be a three, do you, Rich? Maybe a  
14 one?  
15

16 **RICHARD APPELDOORN:** Well, a minus-one or two. We gave it a one  
17 for artificial reefs, and mariculture is directly, more directly,  
18 a food-raising operation, and so you're not going to want those to  
19 be any place where you can have kind of biological or chemical  
20 contamination.  
21

22 **JOE KIMMEL:** Okay. Let's go with a negative-two.  
23

24 **RICHARD APPELDOORN:** Works for me.  
25

26 **VANCE VICENTE:** That works for me, too. I agree.  
27

28 **JOE KIMMEL:** Waste in the next column with research. I have  
29 nothing there, and so I put a zero, and I don't see where there's  
30 a big relationship. I mean, I can see where there could be a  
31 relationship, but I wouldn't design any research around waste,  
32 except I am thinking about, again, that plume of rum slope off the  
33 south coast of Puerto Rico, and there used to be one of the south  
34 coast of St. Croix, and there used to be one off the north coast  
35 of Puerto Rico as well, and both of them required research from  
36 the EPA, and so maybe there is an impact, but has anybody got any  
37 comments or examples that we can use there?  
38

39 **RICHARD APPELDOORN:** Well, I'm thinking here that, at the extreme  
40 level, you're not going to be setting up research right by an  
41 outfall, and so that's clearly a displacement affecting it, and I  
42 don't think we should be considering in here, necessarily, the  
43 required monitoring of waste disposal in the marine environment  
44 that is generating research, and, therefore, that's a positive  
45 thing. I think we're talking about the other research activities  
46 in which it's displacing those.  
47

48 I don't think it's a large-scale event, and I think Vance was

1 making the point that you have the areas right around the outfalls  
2 that you shouldn't be going into, but, at probably not too distant  
3 away, it's considered diluted enough that that's not a problem by  
4 whoever is setting the water quality standards for that, but,  
5 unless you're actually studying impacts of outfalls, it's a  
6 negative relationship, but probably not a large one.

7  
8 **GRACIELA GARCIA-MOLINER:** You have a comment from Michelle, and so  
9 it could affect underwater visual surveys, where river plumes  
10 impact reefs, and we have had to abort dives when there is low  
11 visibility during island-wide surveys.

12  
13 **VANCE VICENTE:** A comment, Richard, is that waste is a major source  
14 of research work, and, again, in Puerto Rico, where Joe and I have  
15 worked for decades, Guayanilla Bay and San Juan Bay, and, in that  
16 respect, waste generates that type of research, and it's research,  
17 water quality related and oxygen and heavy metals and trace metals  
18 and hydrocarbons and all these other water quality parameters that  
19 are being measured, and there are publications that come out of  
20 that and new findings, and so let's look at that way, too.

21  
22 **RICHARD APPELDOORN:** All right. The issue here, again, is going  
23 back that these are competing uses of space and resources relative  
24 to fishing, and the fact that those activities are generating  
25 research, as you mentioned, is irrelevant to the role of whether  
26 waste is displacing research activities for them and not  
27 necessarily negatively impacting areas that can be fished.

28  
29 That's why I said we should not be considering that kind of  
30 augmentation of research in the category here, unless you want to  
31 say that so much research is being focused into those areas that  
32 it actually frees up areas that fishing can be done in. I think  
33 that's the scale of what we're trying to talk about here.

34  
35 **VANCE VICENTE:** Okay. I just wanted to point out that there is a  
36 link there, and I agree that that's not the purpose of this  
37 analysis here, but just leaving it as a zero makes me nervous.

38  
39 **RICHARD APPELDOORN:** I don't want a zero. I would like it to have  
40 like a negative-one, but the point that you're talking about is  
41 actually a really important one, but I don't think within the  
42 context of the connections we're trying to deal with here in the  
43 sub-component that's going to link to fishing.

44  
45 If the issue was scientific knowledge, rather than fishing, then  
46 the fact that we have to go in and learn what's happening, as  
47 impacts to these things, there would be a substantial plus  
48 advantage there, but we're not looking at scientific research here,

1 I think, as a -- In that kind of competing use sense. Increase in  
2 scientific research really isn't in the model. If we want to have  
3 it someplace that -- That would probably be a socioeconomic  
4 research category or something like that, but, within our competing  
5 use category, I don't see it happening, and so I think we're only  
6 looking at is there a negative relationship and how strong it  
7 should be.

8  
9 **VANCE VICENTE:** Okay, Rich.

10  
11 **JOE KIMMEL:** We've got a negative-one there, and I don't have any  
12 problem with it. The Chairman likes it, and so has anybody got  
13 any more comments? All right. Waste and boating. That's Column  
14 M. I have a two there, but, if there's any score there, it should  
15 have a negative value to it, but I can't imagine --

16  
17 **JUAN CRUZ-MOTTA:** Joe, I was going to say that perhaps it should  
18 be negative instead of positive. Thank you.

19  
20 **VANCE VICENTE:** I also agree, Joe.

21  
22 **JOE KIMMEL:** Okay. Should it be a two, one, three? Let's stick  
23 with a two.

24  
25 **RICHARD APPELDOORN:** I am thinking, the way we've scored other  
26 things, it would be a negative-one.

27  
28 **JOE KIMMEL:** Negative-one. Has anybody got strong feelings against  
29 a negative-one for that column?

30  
31 **JUAN CRUZ-MOTTA:** Richard, why minus-one instead of minus-two?

32  
33 **RICHARD APPELDOORN:** I don't think a lot of boaters really care  
34 that they're going over an area near a sewage plume or some kind  
35 of industrial output unless it gets so bad that there's a nasty  
36 smell associated with it or something like that, or perhaps they  
37 see species floating in the water, but, other than that, it's  
38 really not affecting boating activities. Remember that diving is  
39 another activity separate from that, and so getting in the water  
40 is one thing, but just being on the water is another.

41  
42 **JUAN CRUZ-MOTTA:** Thank you, Rich.

43  
44 **JOE KIMMEL:** Okay. Negative-one there. Going to the next column,  
45 waste and marina activity. I know there is a strong relationship  
46 between boating and marina activity, but I don't think waste has  
47 much of an impact here, and I might move that to a zero. Are there  
48 strong feelings?

1  
2 Hearing none, we'll go to waste to recreational diving. There's  
3 a one there, and I don't disagree with a one, but it should be a  
4 negative-one, if we score it at all. Are there comments or  
5 objections?  
6

7 **RICHARD APPELDOORN:** It could be a one or a two, and I'm willing  
8 to live with a one.  
9

10 **JOE KIMMEL:** Okay. Let's go to the last one in this waste row,  
11 conservation and restoration. I think it needs a score, and I  
12 would give a negative-one there.  
13

14 **VANCE VICENTE:** No problems with that with me.  
15

16 **JOE KIMMEL:** Okay. When are we going to eat lunch, Rich?  
17

18 **RICHARD APPELDOORN:** Now. I was waiting for you to finish that  
19 row. Unless somebody has an objection, I would say it's 12:20,  
20 more or less now, and so we can reconvene at 1:30, and we'll start  
21 with artificial reefs. Is that acceptable to everybody? Hearing  
22 no objection, we are adjourned for lunch until 1:30.  
23

24 (Whereupon, the meeting recessed for lunch on July 27, 2020.)  
25

26 - - -  
27

28 July 27, 2020  
29

30 MONDAY AFTERNOON SESSION (137:02)  
31

32 - - -  
33

34 The Scientific and Statistical Committee of the Caribbean Fishery  
35 Management Council reconvened via webinar on Monday, July 27, 2020,  
36 and was called to order by Chairman Richard Appeldoorn.  
37

38 **RICHARD APPELDOORN:** Welcome, everybody. It's 1:33, and we're  
39 going to start up again for the afternoon. Graciela wanted to  
40 read some comments from the chat into the record, and so go ahead,  
41 Graciela.  
42

43 **GRACIELA GARCIA-MOLINER:** When you were discussing light  
44 contamination, light contamination is the source of artificial  
45 light, and so Michelle is dealing with passive acoustics, and she  
46 had to opt out of dives because of issues with lightning while  
47 diving, and she actually had made that comment.  
48

1 Then Julian had been trying to tell you about the large shipping  
2 vessels and the cruise ships, et cetera, and he said that the  
3 bigger issue with larger vessels is the anchoring outside of normal  
4 shipping areas of container ships, propane vessels, diesel  
5 tankers, gas tankers, et cetera. There is no designated moorings  
6 for these ships in the Virgin Islands.

7  
8 Finally, one note of clarification, and so, in the matrices that  
9 you have been talking about, zero, in this case that Joe is  
10 referring to, means no connection, and that's why there is an empty  
11 cell. The blues are those pending issues that you need to go back  
12 to, and, right now, you only have one in this matrix, but just to  
13 make sure that, whenever you say zero, what's going to happen is  
14 it's going to be an empty cell, and there is no actual connection.  
15 If you want to have some kind of connection in the matrix, then  
16 you have to give us the indication that there is some connection  
17 other than one, two, and three, which is what you've been doing,  
18 and that's what I have to say.

19  
20 **JOE KIMMEL:** Okay. Rich, are you ready to go?

21  
22 **RICHARD APPELDOORN:** Yes, and I just had to mute myself, because  
23 I had a cement truck going by, and nobody would have heard  
24 anything, had I been on, but he's gone by. Yes, I think we're  
25 ready to start up, and we're at artificial reefs and marine  
26 development.

27  
28 **JOE KIMMEL:** Yes, and, right now, there is artificial reefs affect  
29 marine development, and there's a one there, but I can't imagine  
30 why I put a one there. I mean, how does an artificial reef affect  
31 marine -- Well, I guess it might, if you put an artificial reef  
32 down first and somebody wants to do some --

33  
34 **RICHARD APPELDOORN:** I think you were thinking in the reverse  
35 direction.

36  
37 **JOE KIMMEL:** Yes, I think so, and so I think that should be a zero,  
38 and the same goes for coastal --

39  
40 **VANCE VICENTE:** Wait, Joe. Regarding artificial reefs and marine  
41 development, there is something going in the reverse way, but it's  
42 important to know, and like, right now, there is a major  
43 proposition to establish an artificial reef on the north coast,  
44 off of Condado, and, right now, there are submarine cables which  
45 would interfere and direct oppose the artificial reef project,  
46 because they would be hampered, or they could be damaged,  
47 irreversibly, and so artificial reefs and marine development are  
48 linked, and that's an actual example.

1  
2 **JOE KIMMEL:** Okay, and so the underwater cables and everything is  
3 considered a type of marine development.  
4  
5 **VANCE VICENTE:** By all means.  
6  
7 **JOE KIMMEL:** Okay. If that's the case, maybe a one is justified,  
8 in both marine development and coastal development, wouldn't you  
9 think?  
10  
11 **VANCE VICENTE:** Yes, by all means.  
12  
13 **RICHARD APPELDOORN:** I would not. I accept Vance's arguments for  
14 marine development, and so we're thinking a minus-one there?  
15  
16 **JOE KIMMEL:** Yes.  
17  
18 **RICHARD APPELDOORN:** All right. Coastal development is on land,  
19 and is an artificial reef going to affect coastal development?  
20  
21 **JOE KIMMEL:** No, I don't think so. Zip. I was thinking nearshore,  
22 but I guess that's all marine.  
23  
24 **RICHARD APPELDOORN:** Well, the other way around, I could see it,  
25 but not --  
26  
27 **JOE KIMMEL:** Okay. Any more discussion on marine development,  
28 coastal development, and artificial reefs? Then let's move on to  
29 artificial reefs affecting military use. I don't see any  
30 relationship there that's important enough to put a number there.  
31 The same with the next column of noise generation. If I'm going  
32 too fast, let me know, and I will slow down.  
33  
34 There's a zero in noise generation and artificial reefs and large  
35 vessel and shipping activities. We hashed this over a little while  
36 ago, and I really don't see a bit relationship there either.  
37 Vance, have you got a problem with that zero in that box, or Reni  
38 or --  
39  
40 **VANCE VICENTE:** No, and I would leave it as zero.  
41  
42 **JORGE GARCIA-SAIS:** I am trying to think of what artificial reefs  
43 do we have of any significant measure? Do we have any real -- We  
44 don't have an artificial reef program, other than the reef balls  
45 and things like that.  
46  
47 **JOE KIMMEL:** So I would keep that as a zero there, too.  
48

1 **VANCE VICENTE:** There are. There are U.S. Corps of Engineers  
2 permitted artificial reefs, specifically in St. Croix, and they  
3 have been registered as such, and so that's one example that I can  
4 think of. I wouldn't doubt that there are others.

5  
6 **JORGE GARCIA-SAIS:** Well, is there enough others -- The thing is  
7 that -- Maybe at present it is not, but I think this has been a  
8 matter of discussion in Puerto Rico for a long time now, and the  
9 topic has been brought up at least ten times that I can remember  
10 in different aspects of artificial reef development, and, at some  
11 point -- Maybe we don't have to deal with this now, but, at some  
12 point, the council should have some kind of criteria in terms of  
13 artificial reef development. I didn't comment, but, if there is  
14 a successful artificial reef development, for example in the north  
15 coast of Puerto Rico, you may have coastal development associated  
16 with the artificial reef development.

17  
18 **VANCE VICENTE:** Those U.S. Army Corps of Engineers -- Authorized  
19 by the U.S. Army Corps of Engineers are at depths and locations  
20 that do not affect or interfere with any large-vessel shipping  
21 activity. Otherwise, they would not be authorized under Section  
22 10 of the River and Harbor Act.

23  
24 **JOE KIMMEL:** Vance, are there any FADs, permitted FADs, around the  
25 U.S. Caribbean?

26  
27 **VANCE VICENTE:** Reni can answer that better. He's a fisherman.

28  
29 **JORGE GARCIA-SAIS:** Not in any large scale. There has been a  
30 project, but they have been brought down. The largest FAD that I  
31 can remember was the barge, and that was removed.

32  
33 **JOE KIMMEL:** Okay.

34  
35 **RICHARD APPELDOORN:** The ones I have off the north coast are thick  
36 steel balls, and one of them got hit and sank, and another one got  
37 lost, and so I don't think it's actually affecting the large  
38 shipping industry, and it's the other way around, and so I would  
39 leave it blank.

40  
41 **JOE KIMMEL:** Okay. Let's move to artificial reefs and waste.  
42 Right now, there is a minus-one there. Artificial reefs are made  
43 of waste, but, as we were talking about, do artificial reefs affect  
44 waste, and solid waste I'm talking about, like bridge remains and  
45 things that have been torn down and put on the bottom to make  
46 artificial reefs. I wouldn't put a minus-one there, and I would  
47 leave it blank as well.

1 **RICHARD APPELDOORN:** Agreed.  
2

3 **JOE KIMMEL:** Okay. The next one would be artificial reefs and the  
4 energy sector. I can't see a big relationship there either,  
5 positive or negative, and so I would keep that as a blank space.  
6 Has anybody got any problems or want to discuss that? Hearing  
7 none, then artificial reefs and light contamination. I don't  
8 think, unless people are putting big lights on artificial reefs,  
9 but I don't think they are. Then artificial reefs and mariculture.  
10 I think they're related, but I will take any comments, if anybody  
11 has got them.  
12

13 **RICHARD APPELDOORN:** I understand they're closely related, but I  
14 don't think we're really considering that. Mariculture is  
15 something that is set up and supposedly designed for, generally,  
16 food production, and so I don't see that being -- Whereas  
17 artificial reefs are sort of a byproduct, in a fishing sense, but  
18 not a design sense.  
19

20 **JOE KIMMEL:** Okay. That's good for the record. Okay. Artificial  
21 reefs and research. There is still people doing research on  
22 artificial reefs, and they attract fish, and the cleaners are  
23 artificial reefs now, especially ones that have been overgrown  
24 with a little bit of coral laminate, and so there is some potential  
25 research to be done, and so I don't know about a two, but I would  
26 give it a plus-one, maybe. Has anybody got a problem with that?  
27

28 **RICHARD APPELDOORN:** I think we would treat it the same way we  
29 were treating waste. The monitoring of waste and the impacts of  
30 waste in the marine environment does generate a lot of research,  
31 but that's not what we were talking about, and we gave it a minus-  
32 one, and the question is would an artificial reef displace research  
33 activities to someplace else.  
34

35 **JOE KIMMEL:** I can't think of any case of that happening.  
36

37 **RICHARD APPELDOORN:** Well, nor can I, and it would be a very  
38 localized event, like you put your reef on somebody's experimental  
39 plots, but, at the moment, I would think that's a tenuous  
40 connection.  
41

42 **JOE KIMMEL:** Yes, and so that should be a zero there, Graciela, or  
43 whoever is putting the numbers in.  
44

45 **GRACIELA GARCIA-MOLINER:** Liajay is driving today.  
46

47 **JOE KIMMEL:** Okay. Thank her for me. Artificial reefs and boating.  
48 Artificial reefs attract boats, people diving and stuff, and so

1 there's a two there.

2  
3 **RICHARD APPELDOORN:** Remember that we have boating, and then we  
4 have diving activity, and you have a two for boating and a three  
5 for diving activity, and I just wanted to make sure that you  
6 weren't subsuming one into the other, and it doesn't look like  
7 you're doing that. That's what they're there for, other than to  
8 get rid of trash, and so I'm good with it.

9  
10 **JOE KIMMEL:** Okay. Has anybody else got any discussion over  
11 artificial reefs and impacts with boating? We've got a number two  
12 there, positive-two. Okay. Let's move on to artificial reefs and  
13 marina activity. It would have a similar sort of relationship,  
14 where there is more marina activity because of artificial reefs,  
15 and so there is a certain relationship, and so I don't know if one  
16 or two, and there is lots of other boats in marinas than people  
17 just going out to artificial reefs, and that's why I've got a one  
18 there.

19  
20 **RICHARD APPELDOORN:** All right. I'm going to ask a question on  
21 that. I would agree with the one if the artificial reefs are  
22 actually increasing the number of boats around the marina. If the  
23 artificial reef is just having more boats from a marina go to the  
24 artificial reef, but it's the same amount of boats, then I would  
25 think it's blank.

26  
27 **JOE KIMMEL:** I was thinking of there would be -- Since there is  
28 artificial reefs, there would be -- People from the marinas would  
29 be taking more boats out there, and so there would be a lot more  
30 marina activity, and that's why I put a one, but I know it's not  
31 a big impact, and so, if you think it should be blank, I will go  
32 with that. Any more discussion on that?

33  
34 **RICHARD APPELDOORN:** I think you actually have to have a big  
35 increase in the number of boats at the marina, and not increase  
36 the number of boats going to the artificial reef, and we've already  
37 covered that, but it would have to be not just a higher proportion  
38 of those boats going to the artificial reef, but actually a much  
39 larger number of boats for there to be a significant interaction  
40 here.

41  
42 **JOE KIMMEL:** Okay.

43  
44 **RICHARD APPELDOORN:** To the level that you're actually increasing  
45 marina size or something like that.

46  
47 **GRACIELA GARCIA-MOLINER:** Richard, that doesn't include boats  
48 using private ramps and coming out to the -- So the increase to

1 the artificial reef can come from anywhere, and it's all related  
2 to the marina, per se, correct?  
3  
4 **RICHARD APPELDOORN:** To me, ramps would be marinas, and so the use  
5 of ramps would be marina activity, but, again, it's coming down to  
6 more boats that need more ramps or whatever, but remember the issue  
7 here is you're competing with fishing, and, if this is not really  
8 generating a competition with fishing, in however many steps it  
9 takes to get there, then I think it should be a blank.  
10  
11 **JOE KIMMEL:** Anybody else got comments for or against that?  
12  
13 **WALTER KEITHLY:** I may have missed it in the discussion, but I  
14 agree with I think it was Rich mentioning does it attract more  
15 boats to the marina, but the -- You could also look at it, and  
16 this is where I may have missed something, as it could affect the  
17 number of trips by the boats in the marina, and the issue of  
18 fishing -- It may certainly lead to competition among individual  
19 fishermen for fishing areas, that being right around the artificial  
20 reef.  
21  
22 **RICHARD APPELDOORN:** Right, and that was the issue that I was  
23 asking Joe, was if his thinking was a higher proportion of more  
24 trips or actually more boats. More trips is kind of in between  
25 the proportion and the more boats, and I am not going to argue  
26 this strongly one way or the other, but is that going to be a big  
27 enough impact that we want to put a one there?  
28  
29 **JOE KIMMEL:** I was thinking of both, actually, both the number of  
30 trips and the number of boats, and that's why I put a one there,  
31 but it's not a major influence.  
32  
33 **RICHARD APPELDOORN:** Sold. Let's move on.  
34  
35 **JOE KIMMEL:** Okay. Artificial reefs and recreational diving. I've  
36 got a plus-three in that column.  
37  
38 **RICHARD APPELDOORN:** That works for me.  
39  
40 **JOE KIMMEL:** Okay. Artificial reefs and conservation and  
41 restoration. I have a plus-two there.  
42  
43 **RICHARD APPELDOORN:** I want to hear your rationale.  
44  
45 **WALTER KEITHLY:** That's what I was going to ask.  
46  
47 **JOE KIMMEL:** I didn't hear that last comment there.  
48

1 **WALTER KEITHLY:** Whoever mentioned the rationale, that's what I  
2 was weighing-in on.

3  
4 **VANCE VICENTE:** Maybe a rationale may be that, in areas where  
5 habitat has been demonstrated to be a limiting factor for  
6 fisheries, creating such a type of artificial hard-bottom  
7 habitats, those have some conservation matters in it. Regarding  
8 restoration, again, depending on the type of artificial reef, there  
9 may or may not be. In the case of reef balls, especially those -  
10 - Well, they're practically all associated with nearshore, high-  
11 energy habitats, but you may consider then that the effect of that  
12 would be under restoration of the shoreline.

13  
14 **WALTER KEITHLY:** Well, let me ask a simpler question. Could  
15 somebody -- When we're talking about conservation, conservation of  
16 what? In other words, as far as I know, the influence of artificial  
17 reef on fish stocks is still an issue of debate, as to whether it  
18 simply aggregates the fish or leads to an increased population,  
19 and so I -- On one hand, I can see artificial reefs actually  
20 resulting in a decrease in fish stocks, and, again, I am thinking  
21 about what the definition of "conservation" is there, or I'm asking  
22 what the definition is.

23  
24 **VANCE VICENTE:** Regarding conservation, especially fisheries  
25 related, I remember the philosophy of Jim Bohnsack is artificial  
26 reefs are okay if, and only if, it has been demonstrated that such  
27 type of habitat is limiting the fisheries, the species diversity  
28 and resources, and, otherwise, it may be a good excuse to turn  
29 them into a dumping ground of waste.

30  
31 **JOE KIMMEL:** I remember, way back when, when they used to refer to  
32 artificial reefs as fountains for overfishing, because it would  
33 concentrate the fish in one place, and especially in the Gulf of  
34 Mexico. They had a bunch of artificial reefs for red snapper, and  
35 people would go out there, and they would catch their limit in no  
36 time, and people started calling them fountains for overfishing,  
37 and so I don't know, and that's not really conservation or  
38 restoration, and that's overfishing, which is not either one of  
39 those either.

40  
41 **GRACIELA GARCIA-MOLINER:** Under conservation, you have discussed  
42 the designation of critical habitat areas that prevent activities  
43 and EFH, et cetera, things that actually prevent other activities.

44  
45 **VANCE VICENTE:** Now that you mention it, Graciela, regarding the  
46 essential fish habitat issue, artificial structures are, or can  
47 be, considered as an essential fish habitat, and it's listed as  
48 such. It doesn't preclude designation of being artificial, in

1 order to not function as an essential fish habitat, and so  
2 artificial habitats are listed under the essential fish habitat  
3 component.

4  
5 **JOE KIMMEL:** Okay. Well, we've had a lot of discussion here, and  
6 I see Marcos Hanke has made a couple of comments. Graciela, do  
7 you want to read those out for everybody?

8  
9 **GRACIELA GARCIA-MOLINER:** The comments have to do with what do you  
10 consider the coral farms, and he was in agreement with Vance  
11 regarding the designation of artificial habitats as EFH.

12  
13 **JOE KIMMEL:** Okay, and so it sounds like a two is warranted in  
14 that box, right? Has anybody got a problem with that?

15  
16 **RICHARD APPELDOORN:** I'm still not sure your rationale here, Joe.

17  
18 **JOE KIMMEL:** Excuse me?

19  
20 **RICHARD APPELDOORN:** Why did you put a two there?

21  
22 **JOE KIMMEL:** We're down to the energy section, Row Number 9.

23  
24 **RICHARD APPELDOORN:** No, we're still on conservation and artificial  
25 reefs. What was your rationale when you originally put the two  
26 there?

27  
28 **JOE KIMMEL:** Well, I was thinking about -- I never have liked  
29 artificial reefs, because of my experience learning about the ones  
30 in the Gulf of Mexico and the red snapper, but, in some cases, I  
31 can see where, while they do aggregate fish in one place, most of  
32 the fish that aggregate there are food fish.

33  
34 Like, for example, off the coast of Georgia, there is a place  
35 called Gray's Reef, and they aggregate the bait fish in that area,  
36 and it turns out to be a very good place to go to catch king  
37 mackerel during their season, because they come through in big  
38 schools, and they are attracted to those baits, and so it's  
39 conservation, in the sense that the bait provides resources for  
40 the mackerel that they couldn't get somewhere else, and so I don't  
41 know if that makes any sense or not, but it's not really a negative  
42 relationship. It's a positive relationship with an artificial  
43 reef.

44  
45 **RICHARD APPELDOORN:** So enhancing fishing doesn't necessarily  
46 sound like conservation or restoration, and, for the same reason,  
47 FADs certainly enhance the fishing experience, but I wouldn't call  
48 it conservation and restoration.

1  
2 Now, whoever made the comment about the coral farms, that is  
3 actually the only specific example that I can think of where  
4 artificial reefs are designed to contribute to conservation and  
5 restoration, in this case the habitat, and so I am not at all happy  
6 with a positive-two, or actually a positive anything, because I  
7 don't think there's too many of those examples, relative to the  
8 question of whether we're actually enhancing removal, which is not  
9 a conservation and restoration function.

10  
11 **VANCE VICENTE:** Richard, regarding the coral farm itself, the coral  
12 farm purpose is not for the farm to become an artificial reef.  
13 It's a source to restore natural reef habitats, and so that's the  
14 issue there.

15  
16 **JOE KIMMEL:** Okay. I think we've had a lot of discussion on that,  
17 and I am tending to agree more now with what Richard said. I  
18 understand the coral farm aspect, where you put something down on  
19 the bottom and you plant corals on it, or corals naturally settle  
20 on it, and they become natural reefs. In that case, I would say,  
21 hey, that's a good restoration thing, but those are few and far  
22 between, I would think, and so I would tend to agree with Rich  
23 that maybe this should be a blank, too.

24  
25 **GRACIELA GARCIA-MOLINER:** Mr. Chair, Marcos Hanke has raised his  
26 hand to speak.

27  
28 **MARCOS HANKE:** Thank you for the opportunity. Just as an example  
29 for the group, in Fajardo, there was some concrete domes, or balls,  
30 being deployed on the coast of Fajardo, and many of them, a long  
31 time ago, I think in the 1990s, and none of those places have been  
32 announced or public, but people go fishing into them, and I know  
33 people that discovered where they are, and they have a lot of life  
34 on it, but it's not a fishing ground. It doesn't enhance any  
35 fishery, but it enhances habitat for some species, and that's just  
36 for the group to have that information. DNR never announced it as  
37 a fishing spot, and it's working more like a habitat or a  
38 conservation strategy, in the way I see it. Thank you.

39  
40 **VANCE VICENTE:** Do you know anything about the Puerto Rico  
41 artificial reef evaluation on the east coast, which was funding  
42 provided by NOAA, to the NOAA Coral Reef Conservation Program, on  
43 September 2013 to the Department of Natural Resources? Do you  
44 know any results from that?

45  
46 **MARCOS HANKE:** No.

47  
48 **VANCE VICENTE:** There is a progress report, which I just happened

1 to find here, and I haven't read it yet, but there is such a report  
2 on the artificial reef program on the east coast, funded by NOAA.  
3  
4 **MARCOS HANKE:** No, I don't know about that study. My report is  
5 based on my experience and interaction with the fishing community  
6 and the potential use of that.  
7  
8 **VANCE VICENTE:** Okay, but I have it on my cellphone right now, and  
9 so maybe Graciela can snap it from there and evaluate it, but such  
10 a report does exist.  
11  
12 **GRACIELA GARCIA-MOLINER:** If you could send us the reference, we  
13 would appreciate.  
14  
15 **VANCE VICENTE:** I am telling you the reference. It's called  
16 "Puerto Rico Artificial Reefs Evaluation on the East Coast: Funding  
17 Provided by the NOAA Coral Reef Conservation Program, Grant Number  
18 NA11NOS4820005", and it's dated September 23, 2013.  
19  
20 **GRACIELA GARCIA-MOLINER:** Thanks.  
21  
22 **VANCE VICENTE:** No problem.  
23  
24 **JOE KIMMEL:** Thanks for that, Vance. Anyway, I think we're down  
25 to Row 9, the energy sector.  
26  
27 **RICHARD APPELDOORN:** What was the final result there? Was it  
28 blank?  
29  
30 **JOE KIMMEL:** Yes, we put a blank there.  
31  
32 **RICHARD APPELDOORN:** Okay. Thanks.  
33  
34 **JOE KIMMEL:** Anyway, the energy sector. Does the energy sector  
35 affect the marine development at all? Not appreciably, as far as  
36 I'm concerned. I have a zero there. Has anybody got comments?  
37  
38 **RICHARD APPELDOORN:** I would disagree. The energy sector is going  
39 to be, or could be, putting out pipes for water entrainment and  
40 for effluent, and, if we're talking eventual wind farms, we're  
41 talking about cables that would be put out, and so I think the  
42 potential for the energy sector to promote more marine development  
43 is at least a positive something.  
44  
45 **JORGE GARCIA-SAIS:** I would argue for a two. I would argue for a  
46 two. It's significant, just what you said, and the potential for  
47 expansion of that impacts are there, in terms of the wind, the  
48 wind generators, based on marine platforms.

1  
2 If you take the entrainment and impingement and thermal effects,  
3 they're there, and the underwater cables and all the energy for  
4 the structure is -- There is an impact, and it's probably impacts  
5 that have been little studied, such as the impact of electric  
6 fields on the navigation by sea turtles and whales and dolphins  
7 and things like that, all of those are concerns that, right now,  
8 are in the same boat, particularly on the east coast of the United  
9 States, and several councils are dealing with that right now, and  
10 I don't think we should discard them easily.

11  
12 **JOE KIMMEL:** All right, and so you're recommending a positive-two  
13 in that column then? Is that right?

14  
15 **JORGE GARCIA-SAIS:** What is the pathway again, Joe? Is it energy  
16 affecting coastal development, or is it the other way around?

17  
18 **JOE KIMMEL:** In development.

19  
20 **JORGE GARCIA-SAIS:** Okay. Energy affecting coastal development.

21  
22 **RICHARD APPELDOORN:** Marine development.

23  
24 **JOE KIMMEL:** We are doing marine development.

25  
26 **JORGE GARCIA-SAIS:** It's probably a negative effect.

27  
28 **JOE KIMMEL:** Okay, and what's the --

29  
30 **JORGE GARCIA-SAIS:** It has positive implications, in terms of  
31 social development, but it probably has some impacts on the marine  
32 environments.

33  
34 **RICHARD APPELDOORN:** What we're saying is that the energy sector  
35 -- If you increase the energy sector, you will be increasing marine  
36 development, a positive relationship.

37  
38 **JORGE GARCIA-SAIS:** Okay. Well, if you look at it from that  
39 standpoint, yes, it is positive.

40  
41 **RICHARD APPELDOORN:** The impact of the marine development may be  
42 negative, but that's the step after.

43  
44 **JORGE GARCIA-SAIS:** Yes, I understand.

45  
46 **JOE KIMMEL:** Okay. That's a positive-two in the marine development  
47 energy section block. There is already a two in the energy sector  
48 and the coastal development block, but I don't know if it should

1 be a two or a negative-two. Probably a negative-two.  
2  
3 **VANCE VICENTE:** It probably would be a negative-two, because, first  
4 of all, you will have aerial emissions, which will restrict the  
5 areas where you would be developing coastal communities, and so  
6 that would be one. Also, like Richard said before, the  
7 installation of utility lines, such as fiberoptic cables and water  
8 lines and gas pipelines, like in the case of Guayanilla Bay, when  
9 they wanted to extend the distribution of natural gas from  
10 Guayanilla to -- That interfered, or that potentially was going to  
11 interfere, with any development within certain areas north and  
12 south of the projected pipeline, and so, actually, the energy  
13 sector would have a negative effect on coastal development, per  
14 se, looking at it from that standpoint.  
15  
16 **JOE KIMMEL:** I don't disagree with that. It sounds like a good  
17 approach. Negative-two. The energy sector affecting military  
18 uses, I don't see any. Has anybody got comments there? Is there  
19 a relationship there?  
20  
21 **RICHARD APPELDOORN:** I don't see one.  
22  
23 **JOE KIMMEL:** Okay. Seeing none, we'll go to energy sector and  
24 noise generation. I don't know there's a minus-one. I was trying  
25 to imagine something that the energy sector would be negative to  
26 noise generation.  
27  
28 **RICHARD APPELDOORN:** It should be positive. They're going to  
29 generate more noise.  
30  
31 **JOE KIMMEL:** Yes, I think so. If there's anything there, it should  
32 be a positive, and I would say a positive-one. Okay. Anybody got  
33 any problems with that? Okay. The energy sector and large-vessel  
34 shipping activity.  
35  
36 **VANCE VICENTE:** That would be a positive-one.  
37  
38 **JOE KIMMEL:** Yes, I think you're right.  
39  
40 **VANCE VICENTE:** They would have to bring in fuel oil and liquid  
41 natural gas, tugboats activity, and smaller boats assisting the  
42 tugboats, and I think it would be positive.  
43  
44 **JOE KIMMEL:** Right.  
45  
46 **RICHARD APPELDOORN:** Should it be higher than a one?  
47  
48 **JOE KIMMEL:** I was going to say that maybe it should be a two.

1 What do you think, Vance?  
2  
3 **VANCE VICENTE:** I am okay with two.  
4  
5 **JOE KIMMEL:** Okay. Energy sector and waste. I don't have anything  
6 there right now, zero.  
7  
8 **VANCE VICENTE:** Well, there is waste. I mean, when you refine the  
9 oil, petroleum, one of the huge wastes is sulfur, and, in  
10 Guayanilla Bay, we have these really high hills of pure yellow  
11 sulfur, which they need to dispose of, and that's a waste directly  
12 related to fossil fuel energy production. Regarding gas, natural  
13 gas, I don't see any waste, because the combustion is almost  
14 complete. Windmills don't generate any waste, that I know of. In  
15 ocean energy conversion, you would be bringing nutrient-rich water  
16 to the surface. Nuclear power plants, there is definitely  
17 byproducts of uranium that have to be disposed of, and so there is  
18 waste, a lot of waste, actually.  
19  
20 **JOE KIMMEL:** All right. Let's put a two there until we finish the  
21 discussion, so we won't forget. Any more discussion, Vance or  
22 anybody else? Rich, are you good with that, too?  
23  
24 **RICHARD APPELDOORN:** Sure.  
25  
26 **JOE KIMMEL:** Okay. Energy sector and artificial reefs. I've got  
27 a zero there.  
28  
29 **VANCE VICENTE:** I don't see much there.  
30  
31 **JOE KIMMEL:** I don't see much there either. Okay. Let's move  
32 over to the energy sector and light contamination. Well, you need  
33 energy for light, but I don't think that's --  
34  
35 **VANCE VICENTE:** If you look at a power plant at night, it looks  
36 like a Christmas tree on December 24, and so they have to be lit  
37 up, for safety reasons and for aerial navigation, and so there is  
38 plenty of lights, believe me.  
39  
40 **JOE KIMMEL:** Yes, and all of the lights along the roads, coastal  
41 roads, too, and so I can see where that might even be higher than  
42 a two, but has anybody got any comments on that?  
43  
44 **RICHARD APPELDOORN:** We're not talking about the distribution of  
45 light for all the coastal roads and whatever, and, yes, that's a  
46 problem, but that's not due to the energy sector, per se. That's  
47 due to coastal development, but, yes, there is substantial light  
48 contamination coming across anything dealing with the power

1 industry.

2  
3 **CHURCHILL GRIMES:** I guess you don't have oil rigs in Puerto Rico  
4 anywhere, do you? I mean, in the Gulf of Mexico, the whole Gulf  
5 is lit up with rigs that are fully lighted.

6  
7 **RICHARD APPELDOORN:** Well, never rule out the possibility here.

8  
9 **JOE KIMMEL:** All right. Well, let's stick with one as the level  
10 of impact there for the energy sector and light contamination,  
11 unless anybody has got a problem. Okay. Hearing none, let's go  
12 energy sector and mariculture. I've got a zero there, and I don't  
13 see any relationship at all.

14  
15 **RICHARD APPELDOORN:** Well, Joe, you have to go back to the argument  
16 they were making in St. Croix about bringing up water, and I think  
17 it was for the energy sector, but they could also use it for  
18 mariculture operations, but that was land-based anyway, and it  
19 didn't really work out, and so I'm good with the zero, but there  
20 have been arguments made otherwise.

21  
22 **JOE KIMMEL:** Okay. Moving on, we'll go energy sector to research.  
23 I've got a one there.

24  
25 **JORGE GARCIA-SAIS:** I think it's more than one. There is a lot of  
26 research because of all the studies that required for thermal  
27 effects of power plants and thermal discharges and the entrainment  
28 and impingement of organisms in the seawater used for cooling  
29 purposes, and so this is research, and it's applied research, but  
30 it's research.

31  
32 Research has to be done to make assessments of those impacts on a  
33 recurring basis, and all the impacts, environmental impact,  
34 statements have to be prepared every time there is a proposal for  
35 a power plant construction, and we have a lot of those in our  
36 history, and so I don't think it's just a one. I think it's a  
37 positive, and it's at least two, in my opinion.

38  
39 **RICHARD APPELDOORN:** Reni, you were not here for the discussion in  
40 the morning where, for other things, we ruled out the research  
41 that was done on the thing itself to -- Like environmental impact  
42 statements or assessing impacts and things like that, because the  
43 issue here is, eventually, are you displacing fishing in space and  
44 time, and that's the competing resource aspect of this. It's  
45 really what is it doing to other research activities, and is it  
46 displacing those into areas where then fishermen are going to say  
47 we can't fish here where all these other restrictions are going on  
48 for research or during a time or something like that.

1  
2 The research that generated because you're doing energy activities  
3 there doesn't count, and the argument I made before is, if we had  
4 a category about research enhancing our knowledge of fishing and  
5 species, et cetera, and that being able to increase the rate of  
6 fishing, because we can do better management, then your argument  
7 would be very strong, but, in terms of the activities that are not  
8 directed towards the item itself, the energy sector or the large  
9 vessels or the waste, et cetera, that is -- What we said in the  
10 morning is that doesn't count.

11  
12 **JORGE GARCIA-SAIS:** Okay. That was my position, and I don't see  
13 otherwise.

14  
15 **RICHARD APPELDOORN:** Right, and we had the same arguments before,  
16 and so we agree with what you're saying, but we decided not to  
17 count that here.

18  
19 **JORGE GARCIA-SAIS:** Okay. No problem.

20  
21 **JOE KIMMEL:** So we've got a one there now, and so it sounds like  
22 everybody is pretty much in agreement about that one.

23  
24 **RICHARD APPELDOORN:** Well, it should be a blank, just like we did  
25 with waste, like sewer outfalls and things like that, and anything  
26 else, artificial reef impacts.

27  
28 **JOE KIMMEL:** Okay. Let's go the next one, boating, and we've got  
29 a zero under research there. Boating and the energy sector, I  
30 don't see any major relationship there, nor do I see one with  
31 marina activity, the next column.

32  
33 **RICHARD APPELDOORN:** You're on a roll.

34  
35 **JOE KIMMEL:** Okay. Neither do I see one for recreational diving  
36 or conservation and restoration. They seem to be totally  
37 unrelated.

38  
39 **RICHARD APPELDOORN:** I would raise the case about oil platforms,  
40 and do we have something similar in the way that that would attract  
41 diving and fishing activities? I can't think of any, but I'm  
42 raising the question.

43  
44 **JOE KIMMEL:** It's been a long time, and so I don't know.

45  
46 **JORGE GARCIA-SAIS:** I was thinking about the piers and all that,  
47 and those attract a lot of fishing, and they actually act as an  
48 artificial reef, and people fish there for snappers and jacks, and

1 so I don't know if that has any type of direct relationship, but  
2 it is the reality. It happens.

3  
4 **RICHARD APPELDOORN:** Well, we already have that the energy sector  
5 can substantially increase marine development, such as the pier  
6 that you mentioned, and then we have marine development -- We have  
7 marine development not affecting mariculture, nor did we have it  
8 affecting artificial reef, but we weren't thinking of piers, and  
9 we could go back to that. Oh, we didn't do that this morning,  
10 because that was done the last meeting, and so we might want to  
11 revisit that one, if you want to take that into account.

12  
13 **JORGE GARCIA-SAIS:** I know, because I have dove all those piers,  
14 and they are full of snappers and jacks, and people fish there,  
15 mostly recreationally, but it does enhance the utilization of those  
16 structures for fishing activities.

17  
18 **RICHARD APPELDOORN:** Does recreational diving impede those  
19 activities?

20  
21 **JORGE GARCIA-SAIS:** I don't know if there is organized recreational  
22 diving for that, but at least I know the fish are there. Whether  
23 they dive it or not -- I have seen the fishermen, and, in  
24 Guayanilla, there is some recreational fishing activity on all  
25 those structures, specifically. I am not sure if in other places  
26 it also happens, but I know that, in Guayanilla, it is happening.

27  
28 **RICHARD APPELDOORN:** All right, but the ultimate question here is  
29 whether that recreational diving, but that doesn't include  
30 spearfishing, is displacing fishing activity.

31  
32 **JORGE GARCIA-SAIS:** I don't think so.

33  
34 **RICHARD APPELDOORN:** I know there's been conflicts, like at the  
35 pier in Vieques, where there is a conflict between those who want  
36 to fish there and those who want to lead tours there, and so they  
37 get upset when the goliath groupers get shot, but I'm not sure any  
38 one of those -- If either side is being successful in excluding  
39 the other, but that's the potential issue here.

40  
41 We're talking, in the end, is recreational diving excluding  
42 commercial or recreational fishing, through the energy sector  
43 leading to this marine development, and that's how the connection  
44 would go. To me, the energy sector enhances that marine  
45 development, and the marine development would enhance the  
46 recreational diving, which is how we have it now, and so I would  
47 leave it blank here, because that's the route that it would travel,  
48 energy sector to marine development to recreational diving.

1  
2 **JORGE GARCIA-SAIS:** If there is something, it's very small.  
3  
4 **JOE KIMMEL:** Okay. I think we're on Row 10, aren't we? We have  
5 a zero under the conservation/restoration and energy sector, and  
6 I think we should leave it there. Number 10 is light contamination  
7 and marine development. How does light contamination affect marine  
8 development? I've got a positive-two here.  
9  
10 **RICHARD APPELDOORN:** Excuse me, Joe, but you have the energy sector  
11 is not affecting conservation and restoration?  
12  
13 **JOE KIMMEL:** Yes, and that's what I had.  
14  
15 **RICHARD APPELDOORN:** I would think it would impede, but we can  
16 leave it as a blank. That's fine.  
17  
18 **JOE KIMMEL:** I mean, I can see that there is a mild effect, but I  
19 can't see scoring it.  
20  
21 **RICHARD APPELDOORN:** That's fine.  
22  
23 **JOE KIMMEL:** Okay. Light contamination, that's the row we're on  
24 now.  
25  
26 **RICHARD APPELDOORN:** I think I would comment to say that light  
27 contamination doesn't affect anything else. Light contamination  
28 is in there because it's going to be impacted by everything else,  
29 and then the light contamination is going to go to a different  
30 sub-model.  
31  
32 **JOE KIMMEL:** So there's a zero in all of the columns.  
33  
34 **RICHARD APPELDOORN:** That's the way I would look at it, but we  
35 should hear from some other people, to make sure they agree with  
36 that.  
37  
38 **JOE KIMMEL:** I agree with that, even though I'm the one that put  
39 the numbers in here.  
40  
41 **RICHARD APPELDOORN:** But remember you had it reversed before.  
42  
43 **JOE KIMMEL:** Yes, and I have a hard time thinking about it the way  
44 you're supposed to. So marine development should be a --  
45  
46 **LIAJAY RIVERA:** Should I clear out all the values in light  
47 contamination then?  
48

1 **JOE KIMMEL:** Yes, the whole row of light contamination should be  
2 zeroes across-the-board. Okay. Row 10, boy, we got that one done  
3 pretty quick. Now mariculture and marine development. After  
4 lunch, I have a hard time thinking. Mariculture and marine  
5 development, I've got a one there, and I don't know why.

6  
7 **JORGE GARCIA-SAIS:** Well, mariculture has brought up some marine  
8 development, for sure. I mean, the big project in Culebra, that  
9 was a big development. All the coral cultures that have been --  
10 That has been some development on the marine environment, and I'm  
11 not sure of the entire effect of those, but I know that there is  
12 something going on in Culebra, and there has been something going  
13 on in -- It's not zero.

14  
15 **JOE KIMMEL:** So you think a positive or a negative-one there?

16  
17 **JORGE GARCIA-SAIS:** It's got to be a positive-one, because it's  
18 added on to -- I mean, I don't know what's going on right now,  
19 but, in other issues, it is a potential activity. Any kind of  
20 mariculture project will bring up some development, some marine  
21 development, wherever it's going on, the boats and people and  
22 materials and habitat enhancement or whatever. I mean, it's not  
23 zero.

24  
25 **RICHARD APPELDOORN:** I am thinking this would be two.

26  
27 **JOE KIMMEL:** Do you have any floating cage type mariculture around  
28 Puerto Rico or the USVI?

29  
30 **JORGE GARCIA-SAIS:** Not that I recall, no, but there is a lot of  
31 mariculture going on with corals, and there has been a large  
32 experimental project with cobia and mutton snapper that had a  
33 considerable amount of development, in terms of the cage  
34 infrastructure and the boats and personnel and all the mercantile  
35 activity going on with those, and it was something, you know. If  
36 it happens again, chances are that you will increase mariculture,  
37 or, if you establish mariculture experiments, chances are that  
38 there is going to be increasing marine activities.

39  
40 **RICHARD APPELDOORN:** I am thinking that it should be a two,  
41 actually. It's just a question that, right now, the magnitude of  
42 the mariculture is small, and so the impact on marine development  
43 is small, but the relationship, I think, is fairly strong, and  
44 that's why I would argue with two.

45  
46 **JORGE GARCIA-SAIS:** Yes, the potential is there for a two,  
47 certainly.

48

1 **JOE KIMMEL:** Years ago, and this was out of what is now called the  
2 Fisheries Lab, but there was a project, and this was like the  
3 early-1970s, to look at the floating mariculture of oysters, and  
4 it wasn't that it was not successful, but it's just that it didn't  
5 take off.

6  
7 The fishermen for some reason, didn't like the whole operation,  
8 even though it lasted for a couple of years, and some people made  
9 some money off of it, but it just went away, because there wasn't  
10 enough support for it, and so there is potential, and I don't  
11 disagree with a two there. Okay. Now mariculture and coastal  
12 development.

13  
14 **RICHARD APPELDOORN:** I am thinking one.

15  
16 **JOE KIMMEL:** Let's do it. Let's put a one there. Have you got  
17 any rationale for me?

18  
19 **RICHARD APPELDOORN:** I am thinking, again, back to the cobia farm,  
20 and they had three cages out, and they really weren't developing  
21 that much, and they were using an existing building in Culebra,  
22 and I think they were getting their brood stock from Florida, or  
23 not the brood stock, but the hatchlings, but, when that operation  
24 moved to Panama, they built a rather substantial shoreline  
25 facility, where they were doing the rearing activities, and then  
26 also all the processing of the fish that were being harvested, and  
27 so, again, as the scale of the mariculture ramps up, it will ramp  
28 up some degree of coastal development, but I would put it as a  
29 one.

30  
31 **JORGE GARCIA-SAIS:** Joe, I am going to give you what is my  
32 rationale, and that has the potential for a three, and that is  
33 because what I think that should happen in Puerto Rico is that we  
34 have a marine aquarium, and not all mariculturists have the  
35 facilities and infrastructure associated with that marine  
36 aquarium, and the potential is there for a big impact, for a big  
37 -- It's not happening, but the potential is there, and so, if you  
38 want to keep it one, I'm happy with that, or a two or whatever,  
39 but that has a huge potential, if we would do what I think should  
40 have been done at least fifteen or twenty years ago.

41  
42 **VANCE VICENTE:** I agree that there is a potential. However, at  
43 present, the coral farm that you are talking about, Reni, is --  
44 They utilize existing resources, and they render their cars, and  
45 they have not constructed any new pier or any structure, any  
46 coastal structure at all, but, potentially, regarding the fish  
47 farm, if that would ever resuscitate again, it does have potential,  
48 and I think the potential is there, and so I am happy with a one

1 or a two.

2  
3 **GRACIELA GARCIA-MOLINER:** If I may, I need to read, for the record,  
4 that Marcos is saying that, right now, there is a conch project in  
5 Naguabo, and it's using the facilities of the fishing village, and  
6 I don't know of any new construction related to that project  
7 itself, and I don't know what the expansion of that might be.

8  
9 **RICHARD APPELDOORN:** Right, but that goes back to the issue that  
10 the magnitude of mariculture here is very small, and so the total  
11 impact on development would be equally small, but the question is  
12 how strong is the linkage, and I think mariculture, in a large  
13 sense, as they do it in other countries, and they haven't done it  
14 here in the U.S. Caribbean yet, but this is on the scale where  
15 you're sending stuff up to the Fulton Fish Market for delivery  
16 across the U.S. or the world or the whatever, and these are very  
17 large-scale operations.

18  
19 When you scale up to that, you end up having a lot of coastal  
20 development to support it, and so it's not a question of what are  
21 we doing now, because we don't have much activity now, but the  
22 relationship, I think, is fairly direct and reasonably strong, and  
23 I would still make it a one for coastal development.

24  
25 Now, I think Reni was talking about why don't we have a big marine  
26 aquarium, like the aquarium in Miami or something like that, in  
27 Puerto Rico, and my answer to that is I don't know, but it was a  
28 great idea twenty years ago, and it's still a great idea, up until  
29 COVID, but I don't see that as a mariculture operation. Those  
30 things are basically a coastal development, and, if it has a  
31 running seawater system, they're going to have a little bit of  
32 marine development, for the piping and whatnot, but it's not  
33 related to mariculture in that sense.

34  
35 **JORGE GARCIA-SAIS:** Rich, but what I'm thinking is something else.  
36 An aquarium as a main structure to support mariculture for research  
37 and other applications, for example the aspect of coral disease,  
38 the farming of sea urchins and other fishes that are reefs need  
39 rebuilding up, that kind of thing. (Some of Dr. Garcia-Sais's  
40 comments are not audible on the recording.)

41  
42 Some of these are necessary for the protection of the marine  
43 environment, such as research for coral disease and research for  
44 other diseases, mariculture for species that have suffered mass  
45 mortality, such as the diadema project, and things like that. For  
46 example, we were talking of groupers, and we should have had, by  
47 now, artificial stocks of Nassau groupers, so we could restock our  
48 reefs when the management application for protection of those

1 species were in effect, and all of that has to be done. That's my  
2 point. The association, for me, is a three, the linkage, as you  
3 call it. For me, the linkage is a three. That is how big it is.  
4

5 For example, about two months ago, I was called to serve on the  
6 spiny lobster farm in Mayaguez, and they were taking an entire  
7 building inland, on the coast, to do that, and the potential is  
8 there, and it hasn't exploded, but it's something that we had to  
9 be thinking about thirty or forty or fifty years ago, and we still  
10 don't -- There are people here that think along those lines, but  
11 the linkage is there.  
12

13 **JOE KIMMEL:** From all the discussion I've heard, it sounds like  
14 there is a lot of potential for mariculture in Puerto Rico, which  
15 would affect the coastal development, but there's not a lot of  
16 progress yet, and so, until there is more progress, I would say  
17 leave it as a one.  
18

19 **RICHARD APPELDOORN:** Well, I disagree with that, Joe, because the  
20 correction be the strength of the connection, and then there's the  
21 magnitude, and so, if you will, think of these as boxes with flows  
22 in between them, and the boxes for mariculture right now is really  
23 small, and, therefore, you can have a direct strong relationship  
24 between mariculture and coastal development, but, since the  
25 mariculture box is very small, there is nothing to flow into that  
26 at the moment.  
27

28 Should the mariculture industry explode, grow, that would trigger  
29 a large degree of coastal development, and I'm not sure that I am  
30 going with a three, and I know I said a one, but I would accept a  
31 two.  
32

33 **JORGE GARCIA-SAIS:** Well, I'm happy with a two, with the caveat  
34 that it has the potential for growing. It has the potential, but  
35 I can agree with a two. Let's leave it at two and work from there,  
36 and the good thing about a two is that it can either go down or go  
37 up.  
38

39 **JOE KIMMEL:** Okay. Let's put a two there.  
40

41 **JORGE GARCIA-SAIS:** If nothing happens in the next fifty years,  
42 probably another council should probably reconsider it back to  
43 one, but it may happen otherwise.  
44

45 **JOE KIMMEL:** I won't be here.  
46

47 **CHURCHILL GRIMES:** Joe, this supports what you're saying, but you  
48 know the service and NOAA are strongly supportive of this. NOAA

1 and the National Marine Fisheries Service is strongly supportive  
2 of this, of mariculture, offshore mariculture, and it's perhaps  
3 now down there yet, but, if they have the opportunity to, I'm sure  
4 they will.

5  
6 **JOE KIMMEL:** I recall there was a push for it, even when I was  
7 still working, and that was nearly ten years ago now.

8  
9 **CHURCHILL GRIMES:** Same almost with me, but they are. I mean,  
10 there's some controversies around here, and the locals don't  
11 necessarily want it, but the agency is pushing it and approving it  
12 and advocating for it.

13  
14 **VANCE VICENTE:** Unfortunately, they have all failed, and this is  
15 like the shrimp farm in Ponce, and the clown fish farm in Salinas  
16 was one of the largest producers of clown fish in the whole  
17 Caribbean region, and that also failed. The cobia aquaculture  
18 also didn't get anywhere, and it's necessary, but it's very  
19 difficult to get it going on this island, period.

20  
21 **JOE KIMMEL:** I don't have any problem with growing cobia, but the  
22 clown fish is an introduced -- Not an introduced species, but an  
23 exotic species, and I would direct people away from that sort of  
24 stuff in the Caribbean waters, for things that don't live here  
25 naturally, but, anyway, let's go from mariculture to military uses.  
26 I can't see any relationship, myself. Anybody got an issue with  
27 that relationship as zero? Okay.

28  
29 Then mariculture and noise generation. There might be a little  
30 bit of noise generation from mariculture, but not a whole lot. I  
31 mean, they do have those pumps, and I was thinking about the cobia  
32 farms off of I guess I was Culebra or someplace like that, and  
33 they did have pumps and stuff that would help them run their nets  
34 and that kind of stuff, and so I guess there is some noise, but I  
35 think it's minor, and so I would leave that as a zero.

36  
37 Mariculture and large-vessel shipping, I've got a negative-one,  
38 and I can see where mariculture might impact the large-vessel  
39 shipping, if it was in the way of the large-vessel shipping, the  
40 mariculture operation was in the way of shipping, but most of the  
41 mariculture operations I've seen are actually coastal, coastal  
42 mariculture, if you will, and they're not out ten miles off of  
43 shore and that kind of stuff. They're usually very close to shore,  
44 and so I don't see much of an activity there, but, if there is  
45 one, I would think it would be a negative-one. Has anybody got  
46 any more comments about that?

47  
48 **VANCE VICENTE:** Well, I think it's going to depend on the

1 production. If you have massive productions, they are going to  
2 need a large vessel to ship out the product, although that's  
3 extremely unlikely.  
4

5 **JOE KIMMEL:** Yes, I agree. Maybe we should put a zero there? Do  
6 you think?  
7

8 **VANCE VICENTE:** Zero, yes.  
9

10 **JOE KIMMEL:** Okay. Mariculture impacting waste, there is always  
11 waste when you've got a mariculture operation going on, and so  
12 negative-three or positive-three? I don't know.  
13

14 **VANCE VICENTE:** That would be a positive-three. You would be  
15 increasing the waste.  
16

17 **JOE KIMMEL:** Yes, you would. Has anybody got a problem with a big  
18 number three there for mariculture and waste?  
19

20 **JORGE GARCIA-SAIS:** Joe, I have a problem, because we are assessing  
21 that the operation at this point is very, very minimal. It's  
22 minimal, and then I think that it should be -- I would go to a  
23 one, and at most two, and, I mean, the linkage is there, but,  
24 relatively speaking, the operation is so small that the amount of  
25 waste right now is very small, and it's mostly probably organic  
26 waste, and I'm not sure. I wouldn't go to a three, and, at most,  
27 two, but I would be more comfortable with one, but that's just my  
28 opinion, and I'm not a mariculture expert at all, and so I would  
29 leave it to you.  
30

31 **JOE KIMMEL:** I'm not an expert in any one of these categories, but  
32 I don't disagree.  
33

34 **VANCE VICENTE:** Let me just say that, again, it would depend on  
35 what type of mariculture. For example, I was on the Sea Grant  
36 Program proposal review team, and I examined a lot of proposals  
37 that have to do with mariculture, and there is some mariculture  
38 projects which are zero discharge, and so all the excessive  
39 nutrients, for example, were being assimilated by the growth of  
40 fleshy red algae or the production of emulsifiers, and everything  
41 was perfectly clean, and so it's going to depend on what type of  
42 -- But I think it would be -- At this point, at least for Puerto  
43 Rico and the Caribbean, I don't see any massive production of  
44 anything, and so I would put a two, and I would not make it a  
45 three. My suggestion is a two, but it's up to you.  
46

47 **JOE KIMMEL:** I like two. That sounds good. Any more discussion  
48 about that from Rich or anybody else?

1  
2 **RICHARD APPELDOORN:** I like one. It's not a question of -- Again,  
3 we're talking about what is the potential for the relationship,  
4 and, obviously, if you increase mariculture, there is going to be  
5 some degree of waste, and so there's a positive something there,  
6 but how much waste can be generated, I don't know, and so I don't  
7 know, and a two is fine.  
8  
9 **JOE KIMMEL:** Part of my thinking is, when I first came to Puerto  
10 Rico, there was an aquaculture department, as part of the  
11 Department of Marine Science, and now it was aquaculture, and so  
12 it was fresh water, but what amazed me, more than the things that  
13 they were growing, was the amount of waste it produced, and even  
14 that waste wound up flowing into the marine environment, and so  
15 that's in the back of my head, and that's why I chose the number  
16 I did, but, anyway, I'm good with a two. Any further discussion  
17 on that one? Okay. Mariculture and artificial reefs.  
18  
19 **RICHARD APPELDOORN:** Joe, I actually had lost my screen for a  
20 while, and I couldn't delete myself, and so I didn't get what you  
21 put in for the box previous to that, the large vessel activity.  
22 What's the value there?  
23  
24 **GRACIELA GARCIA-MOLINER:** Large vessel activity is empty.  
25  
26 **RICHARD APPELDOORN:** Okay. That's what I just needed to know.  
27 Thank you. Okay. Back to artificial reefs.  
28  
29 **JOE KIMMEL:** Now we go to artificial reefs and mariculture, and  
30 I've got a zero there. I can't think of a really good rationale,  
31 except that mariculture is usually inshore, but not all the time,  
32 but I don't know of anybody that would want to put an artificial  
33 reef next to a mariculture facility, because of the waste it  
34 generates, actually, and then there is always a lot of activity,  
35 fishing, around artificial reefs, and I don't think the mariculture  
36 people want to have a lot of activity around their nets and cages  
37 and whatever, and so, anyway, I put a zero there.  
38  
39 **VANCE VICENTE:** I agree, unless the artificial reef is strictly  
40 associated with the type of mariculture project. Like, for  
41 example, you may need artificial substrate if you are raising  
42 oysters, for example, or for the settlement of -- Things like that.  
43 I mean, from that point of view, there may be an association.  
44  
45 **JOE KIMMEL:** So, Vance, do you think we ought to have a number in  
46 that block, or are you okay with a zero there?  
47  
48 **VANCE VICENTE:** I don't know. If mariculture is going to involve,

1 for example, benthic species, macroalgae and red algae and things  
2 like that, you would need a substrate, maybe, and you may need an  
3 artificial substrate to have that growing, if the project is going  
4 to be located at-sea.

5  
6 If it's going to be growing in inland upland tanks, then it doesn't  
7 apply, but there are aquaculture projects which are directly in  
8 the ocean, and they do use artificial substrate for oyster  
9 culturing or for pearl oyster culturing, and there is other  
10 examples, the building of cages, which involve artificial  
11 substrata, and so there is something there, I think, and I don't  
12 know.

13  
14 **JORGE GARCIA-SAIS:** I agree with Vance.

15  
16 **TARSILA SEARA:** One thing that I was thinking is that the  
17 structures themselves, the cages that are using and some of the  
18 other structures, could also be considered artificial reefs, if  
19 they are attracting other organisms, and so I think that there  
20 should be something in there.

21  
22 **JOE KIMMEL:** Okay. Good point. Let's go ahead and put a one  
23 there, just for a placeholder, and maybe it ought to be a blue  
24 one. I don't know, but what do you think?

25  
26 **JORGE GARCIA-SAIS:** Right now, Stacy Williams is undertaking a  
27 mariculture experiment on sea urchins and diadema, and she collects  
28 them post-larval, and so, actually, there is small juvenile urchins  
29 floating on lines, ropes, underwater, and so that pretty much  
30 looks, to me, like an artificial something, and I don't know, but  
31 artificial something, and there is a big rope, and there is a lot  
32 of sea urchin settlement on those lines.

33  
34 That's a collection method also for the juvenile, for the early  
35 juvenile, lobsters, and so, whatever it is, and I'm not sure if we  
36 can call that artificial reef, but it is artificial something,  
37 structures, that are placed to enhance mariculture experiments or  
38 whatever.

39  
40 **JOE KIMMEL:** I remember, when they were doing the cobia farming,  
41 they had those big nets out, where they kept the cobia, and they  
42 noticed, when they would go out to clean the nets, so there would  
43 be a good flow of water through them, they discovered there were  
44 lots of spider crabs and lobster, but mostly spider crabs, and  
45 that basically sort of formed a mariculture operation, and one  
46 person actually suggested turning it into a -- They wanted to call  
47 it a Caribbean king crab operation, but I never heard any more  
48 about it after that one time. Anyway, I'm okay with a one there,

1 if everybody else is okay with a one.  
2  
3 **GRACIELA GARCIA-MOLINER:** Let me read a comment from Michelle in  
4 the chat. Actually, the cages acted like fish attracting devices,  
5 and spear fishers were attracted to that.  
6  
7 **JOE KIMMEL:** Okay. Good comment. Well, I still think it should  
8 be a one there.  
9  
10 **VANCE VICENTE:** I agree. I think it should be a one also, but  
11 leave some room for discussion and how we're going to define  
12 artificial reef versus artificial sub-strata, because, for reef,  
13 there is a definition for "reef", and it's an obstruction to  
14 navigation, since we're talking about a massive type of either  
15 biogenic or non-biogenic structure, versus temporary artificial  
16 substrata, and so I suggest we later break down the definitions  
17 better, and I'm okay with a one.  
18  
19 **JOE KIMMEL:** Okay. Good. I would go with that. I haven't heard  
20 anybody suggest anything else, and so let's stick with a one there.  
21 If we go to the next column, it's mariculture impacting the energy  
22 sector. I've got a zero in that one.  
23  
24 **VANCE VICENTE:** Mariculture projects are going to put a demand on  
25 additional energy consumption, unless you have solar panels and  
26 the like, which are also involved with energy, but there is a  
27 linkage there, Joe.  
28  
29 **JOE KIMMEL:** Okay. Has anybody else got comments that way? Do  
30 you agree or disagree with Vance? I am not opposed to it.  
31  
32 **RICHARD APPELDOORN:** I agree with the statement, but I just don't  
33 think it rates a one.  
34  
35 **JOE KIMMEL:** Okay. I think it's a small scale, Vance, and I don't  
36 think it's ready for a one yet.  
37  
38 **RICHARD APPELDOORN:** I mean, even if mariculture was a huge  
39 industry here, I don't think it's going to drive the creation of  
40 new power plants, for example.  
41  
42 **VANCE VICENTE:** I mean, it would not be on an industrial scale, a  
43 large scale, but definitely these water pumps take a lot of energy,  
44 to keep all that water flowing and lighting, keeping lights at  
45 night for the culture, and there is some linkage there, but maybe  
46 an embryonic one, but I just put it out.  
47  
48 **JOE KIMMEL:** Embryonic. Okay. Maybe we should put an "E" there.

1 Anyway, mariculture and light contamination. Again, I was thinking  
2 of the wrong light contamination, and I don't know if a negative-  
3 two is appropriate for that block or not. Maybe a zero.  
4

5 **RICHARD APPELDOORN:** Well, negative nothing -- Mariculture would  
6 not reduce light, but I would make it blank.  
7

8 **JOE KIMMEL:** Okay. Then the next one would be mariculture  
9 affecting research, and I would stick with a one there. Has  
10 anybody got any more comments about that? Hearing none, we'll go  
11 to mariculture and boating.  
12

13 **RICHARD APPELDOORN:** Was that a positive-one or a negative-one  
14 that you're putting in? I think it's negative.  
15

16 **JOE KIMMEL:** For mariculture and research?  
17

18 **RICHARD APPELDOORN:** Yes.  
19

20 **JOE KIMMEL:** Well, I was thinking that it would generate research.  
21

22 **RICHARD APPELDOORN:** In the same way that energy generates research  
23 and waste generates research, but we're not looking at the question  
24 of knowledge enhancement, but we're looking at whether it's  
25 competing with fishing, and so is mariculture displacing research  
26 that will then compete with fishing someplace else?  
27

28 **JOE KIMMEL:** So you think it should be a negative-one?  
29

30 **RICHARD APPELDOORN:** Yes, or a zero, depending on how big of a  
31 problem you think we're talking about.  
32

33 **JOE KIMMEL:** I don't see it as a major problem at all. In fact,  
34 I like the zero.  
35

36 **VANCE VICENTE:** If we're going to be using the same rationale, it  
37 would be a zero.  
38

39 **JOE KIMMEL:** Okay. The next column is mariculture and boating.  
40 Well, mariculture requires people in boats, and so am I going the  
41 wrong way? Should that be a one or a zero? Anybody?  
42

43 **JORGE GARCIA-SAIS:** I would go with one.  
44

45 **VANCE VICENTE:** Yes, the potential definitely is there, even though  
46 you can have mariculture upland, and so you would not even need a  
47 boat, but usually there are boats associated with it, and so I  
48 think a one would be proper.

1  
2 **JOE KIMMEL:** Yes. Okay. All right. Let's go to the next one,  
3 marina activity. While we had the same argument that we had with  
4 boats before in the other categories, and usually boating and  
5 marina activity get similar scores, but I don't see that as a big  
6 deal here for this marina activity category. I would keep it as  
7 a zero. Are there comments?  
8  
9 **RICHARD APPELDOORN:** I would agree. I could see where there might  
10 be exceptions, but I would still go with a zero.  
11  
12 **JOE KIMMEL:** Okay. Then that brings us to mariculture and  
13 recreational diving. Somebody has already mentioned that -- In  
14 fact, when they had the cobia farms out there, there were people  
15 that would try to go out there and recreationally dive to just be  
16 -- To just watch what was happening, or see what was happening,  
17 see what was going on, and so, in that case, yes, a one is  
18 justified, but, considering that there is very little of that going  
19 on, I would go with a zero as well.  
20  
21 **RICHARD APPELDOORN:** Again, it's not based on what's going on.  
22 It's based on the relationship and what it would be if we had a  
23 big increase in say cage culture mariculture around the island,  
24 and so imagine us having cages around the islands, and would that  
25 be redirecting recreational diving?  
26  
27 **JOE KIMMEL:** So like a big FAD you're talking about?  
28  
29 **RICHARD APPELDOORN:** Well, the comment that was made was that those  
30 cages were attracting -- They acted like FADs, and people were  
31 diving, and was that to spearfish, because that's not a  
32 recreational diving category, because recreational fishing is in  
33 a different model, and so, here, we would be talking about  
34 recreational diving becoming such an important activity that it  
35 would displace fishing.  
36  
37 **JOE KIMMEL:** I don't think so, would it?  
38  
39 **RICHARD APPELDOORN:** To me, I would say no, because, as the number  
40 of cages increases, for example, you are dispersing that increased  
41 recreational diving in the same way, and, therefore, I don't think  
42 it would fundamentally change the conflict that we see, although  
43 it might be specific locations that, because they are near a  
44 tourist destination, that are specifically targeted by the dive  
45 tours, but --  
46  
47 **JOE KIMMEL:** So you're suggesting a zero in that column?  
48

1 **RICHARD APPELDOORN:** I think I am, yes.  
2

3 **JOE KIMMEL:** Okay. I accept that rationale. Let's put a zero  
4 there, under recreational diving.  
5

6 **GRACIELA GARCIA-MOLINER:** Richard, I don't know if you mentioned  
7 that apnea group that actually spear fishes for pelagics that go  
8 around these areas, and so that would be the only one that I can  
9 think of that would make any difference.  
10

11 **JOE KIMMEL:** I still think that's a -- I still think it should be  
12 a zero in that block. Okay. Moving on, we'll go to mariculture  
13 and conservation/restoration.  
14

15 **RICHARD APPELDOORN:** Can I back up, because I just really had a  
16 bad thought, and this would affect not this one, but some of the  
17 other decisions that we've already made. I've been making the  
18 point that recreational diving is not recreational fishing,  
19 because we have a recreational fishing component in the fishing  
20 sub-model.  
21

22 However, there's another way of thinking about this, and that would  
23 be that recreational fishing is somehow dependent on the amount of  
24 recreational diving going on, and so there would be an arrow going  
25 from recreational diving to recreational fishing. Therefore,  
26 anything that would increase recreational diving, regardless of  
27 this purpose, would increase recreational fishing.  
28

29 **JOE KIMMEL:** That title of "recreational diving" is -- To me,  
30 recreational diving is you're not carrying a speargun, and you're  
31 out looking at stuff. If you want to have spearfishing and snaring  
32 and that sort of stuff, I can see that as a better label, but, now  
33 that I know what it is, I can deal with it just like it is, but,  
34 anyway.  
35

36 **RICHARD APPELDOORN:** So I'm not arguing or advocating for change,  
37 but I just wanted to bring up that that's another way of looking  
38 at things, and, if somebody on the committee feels we should go  
39 that way, we can regroup and look at the recreational diving  
40 category again, because we weren't thinking that way before, but  
41 my thought process at the moment is to not do that.  
42

43 **JOE KIMMEL:** Okay.  
44

45 **GRACIELA GARCIA-MOLINER:** Mr. Chair, just one comment. There might  
46 be a little bit of a difference between Puerto Rico and the Virgin  
47 Islands. Most of the divers in the Virgin Islands will go to see  
48 what's there. In Puerto Rico, the people who are diving and

1 fishing might be higher, but then, if you put it together, in terms  
2 of the conservation and movements that we've had around, we don't  
3 know exactly what that percentage would be now.

4  
5 You also have a comment in the chat from Marcos Hanke on the fact  
6 that, in Culebra specifically, the tourist operations include  
7 diving at the coral farms I think, and so many of the tourist  
8 operators will visit the coral farms, but that will be to see  
9 rather than to fish.

10  
11 **JOE KIMMEL:** Yes, that's my feeling of recreational diving, is to  
12 see rather than to fish, but, like I say, now that I understand  
13 that recreational diving includes spearfishing and those sorts of  
14 things, I can deal with that. Okay. I think we're ready to go on  
15 to the mariculture and conservation/restoration. I've got a one  
16 there, but I don't know why. Most of my ones turn into zeros  
17 anyway.

18  
19 **VANCE VICENTE:** Mariculture and conservation, they, in many ways,  
20 are linked. For example, they are cultivating this fishery  
21 product, and you are reducing fishing pressure in the wild, and so  
22 that should be considered under conservation measures.

23  
24 **JOE KIMMEL:** Okay. Are you good with a one?

25  
26 **VANCE VICENTE:** Yes.

27  
28 **JOE KIMMEL:** Okay. Mr. Chairman, can have a ten-minute break or  
29 so?

30  
31 **RICHARD APPELDOORN:** Well, considering you're leading the  
32 discussion, if you have to go on break, we should all do that, and  
33 I think we're actually scheduled for a break about this time, and  
34 so why don't we do that? I have 3:12, and so let's say 3:25.

35  
36 **JOE KIMMEL:** Yes, that sounds good.

37  
38 **RICHARD APPELDOORN:** All right. We'll take a break until 3:25.

39  
40 **JOE KIMMEL:** All right. Thanks.

41  
42 (Whereupon, a brief recess was taken.)

43  
44 **JOE KIMMEL:** Okay. We're down to the twelfth row and Column B,  
45 marine development, research affecting marine development. Well,  
46 yes, and all the research requires housing and streets and  
47 electricity. No, but I don't think there's much impact there, but  
48 I have a one in that box.

1  
2 **RICHARD APPELDOORN:** It should be blank. I don't research has  
3 ever promoted or stopped development.  
4  
5 **JOE KIMMEL:** Okay. Let's do a zero there, because I like Rich's  
6 philosophy more than my own, and the same way with coastal  
7 development, the next column over? That should be a zero as well?  
8  
9 **RICHARD APPELDOORN:** Yes.  
10  
11 **JORGE GARCIA-SAIS:** (Dr. Garcia-Sais's comment is not audible on  
12 the recording.)  
13  
14 **JOE KIMMEL:** I think we're now on research and military uses. I  
15 have a zero there as well.  
16  
17 **JORGE GARCIA-SAIS:** Joe, can you go back one, because I am not  
18 sure if I understood it correctly, but, I mean, research requires  
19 infrastructure. Infrastructure, if it's done in marine research,  
20 it's going to be infrastructure close to the coastal, coastal  
21 areas, and there's going to be some related with research affecting  
22 coastal development. Back to my point about the potential about  
23 mariculture research affecting coastal development, and the  
24 linkage is there, and the potential is there, and I don't see --  
25 Frankly, I don't see why it's going to be a zero or a blank.  
26  
27 **VANCE VICENTE:** I agree with Reni on not only the infrastructure  
28 of the building itself, but piers have to be built, and boats have  
29 to be constructed, or repaired, and people move into the facility  
30 and work that in the facilities need housing, and they build homes,  
31 and so definitely it has to be at least --  
32  
33 **JORGE GARCIA-SAIS:** Maybe you are looking at it from a different  
34 standpoint, from a different perspective, and maybe my perspective  
35 is wrong, but please tell me.  
36  
37 **JOE KIMMEL:** So what would you put there, Reni, a one or a two?  
38  
39 **JORGE GARCIA-SAIS:** I would put a two, because, depending on what  
40 happens, you can slow it down or speed it up, and it all depends  
41 on how much research you can actually develop. I mean, the more  
42 research you develop, the more infrastructure there is going to  
43 be, and the higher the coastal development it's going to have, or,  
44 if you close it all down, then it's not going to matter. It's not  
45 going to have any impact on coastal development, and it all depends  
46 on how much. The more you open it, the more impact it has. Right  
47 now, there is an ongoing -- It's an ongoing thing.  
48

1 I mean, look at, for example, in St. Thomas, and you have that  
2 marine facility of the University of the Virgin Islands occupying  
3 a space on the coast, with a pier, a boat, a lot of research, and  
4 it uses electricity, and it uses lights, illumination, and the  
5 research activities underwater are going on. There is even some  
6 other research activities that are done by individuals that do  
7 affect, that have some kind of minor effect, but, on a  
8 significantly large scale, you have the -- In terms of what we are  
9 talking about, if I am talking incorrectly, I just need to know.

10  
11 **JOE KIMMEL:** No, I don't have any problem with a two there, and I  
12 would like to hear something from Rich, to see what he thinks,  
13 because, as I was filling out this table, the closer I got to the  
14 end, the more it was like just put a number or not in the block,  
15 and it was --

16  
17 **JORGE GARCIA-SAIS:** I am comfortable with two, because I think  
18 that all of us are islands, and we should have had much higher  
19 research and coastal development associated with research than  
20 what we have, and so I think that we are underdeveloped, and that's  
21 what I think it is, and I think that our research capabilities are  
22 much higher and should have been developed to a much larger extent  
23 than we have, and we are just underdeveloped, in the sense, but  
24 the linkage there and the potential is there, certainly.

25  
26 **JOE KIMMEL:** I agree, Reni. I am happy with a two. Any more  
27 comments?

28  
29 **WALTER KEITHLY:** I just don't see a two here. Research is never  
30 going to be that large that it's going to lead to significant  
31 coastal development, the way I would look at it.

32  
33 **JUAN CRUZ-MOTTA:** I agree with that last comment. It is totally  
34 underdeveloped, and I guess it should be one. I mean, the  
35 relationship is not there, but not to be a two, I guess. Thank  
36 you.

37  
38 **RICHARD APPELDOORN:** I am looking at it from the point of view of  
39 like compare it to what we were talking about with mariculture,  
40 where the potential for mariculture to be very large is there.  
41 Whether it happens or not is another story, but the potential for  
42 research to be large, on that kind of scale, is zero. If we're  
43 considering that to be a major facility, which I wouldn't, and  
44 it's sort of a mid-level facility, there might be one other site  
45 that could go to that kind of level.

46  
47 In the Virgin Islands, you have the small facility that the UVI  
48 has, and that's really kind of what research is capable of doing.

1 Even though is a relationship, obviously, between having the  
2 facilities, and therefore coastal development, I'm not sure it  
3 pushes the envelope large enough to really warrant -- Actually for  
4 me to warrant consideration at all, and that's why I would leave  
5 it a blank, but, if you're going to push it, then I would go no  
6 higher than a one.

7  
8 **JOE KIMMEL:** Well, listening to all the comments, let's go ahead  
9 and put a one there, so we can move on.

10  
11 **RICHARD APPELDOORN:** If we're going to put a one in that one, I  
12 would also put a one in marine development, because of the argument  
13 about piers and things like that.

14  
15 **JOE KIMMEL:** Okay. Let's do it. A one.

16  
17 **JULIAN MAGRAS:** I have a question. How about Coral World? Would  
18 Coral World fit into this, because they have an underwater  
19 observatory, and they do protections for turtles, and a lot of  
20 different other mammals and stuff like that, and the dolphin  
21 aquarium and all that stuff, and how would that play into this,  
22 also?

23  
24 **JOE KIMMEL:** I think it definitely plays into it, but it's a matter  
25 of the degree overall, and I still think that we can't put much  
26 more than a one in that box. If everybody wants to disagree and  
27 go higher or lower, I'm okay with most anything you want to put in  
28 there, but, myself, I can't see impacting either the marine  
29 development or -- Marine research, I'm talking about, more than a  
30 number one.

31  
32 **JULIAN MAGRAS:** Okay. I was just asking. Thank you.

33  
34 **JOE KIMMEL:** Okay. Thank you.

35  
36 **RICHARD APPELDOORN:** But it does bring up an issue of like there  
37 was a major aquarium built for the tourist industry coming in and  
38 out of San Juan, or, for that matter, a much bigger facility than  
39 Coral World in St. Thomas, but that's still going to be a single  
40 facility, and, while there will be some development around that,  
41 and therefore deserves some consideration, I think the scope of  
42 that kind of development on a larger scale just isn't there. I  
43 mean, larger scale meaning multiple locations.

44  
45 That is a good question about where you put something like that.  
46 What we were talking here is in terms of research being a competing  
47 activity and that you would have a situation where, which happens  
48 around Mayaguez, where there is so much activity going out, with

1 the students and the faculty and research projects there that the  
2 fishermen just don't fish there anymore, and so they have been  
3 displaced by that research activity in whatever area that is.

4  
5 That is the kind of thing, when we talk about research and the  
6 displacement and being a competing activity, and then, when we  
7 talk about coastal development, is that research activity leading  
8 to coastal development that would also then, similarly, compete  
9 with fishing activities, on some kind of spatial scale, and so we  
10 haven't talked anything about like big aquaria, and basically  
11 education-type activities, but I would generally, I think, put  
12 education under the research category here.

13  
14 **JOE KIMMEL:** Okay, and so there's a one for marine development and  
15 research and coastal development and research, and so let's go  
16 ahead and move on to research affecting military uses. I have a  
17 zero there, and I can't really see a relationship, and the same  
18 for noise generation, and I don't see a big relationship there  
19 either.

20  
21 I've got zero for military, zero for noise generation and research  
22 and large-vessel shipping, and I can't think of a relationship  
23 between those two, unless -- Well, I can't think of one. I guess  
24 some research is conducted off of large vessels, but shipping  
25 activity no, and so I've got a zero in that box as well. Does  
26 anybody have any comments or disagreements with that position?  
27 Okay. Now we're in research and waste, and I don't have any  
28 relationship there either. There might be one, but I don't have  
29 one.

30  
31 **VANCE VICENTE:** There is. There is waste in research, and all the  
32 chemical that we use that run out of the disposal of specimens of  
33 fish and stuff that we collect and look at their insides, and there  
34 is always waste. There is waste, and I would leave it as a one,  
35 because of the nature of the research that I am involved with,  
36 that we are generally involved with, but I would not leave it at  
37 zero at all.

38  
39 **JOE KIMMEL:** Vance, you're right. You and I shared an office, and  
40 I did a lot of waste. Any more comments about research and waste  
41 generation? I've got a one in that box. Is that okay with  
42 everybody?

43  
44 **JORGE GARCIA-SAIS:** Fine.

45  
46 **RICHARD APPELDOORN:** I don't know how it at say the Fisheries Lab  
47 or over at UVI, but Mayaguez, all the waste of that goes out and  
48 into the sewage system and is treated there, which is a land-based

1 facility, inland-based facility. Anything toxic is brought over  
2 in containers and properly taken care of on the main campus.

3  
4 There really isn't that much waste being generated that's going  
5 into the marine environment, and the biggest thing would be like  
6 transect lines that get left behind, and there is a bit of that,  
7 and I don't think that any of that is significant, in terms of  
8 displacing fishing activity. If anything, fishing displaces  
9 research activities, and so I don't think it's a problem, at least  
10 in my experience.

11  
12 If you went back decades ago, in Joe's experience at the department  
13 and whatnot, yes, there were those kinds of issues, but those have  
14 all been eliminated. Again, I can only speak from the point of  
15 Mayaguez, but --

16  
17 **VANCE VICENTE:** But, Richard, we're talking about generation of  
18 waste and not how it is treated or how it's disposed of, but it's  
19 how much are you contributing to the waste aspect of the  
20 environment, and definitely there is a generation of waste,  
21 irrespective of whether it's being treated by pharmacological  
22 laboratories or detoxified here and there, but you're still  
23 generating it, and so --

24  
25 **RICHARD APPELDOORN:** It's not irrespective of that, because we're  
26 talking about whether a waste activity, which this is leaking into,  
27 is competing with or displacing fishing activity. If you think  
28 stuff is going on with that, to that scale, then, yes, we put  
29 something there, but everything generates waste, but that doesn't  
30 mean that it's relevant to our model.

31  
32 **VANCE VICENTE:** Just leaving it a zero makes me uncomfortable, and  
33 that's all, but I don't know. It's up to the group to decide.

34  
35 **JOE KIMMEL:** I am wondering -- After hearing Richard's point of  
36 view, I would have to agree that it's probably closer to a zero  
37 than a one, but what is the difference between a zero and a one in  
38 this case? I don't know.

39  
40 **WALTER KEITHLY:** I think it's clearly a zero, myself. You have to  
41 look in relative terms on these issues, and certainly waste  
42 generating from research, which there is waste, is small relative  
43 to marina activities, which is the next item down in the row, and  
44 so one of the problems we've had all day, or throughout this whole  
45 process, is not thinking, or at least not knowing, how to measure  
46 zero versus one versus two, but, in a relative term with some of  
47 these other factors, I would clearly say that's a zero.

48

1 **RICHARD APPELDOORN:** If you look up the columns, where does  
2 research compare in generating waste to marine development, which  
3 we gave a one to, or military uses, which we gave a one to, or  
4 some of the other things that we gave twos? I mean, are we really  
5 at a level that would be lumped in with marine development or  
6 military uses? If you think so, then we put a one, but, if you  
7 don't think so, you go down to zero.  
8

9 **JOE KIMMEL:** Let's put a zero there, while we're talking about it.  
10

11 **VANCE VICENTE:** I am inclined towards zero, but not fully.  
12

13 **JORGE GARCIA-SAIS:** Let's put a 0.5.  
14

15 **JOE KIMMEL:** I didn't hear that last comment.  
16

17 **RICHARD APPELDOORN:** We can't do that. It's a one, two, or three.  
18 We're not putting in fractions. It's either a zero, one, two, or  
19 three. Those are your options.  
20

21 **JOE KIMMEL:** Okay. Are we finished talking about research and its  
22 impact on waste? I agree there is some, but I don't think it  
23 warrants anything other than a zero there. Okay. Let's go to  
24 research and artificial reefs. I've got a one in the box. This  
25 is thinking that research happens on artificial reefs, but maybe  
26 I'm thinking of it in the wrong direction there, but research  
27 doesn't create artificial reefs, unless somebody is wanting to  
28 study artificial reefs and there is none around. Then there would  
29 be a one, I guess.  
30

31 **RICHARD APPELDOORN:** Again, the idea is that, if you were doing  
32 research in an area, would you be more or less -- Would that  
33 stimulate or impede the development of artificial reefs in that  
34 area?  
35

36 **VANCE VICENTE:** If the research is going to involve trawling, then  
37 the artificial reef would be in the way. It just depends on the  
38 nature of the research.  
39

40 **RICHARD APPELDOORN:** Yes, but the argument goes the other way  
41 around. This is not the impact of artificial reefs on research,  
42 but it's the impact of research activities on artificial reefs.  
43

44 **JOE KIMMEL:** So how about a zero in that box? Does that make you  
45 feel better?  
46

47 **VANCE VICENTE:** Yes, I would put a zero.  
48

1 **JOE KIMMEL:** Okay. Let's put a zero under artificial reefs there.  
2 Any further discussion on that point? There was quite a few  
3 comments. Okay. Then research affecting the energy sector, and  
4 I don't see it. What do you think, Vance? You're the energy guy.  
5 Okay. We've got a zero there. Research affecting light  
6 contamination. No. Zero there. It should be a zero.

7  
8 Then research and mariculture. I can see where research could  
9 generate some mariculture, if somebody wants to study different  
10 types of pens or different types of things to grow in different  
11 apparatus, and I can see where that would affect mariculture. I  
12 don't know if two is the right number, but I think there is an  
13 interaction there.

14  
15 **RICHARD APPELDOORN:** Joe, I don't understand your logic.

16  
17 **JOE KIMMEL:** Not too many people do, Rich.

18  
19 **RICHARD APPELDOORN:** Yes, but I've known you a long time, and I  
20 still don't understand it.

21  
22 **JORGE GARCIA-SAIS:** I think it's possible, and it's just a matter  
23 of scale. Now, we have produced these scale factors, in terms of  
24 these relationships, and then we don't know if it's significant  
25 enough to account for, and so that's what I am debating here now  
26 before I make any comments, because it now happens that we're  
27 considering it, and if it's on a scale that it becomes to be  
28 significant, because the relationship is there, but now it's a  
29 problem of magnitude, how much to give to make it a one. How much  
30 does it need to be to make it a one? How much research has gone  
31 on in terms of accounting for a significant increase or a  
32 significant mariculture effect, and I don't know. Certainly there  
33 is some, but how much is enough to make it a one is a matter of  
34 opinion, but it is that small.

35  
36 **JOE KIMMEL:** I really don't know. I'm good with a one, or even a  
37 zero.

38  
39 **JORGE GARCIA-SAIS:** Actually, there is a big difference between  
40 zero and one. Zero is an infinite number. It's an infinite value,  
41 and one is pretty real, and so there an average between zero and  
42 one.

43  
44 **RICHARD APPELDOORN:** I am still arguing zero. I don't think, and  
45 I could be wrong, but I don't think, if you have research activity  
46 going on in an area, that that's going to positively stimulate  
47 that you're going to produce mariculture activity into that area.  
48 Again, we would exclude research that was done specifically for

1 that mariculture, and so, if someone was proposing a mariculture  
2 operation, and they had to do the environmental impacts and other  
3 kinds of studies, that research doesn't count.

4

5 **JOE KIMMEL:** Okay.

6

7 **RICHARD APPELDOORN:** We're talking about does the fact that there  
8 are areas off of Mayaguez that are -- Is that something that is so  
9 tied to the research activities that you would not consider putting  
10 a mariculture operation in there, and that's what we're talking  
11 about, or you would consider it, and it would enhance that.

12

13 **JOE KIMMEL:** Okay, and so let's put a zero there, under  
14 mariculture. I like Rich's point of view. Okay. Research and  
15 boating. I've got a one. Has anybody got comments?

16

17 **RICHARD APPELDOORN:** I agree with it.

18

19 **JOE KIMMEL:** Okay. Anybody disagree with it? Research and marine  
20 activity, I have a one there as well, for much the same reason,  
21 which I haven't really said, except that you need -- If you're  
22 going to do marine research, you're going to need a boat, unless  
23 you're working in a lab or something. All right. So one is okay  
24 for marina activity as well? Has anybody got any comments about  
25 that?

26

27 **RICHARD APPELDOORN:** It's good for me.

28

29 **JOE KIMMEL:** Okay. Research and recreational diving. I can see  
30 where research -- If somebody that's a recreational diver -- We  
31 are talking about spearfishing now though, aren't we?

32

33 **RICHARD APPELDOORN:** No, we're not. We're not talking about  
34 spearfishing.

35

36 **JOE KIMMEL:** Well, in that case, then I think maybe a zero is best  
37 for this box as well.

38

39 **RICHARD APPELDOORN:** Well, an issue we haven't talked about is --  
40 I was going to say how you would classify research diving, but  
41 research diving is research, and research doesn't impact research.  
42 It is research, and so what was your comment then, that it wouldn't  
43 have an impact?

44

45 **JOE KIMMEL:** Yes, and I don't think there's much impact there. It  
46 should be a zero, I think.

47

48 **RICHARD APPELDOORN:** I would agree.

1  
2 **JOE KIMMEL:** Okay. Then the last one on this Row Number 12 is  
3 research and conservation/restoration. I always give that --  
4 Research is always directed at conservation and restoration, for  
5 the most part, and so I gave that a two.  
6  
7 **RICHARD APPELDOORN:** Again, it's not what it's directed to, but  
8 it's if you have a research facility, and therefore you're doing  
9 research in the field and everything like that, is that surrounding  
10 area more likely to be declared a conservation zone, for example,  
11 or are there going to be other restrictions on fishing activities  
12 or whatever, because of the nature of that research work in that  
13 area, and so, yes, I think it's a positive relationship, and I  
14 don't know whether it's a one or a two.  
15  
16 **JOE KIMMEL:** Would you be more comfortable if it's a one?  
17  
18 **RICHARD APPELDOORN:** No, I'm saying I don't know. I wouldn't mind  
19 hearing from other people from what their experiences have been,  
20 in terms of areas that have been say prime research areas off a  
21 lab or something like that and whether there has been a drive then  
22 to create conservation zones, or other kinds of restrictions,  
23 associated with that.  
24  
25 **JORGE GARCIA-SAIS:** In my opinion, it should be a two, but it's  
26 now a one. It should be two, but it's one, in my opinion.  
27  
28 **JOE KIMMEL:** You think it should be a one?  
29  
30 **JORGE GARCIA-SAIS:** No, I think it should be a two, but it's a  
31 one. I mean, in terms of what it should be, it should be -- The  
32 areas of research should have had stronger conservation  
33 connotations than what they actually have.  
34  
35 **JOE KIMMEL:** Okay. Let's go ahead and put a one in that box.  
36  
37 **VANCE VICENTE:** Yes, I would put a one.  
38  
39 **JOE KIMMEL:** Okay. Thank you. Okay. Now we're down to Row 13,  
40 boating, and I have got ones for both marine development and  
41 coastal development. I am trying to think why I put it there.  
42  
43 **RICHARD APPELDOORN:** I think you were reversing things.  
44  
45 **JOE KIMMEL:** In my mind, I was thinking that marine development is  
46 something that's out in the water, right, and you need a boat to  
47 get there, but does it increase marine development? I don't know,  
48 or enhance marine development? I don't know.

1  
2 **RICHARD APPELDOORN:** To me, the consequences of those two does not  
3 affect those two, and so I would make the first two blank.  
4  
5 **JOE KIMMEL:** Okay. All right. Let's do that, zero and zero, in  
6 those first two columns. Does anybody else have an opinion about  
7 that? Okay. Now boating and military uses, and I've got a zero  
8 there. I would keep it that way.  
9  
10 **RICHARD APPELDOORN:** So would I.  
11  
12 **JOE KIMMEL:** Okay. Boating and -- This is one where I've probably  
13 the got wrong direction on, and that is noise generation. I  
14 remember weekends at Mayaguez, and, boy it was noisy from Saturday  
15 through Sunday, or Friday night through Sunday, and on the water,  
16 and so a lot of boats cause a lot of noise.  
17  
18 **VANCE VICENTE:** On a larger scale, jet-skis are all over the place,  
19 and they do generate noise.  
20  
21 **JOE KIMMEL:** That's right. Okay. Anybody got a problem with a  
22 negative-two in that box?  
23  
24 **RICHARD APPELDOORN:** Yes, and it should be a positive-two.  
25  
26 **JOE KIMMEL:** It should be a positive-two, yes. Okay.  
27  
28 **JORGE GARCIA-SAIS:** It could be a one, because it's not every day,  
29 and it's just weekends or whatever, certain hours, and it's not  
30 twenty-four hours a day, and it's three or four hours. I mean,  
31 it's a matter of magnitude, and I don't -- It is, and it certainly  
32 happens, but I wouldn't go to a two. It's not like happening every  
33 day and you can't live with it and things like that. It's just a  
34 little bit of noise on the weekends, but it's not that --  
35  
36 **VANCE VICENTE:** Well, I don't know, Reni. Maybe in the San Juan  
37 area, and I visit San Juan Bay and the surrounding area very  
38 frequently, and they're always running around, and those jet-skis  
39 are all over the place, and not so much boats themselves, but the  
40 recreational jet-skis are I think massively -- They come from San  
41 Juan Bay in groups of ten, twenty, forty, and they go out of the  
42 bay, and then they come back into the bay, and, when you are  
43 diving, they are zooming over you, and that's not twenty-four  
44 hours, but it's at least eight hours a day, every day.  
45  
46 **JOE KIMMEL:** I agree, Vance.  
47  
48 **JORGE GARCIA-SAIS:** I think that is fair, but look at the entire

1 coastline of Puerto Rico, Culebra and Vieques, and, when you look  
2 at it, it's several small spots where that activity is  
3 concentrated, and, when you are there, they make noise, and you  
4 feel it, but, in the entirety, on the entire coastline of Puerto  
5 Rico, if you look at it from the broad scale -- From a broad scale  
6 spatial scale, it's really small. If we start looking at things  
7 like this, in this perspective, in the whole thing, then it's very  
8 small.

9  
10 **VANCE VICENTE:** Sure, and, if you go to Mona Island, that won't be  
11 a problem, but --

12  
13 **JORGE GARCIA-SAIS:** That's exactly what I am talking about. Until  
14 San Juan, we don't have anything, and then you go to the west coast  
15 and there is just a few spots where there is noise, and, on the  
16 south coast, there is just a few spots where there is noise, and  
17 that is what I'm talking about. If you're going to look at things  
18 on the spot, then, yes, it's very noisy, but, if you look at it on  
19 the large scale of Puerto Rico, it's just a few spots where there  
20 is noise.

21  
22 **VANCE VICENTE:** I think we're stressing areas that are populated,  
23 and where all these other activities that we have been discussing  
24 are related to, and we're not looking at isolated areas, and I  
25 look at it more on a developed regions, because, of course, you  
26 can always find extreme conditions, where there isn't any, or much  
27 more, of the activities that we're talking about, but, putting it  
28 within perspective of all the other parameters that we've been  
29 discussing, it does have some -- I mean, I won't go for a two, but  
30 at least a one, just because I know that it is there.

31  
32 **JORGE GARCIA-SAIS:** I am happy with a one, but, if we are talking  
33 about a two, you are telling me that half of the coastline of  
34 Puerto Rico is under that threat, and that is not the reality.  
35 It's just a few spots.

36  
37 For example, take La Parguera. If you go on a Saturday afternoon,  
38 and you hear all the noise that comes from the boats, you think  
39 you are in hell, but then you go a little further, and you don't  
40 hear the noise, and you are still in La Parguera, and so it's a  
41 matter of perception.

42  
43 **VANCE VICENTE:** Okay. I don't think that's the issue. It's how  
44 well linked are boats with noise, and they are very linked, whether  
45 it's -- If you don't have a boat around you, it doesn't make any  
46 noise.

47  
48 **JORGE GARCIA-SAIS:** I agree with you. You are right. You are

1 right, but so has other considerations that we have seen that there  
2 is a link, and we still put zero, because of the scale, and now  
3 I'm confused.

4

5 **JOE KIMMEL:** Well, you know, Reni, I remember -- J.J., go ahead.  
6 I know you've been waiting.

7

8 **JUAN CRUZ-MOTTA:** I was wondering if you were able to hear me. As  
9 I see it, most of the noise, regardless of how much noise is  
10 produced, much of that noise is produced by boats, and so, in that  
11 case, I would agree with Vance. I would like to see in that cell  
12 a number two, at least. Thank you.

13

14 **JOE KIMMEL:** Thank you, J.J. You know, I would stick with a two  
15 as well, and I remember diving in the shallow reefs in La Parguera  
16 there, and I can't remember the names of the reefs anymore, but  
17 the ones closest to shore, and a boat would go over, and the fish  
18 certainly notice the noise, because you see them rush to the  
19 bottom, and the same thing when I was doing some research out in  
20 Fort Jefferson and the Dry Tortugas, where the fishing boats would  
21 go over, and, man, the fish would dive to the bottom, and so I  
22 would stick with a two there.

23

24 **JORGE GARCIA-SAIS:** Why not a three? That would be even worse,  
25 and so why don't we go with a three?

26

27 **JOE KIMMEL:** Because three is the biggest number that we've got,  
28 and I don't think it warrants that.

29

30 **JORGE GARCIA-SAIS:** Well, you're telling me that it's even  
31 affecting the fish underwater, and so my point is that, yes, it is  
32 an intense effect, but it is localized, a very small localized  
33 area, overall, compared to the entire island of Puerto Rico. Those  
34 few spots are small things. What is it, 0.2 percent of the entire  
35 coastline, or 0.1, or 0.01, and I don't even know how little it  
36 is.

37

38 Certainly the effect is there, and it's a matter of scale, and  
39 that is why I am -- I am not taking this out of this specific  
40 thing, but it is that I have problems trying to put these three  
41 numbers into our boxes. It's a more conceptual problem than just  
42 the issue of the boats and the noise.

43

44 That's why I am having problems. It's that sometimes we see the  
45 link, and we don't put anything, and we put a zero, and sometimes  
46 we see a -- Because it's like starting in some way of our personal  
47 experience, we exacerbate it and put a big number, when it really  
48 isn't, on a larger spatial scale, and that is the problem that I

1 have. I am not discussing the impacts of boats and noise. I know  
2 it's there, but it's the sense of where we are in relation to that  
3 boat.

4

5 **JOE KIMMEL:** Thanks, Reni. Let's get J.J.'s comment here.

6

7 **JUAN CRUZ-MOTTA:** Thank you. Look at it this way. It's not the  
8 boats are affecting directly the number of species. It's how  
9 boating affects the noise generation. Then, if you think it's a  
10 very localized effect, then, when we do a connection with noise  
11 generation in another sub-model, that would be low, but the fact  
12 is that most of the noise that is produced underwater is produced  
13 by boating, and, actually, when you said why not three, I would  
14 totally agree with you, and I would use three.

15

16 Now, because, to reach a consensus, and because some people think  
17 it's one, I would support a two, but, otherwise, I would say that  
18 most of the noise that is produced underwater in Puerto Rico is  
19 produced by boats, and that's a strong relationship.

20

21 **JULIAN MAGRAS:** Can I make a comment?

22

23 **JUAN CRUZ-MOTTA:** Give me one more second, Julian. Then, if we  
24 want to relate that to the fish, then the effect of noise  
25 generation on fish is really now, because it's very localized.  
26 Thank you.

27

28 **JOE KIMMEL:** Thank you, J.J. Who was that that wanted to talk?  
29 Julian, go ahead.

30

31 **JULIAN MAGRAS:** Here in the Virgin Islands, especially St. Thomas  
32 and St. John, where we have a lot of boating activities, with the  
33 cruise ships and day sails and snorkels and everything, I see the  
34 characteristics a little different.

35

36 When the fish hear the boats coming, they know it's chum time, and  
37 the divers are going over, and they're going to be either throwing  
38 dog food or bread or squid, and the fish, by the time they hear  
39 the boat coming, instead of them going to the bottom, the fish are  
40 always around the boats, and so I think, over a long period of  
41 time, that fish get accustomed to that natural sound of the  
42 different boats, and we see it when we're pulling traps out, and  
43 so it's like you will be out there, and, once the sharks hear the  
44 engines, especially the diesel engines, they float, because they  
45 know we are pulling traps, and there is some discards, and they're  
46 going to get food.

47

48 Maybe in some places, sure, the fish disappear, but I think, when

1 the fish get accustomed to that sound, because that sound is there  
2 every day, and they hear it, that they respond in different ways,  
3 and so my response is that, if they never hear that noise before,  
4 they will disappear, but, if they know it's feed time, chum time,  
5 they are waiting. Thank you.

6  
7 **JOE KIMMEL:** Thank you, Julian. I have seen the same sort of thing  
8 happen out at the Dry Tortugas. The shrimp boats, there was one  
9 area out there that they were allowed to anchor in, and the fish  
10 knew when the shrimp boats were coming, because they knew there  
11 was a lot of stuff going overboard, and so you would see every  
12 grouper and snapper and shark heading towards that anchor area,  
13 but, nonetheless, the boating is causing noise generation, and so  
14 I am not opposed to a two or a three in that box there. What do  
15 you think?

16  
17 **RICHARD APPELDOORN:** Two comments. One is, for Puerto Rico, and  
18 the Virgin Islands, to some degree, we actually have data that  
19 could be used to answer just how widespread the noise is,  
20 spatially. Unfortunately, I don't have access to that information  
21 at the moment, and some of it has not been analyzed, but it's  
22 definitely there in the record.

23  
24 Secondly, we were talking about scale in the sense of whether  
25 something should be counted at all or not, and, once you agree to  
26 count it, then you can worry about what the magnitude is, but,  
27 when we were talking about research, for instance, it was how large  
28 could research really be that it would really constitute a problem  
29 on the scale that we're talking about for, in the end, fishing.

30  
31 While boating might be localized, or the vast majority of boating  
32 activities might be localized, what's the potential for that to  
33 increase? We have maybe a thousand, maybe a thousand, commercial  
34 fishing boats, but we have tens of thousands of recreational boats,  
35 and that number has done nothing but go steadily up, probably with  
36 the exceptions of Maria and the current COVID situation, and so  
37 the potential for boating activities to increase and spread around  
38 the island I think is substantial.

39  
40 Therefore, we do need to consider it, but at what level, and I  
41 don't think it's a three, but I do think it's substantial, and it  
42 could be a two, or it could be a one, depending on how you want to  
43 look at that spatial scale, because the spatial scale itself has  
44 the potential for increasing to be much, much larger than it is  
45 now, and, therefore, it is something that we need to consider.

46  
47 As J.J. said, then we will talk about whether that noise generation  
48 is positive or negative, and it sounds like we're going to have an

1 interesting debate, because we've already talked about scenarios  
2 where fish and dolphins key in on this thing, versus other  
3 activities where the fish are reactively negative to that, but,  
4 right now, are boats generating sounds, noise, and yes, and what  
5 is the potential for that to increase, both in magnitude and  
6 spatial distribution, and I think that's the part we're struggling  
7 with. In that sense, a two would be a compromise between all the  
8 values.

9  
10 **JOE KIMMEL:** That's where I'm going. I have heard a couple of  
11 people suggest a three, including myself, but then rejecting a  
12 three, including myself, and so let's stick with a two there. I  
13 think that's probably appropriate at this time for this particular  
14 situation. Go ahead, Graciela.

15  
16 **GRACIELA GARCIA-MOLINER:** If there is an SSC member who is going  
17 to say something, I will wait. No? Okay. Michelle says that  
18 sounds travels farther underwater, affecting more areas than where  
19 the source is, and Richard mentioned that there are data that need  
20 to be analyzed to determine the spatial extent of this noise, and  
21 so I need to have a reference, if someone can send me that, Michelle  
22 or Richard.

23  
24 The last piece of information that I have is we're trying to get  
25 from the DNER and the Coast Guard the number of vessels,  
26 recreational vessels, registered in Puerto Rico. There are upwards  
27 of 50,000, by last count, and so probably around 60,000, even if  
28 they are not going in the water now because of the executive orders  
29 that the governor has issued lately, but, I mean, it's considerably  
30 more recreational activity, and that wouldn't include the cruise  
31 ships that come into the U.S. Virgin Islands, more than to Puerto  
32 Rico, but at least I believe three times a week, on a weekly basis,  
33 for years.

34  
35 **RICHARD APPELDOORN:** Cruise ships are not boating.

36  
37 **GRACIELA GARCIA-MOLINER:** Okay.

38  
39 **JOE KIMMEL:** Okay. Let's go ahead. We've got a two in that box,  
40 and let's keep it that way and go from boating to large-vessel  
41 shipping activities. I don't have any relationship there, and I  
42 don't really see a major one, and so I didn't put any number in  
43 that box.

44  
45 Boating with regard to waste. I have a negative-two, and I'm not  
46 sure the direction is right, but boaters -- The act of boating and  
47 boaters do contribute to waste, and they stir up the bottom, and  
48 they throw stuff in, and just the oils and stuff that comes out of

1 the motors, and so I have a two, and I'm not sure if it should be  
2 a negative-two or a plus-two.  
3  
4 **JUAN CRUZ-MOTTA:** I suggest a positive-two, because, as boating  
5 increases, waste increases.  
6  
7 **JOE KIMMEL:** Okay. Let's go ahead and change that to a plus-two.  
8 Okay. Boating and artificial reefs. I have a two there too, and,  
9 for boating and artificial reefs, I am trying to think of -- You've  
10 got to have a boat to get to them, but I think that's looking in  
11 the opposite direction. Is that right, Rich? He might not be  
12 here anymore, and I don't know.  
13  
14 **WALTER KEITHLY:** I will answer that. I think it is the opposite  
15 direction, that artificial reefs may lead to increased boating  
16 activities, but not vice versa.  
17  
18 **JOE KIMMEL:** Okay, and so a zero there, do you think?  
19  
20 **WALTER KEITHLY:** I would.  
21  
22 **JOE KIMMEL:** Okay. Let's put a zero in that box. Okay. Boating  
23 in the energy sector, I don't have anything there either. Has  
24 anybody got an issue with that?  
25  
26 **RICHARD APPELDOORN:** Joe, I want to go back to waste. Sorry, but  
27 I was muted.  
28  
29 **JOE KIMMEL:** Where were you wanting to go back to?  
30  
31 **RICHARD APPELDOORN:** Waste. There is no question that there is a  
32 lot of trash that comes off boats, and there is the oil and gas-  
33 associated discharges, but we were talking about waste in terms of  
34 point source discharges of sewage and pharmaceuticals and whatever  
35 kinds of things like that, and are we really on a scale like that,  
36 that --  
37  
38 **JOE KIMMEL:** I don't know.  
39  
40 **RICHARD APPELDOORN:** I mean, boating, I don't think, is affecting  
41 the kind of waste that we were talking about there, but boating is  
42 its own source of waste, but are we on a scale of what's coming  
43 out of our sewage systems is a two?  
44  
45 **JOE KIMMEL:** I just heard some numbers of 50,000 commercial  
46 fishermen.  
47  
48 **RICHARD APPELDOORN:** No, 50,000 recreational fishermen. No, it

1 was recreational boats.  
2  
3 **JOE KIMMEL:** Recreational boats. That's a lot of boats with a lot  
4 of oil.  
5  
6 **JORGE GARCIA-SAIS:** All those boats are in the marinas 99 percent  
7 of the time, all of them. Then, when they go out, they all go to  
8 the same place.  
9  
10 **RICHARD APPELDOORN:** Okay. I will leave it.  
11  
12 **JORGE GARCIA-SAIS:** I would keep that a one, at most a one, and I  
13 don't think that it reaches one.  
14  
15 **JOE KIMMEL:** Okay.  
16  
17 **RICHARD APPELDOORN:** That's where I was going to go, is a one.  
18  
19 **JOE KIMMEL:** Then let's put a one in that box, under waste. Thank  
20 you.  
21  
22 **GRACIELA GARCIA-MOLINER:** Let me correct myself, because I said  
23 60,000, because that was the last count, but, in the last three  
24 years, the count has been around 25,000 registered vessels with  
25 the U.S. Coast Guard, and so I need to check on that, because  
26 that's a dramatic drop from the last time we were informed of the  
27 number of vessels.  
28  
29 **JOE KIMMEL:** Okay, and we already talked about boats and artificial  
30 reefs.  
31  
32 **WALTER KEITHLY:** I would just ask Graciela, and this kind of caught  
33 my interest, but those are -- One, you mentioned Coast Guard  
34 vessels, but, before, you mentioned recreational boats, and  
35 they're certainly different. It's five gross tons or whatever it  
36 would be.  
37  
38 **GRACIELA GARCIA-MOLINER:** Here in Puerto Rico, what they do is  
39 they register with the DNER, but they supply that information to  
40 the Coast Guard, and so that's why I have to check, because,  
41 before, the sum of all the recreational vessels that were  
42 registered with the DNER added up to 60,000, and so, now that I  
43 have gotten the 2017 to 2019 information, it might not include all  
44 the other recreational vessels that they included before.  
45  
46 **WALTER KEITHLY:** That's what I was thinking, that it was apples  
47 and oranges on that one.  
48

1 **GRACIELA GARCIA-MOLINER:** Exactly, and so all I'm saying is that,  
2 from the same information that they sent me before, and the  
3 information that they just sent me, the difference of that amount  
4 needs to be checked, but I just wanted to put it out there, because  
5 it's a dramatic difference in numbers.  
6

7 **WALTER KEITHLY:** Okay. Thank you. I just felt this needed --  
8

9 **JULIAN MAGRAS:** Can I make a comment?  
10

11 **RICHARD APPELDOORN:** Go ahead.  
12

13 **JULIAN MAGRAS:** The comment is that I think you're seeing a lot of  
14 drop in those numbers, and we saw it here, because a lot of the  
15 boats were lost with the hurricanes, and so we saw a big, dramatic  
16 drop in the quantity of recreational boats that were registered  
17 over here with DPNR, and so the drop was significant.  
18

19 Now, this year, before COVID, we were seeing a great increase and  
20 those numbers going up, and, actually, since COVID, we saw a higher  
21 number, because, all around us, they were not accepting the boats  
22 here in the Virgin Islands, and we were accepting everyone, and  
23 then they had to register during the period of registration, which  
24 is going on now, and they had to register, and so we saw an  
25 increase, but, after the hurricanes, the numbers really, really  
26 dropped, and so I think that's true for the fact that a lot of  
27 people lost their boats, and so I just wanted to put that out  
28 there.  
29

30 **JOE KIMMEL:** Okay. That's good information, Julian.  
31

32 **RICHARD APPELDOORN:** Well, I will add some context to that for  
33 Puerto Rico. For years, Puerto Rico was trying to clean up their  
34 records, because what they had been doing was adding new boats  
35 that get registered, but they were never taking off any boats that  
36 had dropped out of the system, and so that probably also  
37 contributed largely to the drop that Graciela mentioned.  
38

39 **JOE KIMMEL:** Yes. Okay. Let's see. I think we're at boating and  
40 the energy sector, which I don't see a relationship. Has anybody  
41 got any strong feelings about that one? Then the next column is  
42 light contamination, and I admit that I was thinking about boats  
43 stirring up the water, but now I understand that that's not what  
44 light contamination is all about, and that should probably be a  
45 zero as well.  
46

47 Then boating and mariculture. While there is a relationship, I  
48 don't know if it's a one, or maybe a zero. Has anybody got any

1 discussion on that? Vance is gone.  
2  
3 **RICHARD APPELDOORN:** Well, I don't think boating would enhance  
4 mariculture, and so it wouldn't be a one.  
5  
6 **JOE KIMMEL:** J.J., did you have any comment?  
7  
8 **JUAN CRUZ-MOTTA:** I would say perhaps I agree with Rich that that  
9 should be zero, and perhaps mariculture would increase boating,  
10 but not boating to mariculture. Thank you.  
11  
12 **JOE KIMMEL:** I agree. Let's put a zero there. Thank you. Then  
13 boating affecting research. Why I have a two there, I'm not sure.  
14 I mean, there is a relationship. A lot of research requires boats.  
15  
16 **RICHARD APPELDOORN:** That's the other way.  
17  
18 **JOE KIMMEL:** Yes, that's looking at it the other way, and so let's  
19 put a zero there. Then we're in the marina activities.  
20  
21 **RICHARD APPELDOORN:** I am trying to think of whether boating would  
22 actually inhibit research, but I think I am still good with a  
23 blank.  
24  
25 **JOE KIMMEL:** Okay. Let's see. Boating and marina activities. I  
26 think I was thinking about the same thing I had before, and I think  
27 that should be a zero.  
28  
29 **RICHARD APPELDOORN:** No, boating --  
30  
31 **JOE KIMMEL:** Boating and marina activity, yes, boating does  
32 increase marina activity. Whether it's a three or not, I don't  
33 know. Any comments?  
34  
35 **WALTER KEITHLY:** I have a comment. If boating doesn't affect  
36 marina activity, I don't know what would.  
37  
38 **RICHARD APPELDOORN:** It's a chicken-and-egg argument of which one  
39 do you want to put first, or is it a positive feedback? Since we  
40 haven't looked at marina activity affecting boating, but, yes, I  
41 think I would say that boating affects marina activity, but, if  
42 you put a marina in, then it's the other way around.  
43  
44 **JOE KIMMEL:** Yes. What about the magnitude here? Are we talking  
45 about a one or a two? I've got a three. Anybody?  
46  
47 **RICHARD APPELDOORN:** I would say that's probably pretty good.  
48

1 **JOE KIMMEL:** Okay. Moving on, we'll go to recreational diving and  
2 boating. I would see that as pretty similar to the marina  
3 activity, when I think about boating does affect recreational  
4 diving. The more boats you've got, the more recreational divers  
5 that probably go out, and so I would think that's a -- I don't  
6 know if it's a three, but I would think a two or whatever, but any  
7 comment?  
8

9 **RICHARD APPELDOORN:** I think the strength of the linkage is the  
10 same, but the proportion of boats engaged in recreational diving  
11 is going to be much, much less than all boats going in and out of  
12 marinas and ramps and whatnot, because only a small portion of  
13 those boats are engaged in diving activities, but I think the  
14 linkage is probably pretty strong. It may be 10 percent of boats  
15 go out diving, but, if you increase -- If you double the number of  
16 boats, you double the number of divers, and so I think it's a  
17 strong connection.  
18

19 **JOE KIMMEL:** Well, I don't think it's a three though. It might be  
20 a -- Let's put a one there, unless we get some more discussion.  
21

22 **RICHARD APPELDOORN:** I think it should be stronger than a one.  
23

24 **JOE KIMMEL:** Okay. Let's put a two there. I'm pretty easy, as  
25 you've seen. Anybody got a strong opinion? Okay. Then we'll go  
26 with the next column, boating and conservation/restoration. I've  
27 got a one.  
28

29 **RICHARD APPELDOORN:** If you put a negative in front of it, I will  
30 accept that.  
31

32 **JOE KIMMEL:** Okay. Let's put a negative-one there. Okay. Great.  
33 Boy, we're moving right on here.  
34

35 **RICHARD APPELDOORN:** J.J., did you have a comment?  
36

37 **JUAN CRUZ-MOTTA:** I agree that it should be negative, and that's  
38 all. Thank you.  
39

40 **JOE KIMMEL:** Thank you. Okay. We're down to Row 14, marina  
41 activity and marine development. Well, I would think marina  
42 activity would enhance marine development, or would it have a  
43 positive interaction with marine development, and so I put a one  
44 in that box.  
45

46 **RICHARD APPELDOORN:** I think it goes the other way.  
47

48 **JOE KIMMEL:** I'm still thinking of it backwards? Okay.

1  
2 **JUAN CRUZ-MOTTA:** Why is that?  
3  
4 **WALTER KEITHLY:** Yes, and I would tend to think that marina  
5 activity would lead to increased marine development.  
6  
7 **JUAN CRUZ-MOTTA:** I agree with that statement.  
8  
9 **RICHARD APPELDOORN:** Okay. Sorry. I was confusing it with coastal  
10 development, and so go ahead. One is fine.  
11  
12 **JOE KIMMEL:** Okay. Marina activity and coastal development. We've  
13 got a one there as well, but that might not be as strong of a  
14 relationship as marine development.  
15  
16 **RICHARD APPELDOORN:** I think coastal development drives marina  
17 activity, and I don't see marina activity driving coastal  
18 development.  
19  
20 **JOE KIMMEL:** Okay, and so a zero there, or a blank?  
21  
22 **RICHARD APPELDOORN:** Yes, that's what I would do.  
23  
24 **JOE KIMMEL:** Okay. Let's take that one away.  
25  
26 **JORGE GARCIA-SAIS:** Joe, let me clarify something. Going back to  
27 the relationship between boats and conservation/restoration, it  
28 looks to me, in the previous argument, that there was a strong  
29 perception that boats were a problem, that boats were a problem  
30 because of the noise, big noise, and a problem with the fishes,  
31 and it's bad, and so let's call it a two, and it's not a three,  
32 but then we go into boats and conservation/restoration, and it's  
33 just one. That's where I have a problem. I don't see the  
34 consistency in our rankings of these relationships. Sorry.  
35  
36 **JUAN CRUZ-MOTTA:** If you want to increase the previous -- I mean,  
37 for this one, I would support Reni's proposal. Thank you.  
38  
39 **JOE KIMMEL:** I was just trying to determine what the number was  
40 that Reni and J.J. wanted to change. That was the one at the end  
41 of the table, Column P, and is that where it was?  
42  
43 **JORGE GARCIA-SAIS:** Joe, I frankly don't think that we have enough  
44 information to make that decision. We don't even know how many  
45 boats are there. We don't know about the scale. We are not really  
46 informed to make that assessment, and that's my point. That's  
47 where I stand.  
48

1 That's why I would have gone with a one, because of the scale,  
2 because of amount of -- I mean, the average number of boats per  
3 day out there and the noise that they generate on the entire ocean  
4 that surrounds us, I believe it's small, but I may be wrong, but,  
5 if I am wrong, then that kind of criteria should be stable, to be  
6 consistent throughout, and not one here and two there and three  
7 over there and so forth, and then zero, and then some relationship  
8 that we don't understand, that are real, we are going with zero,  
9 because we don't think they're big enough.

10  
11 I think that -- I know we are playing around with this, and we  
12 don't have the information for everything, and we're just taking  
13 our best knowledge, but sometimes I feel that we are being  
14 inconsistent in how we are looking at things, and so that's just  
15 my standpoint.

16  
17 There are things that are important, and we are going very fast,  
18 and I know you're tired, and I know everyone is tired, but we are  
19 going too fast on things that are too important, and that's just  
20 my opinion, and I've been wrong before, and I know that probably  
21 nobody is right and nobody is wrong here, but it's just our  
22 perception of things, but this one has really woke me up, because  
23 I see that, in one stand, we say there is 50,000 boats, and they're  
24 all going at the same time, and the noise is terrible, and the  
25 fish are running away, and it's a disaster.

26  
27 Then, when we go to the main ones, and that is the boats between  
28 conservation/restoration, then we just dispatch it with a one and  
29 just keep going, and that's where I have a problem.

30  
31 **JOE KIMMEL:** Reni, I agree with most everything you've said, but  
32 I am not an expert on any one of these categories, and I'm not  
33 sure that anybody in the group is, but we have to do the best we  
34 can, and so that's what we're trying to do. We're trying to put  
35 all of our heads together to put the best number there that we  
36 know of, and everybody's comment is helpful and welcome, especially  
37 if they have a rationale for putting it there. Sorry that I got  
38 rambling, but, Rich, did you have something?

39  
40 **RICHARD APPELDOORN:** The questions are very different. One is, is  
41 boating generating a lot of noise, and, whatever you felt about  
42 that, we came up with a number. This one is asking whether boating  
43 activity is somehow positively or negatively affecting the  
44 implementation of conservation and restoration activities, which  
45 is usually something spatial, but it could be something other than  
46 that, in some way, but that's kind of the question here, and you  
47 could say that boating -- If there's a lot of activity going on  
48 with boating, it's not necessarily a good place to try to put a

1 conservation zone, because of the potential impacts from the noise.  
2  
3 Reni is right that we don't know a lot about how that really  
4 manifests itself in the environment, but it is a separate question.  
5 Now, do you want to say, if there's more boating activity, people  
6 will more likely try to put in a conservation zone, or something  
7 like that, and then it would be a positive relationship?  
8  
9 I suppose that happens, but, generally, there is an increase in  
10 conservation concern as more people are using the environment,  
11 but, if you look what happens in Parguera, the places where there  
12 is more boating activity, those are the least likely places that  
13 you would want to have a conservation effort, because it's totally  
14 overwhelmed by the amount of boating activity.  
15  
16 **JORGE GARCIA-SAIS:** I understand that, but I don't understand why  
17 we needed a one.  
18  
19 **RICHARD APPELDOORN:** As opposed to?  
20  
21 **JORGE GARCIA-SAIS:** Two.  
22  
23 **RICHARD APPELDOORN:** If you want to have a two there, that's fine,  
24 but don't think it has to be that way because of how we scored the  
25 noise aspect. Those are two separate questions, and the effect of  
26 boating activity on one versus the other are different.  
27  
28 **JORGE GARCIA-SAIS:** The way I see it is that they are relatively  
29 -- They are relatively far, and, if we sort of consider noise as  
30 a problem with conservation and preservation of the natural  
31 environment, and it has the connotation of affecting fisheries, or  
32 fishes, because they run out -- They are going out because the  
33 boats are there, then I believe that that is proportional to its  
34 impact upon preservation and conservation.  
35  
36 **RICHARD APPELDOORN:** But it's not, because preservation and  
37 conservation is based on, in this competing use model, that it's  
38 based on an areal closure, which could be seasonal, or it could be  
39 full-year-round, but that's how you're doing it, and it's not like  
40 saying we're going to mandate that everybody now get four strokes  
41 so that we can reduce the amount of noise, and I don't think we  
42 were thinking that way anyway.  
43  
44 That could just be something that comes out of the noise category,  
45 because that's island-wide, whereas the conservation and  
46 restoration areas usually are area-based, and, therefore, the  
47 nature of the question about how boating affects that is different.  
48 The scales are different.

1  
2 Boating activity could have other impacts on conservation and  
3 restoration. For instance, boating activities appear to be, by  
4 far, the major source of dolphin damage, and, if you want to have  
5 a place to preserve dolphins, maybe you put a boating reserve, or  
6 some reserve where boats are not allowed in, or some other  
7 conservation measure that you can't approach dolphins at a certain  
8 distance or something like that with boats, to try to minimize  
9 those impacts, but that's very different from the noise generation  
10 question.

11  
12 **JORGE GARCIA-SAIS:** I know they are different, Rich, but what I  
13 don't agree with is with the scoring, because, if you ask a manatee  
14 about the problems with the boats and conservation and  
15 preservation, they will give you a three, but let's please go on,  
16 because it's fifteen minutes to five. Let's just go on, but I'm  
17 just saying. I know it's just my opinion, and it's no problem.

18  
19 **JULIAN MAGRAS:** Can I make a comment?

20  
21 **JOE KIMMEL:** We're at marina activities and -- Who is that?

22  
23 **JULIAN MAGRAS:** This is Julian. Can I make a comment?

24  
25 **JOE KIMMEL:** Yes. Go ahead, real quick.

26  
27 **JULIAN MAGRAS:** My comment is we have -- Like, here in St. Thomas,  
28 we have the Marine Conservation District, and it's a big, large  
29 habitat closures, and the boating activity in there is so  
30 ridiculous, and it falls within the marina also, and it's not only  
31 the boats that we have problems with, but it's the jet-skis, and  
32 so there is so much boating activity that is taking place inside  
33 of this beautiful sanctuary area, and, you know, it's pretty  
34 similar to what Reni is saying. It draws great concern with the  
35 amount of activity that takes place in a lot of these closed areas.

36  
37 The fishers were all part of putting it in place, and then we see  
38 that, where you have a nice juvenile habitat that's supposed to be  
39 taking place, the boating activity is not only destroying that,  
40 but it's also destroying the baitfish, and so, you know, we always  
41 talk about overfishing and stuff like that, but a lot of the human  
42 use activities are causing a lot of the issues that we see in the  
43 fishery.

44  
45 **JOE KIMMEL:** Yes, and I understand your point there, Julian.

46  
47 **RICHARD APPELDOORN:** Joe, make it a minus-two, and let's move on.

48

1 **JOE KIMMEL:** Okay. That's way back at the end of the table that  
2 you're talking about, the boating and the conservation? Is that  
3 where you're talking, Rich?  
4

5 **RICHARD APPELDOORN:** Yes.  
6

7 **JOE KIMMEL:** Okay. Make it a minus-two. Okay. Now we're at  
8 marina activity, and I think we went through the first couple of  
9 columns there. I think we're at military use, marina activity and  
10 military use. I don't see any relationship there, and so I left  
11 it as zero. Then marina activity and noise generation. I've got  
12 a minus-one, but I think it should be a zero.  
13

14 **RICHARD APPELDOORN:** It should be positive.  
15

16 **JOE KIMMEL:** You think it should be a positive number? Then make  
17 that a positive-one.  
18

19 **RICHARD APPELDOORN:** I would go with that.  
20

21 **JOE KIMMEL:** Okay. Then marina activity and large-vessel shipping  
22 activity. I don't see a positive relationship. Well, I don't see  
23 a relationship there at all. Marina activity and waste.  
24

25 **GRACIELA GARCIA-MOLINER:** Joe, can I interrupt for a second?  
26

27 **JOE KIMMEL:** Yes.  
28

29 **GRACIELA GARCIA-MOLINER:** Sorry about this, but my chat is coming  
30 in late to me, and so I do have to read these for the record, if  
31 I may. You have to include the sounds of loud music, besides the  
32 engine sound. That affects the marine birds. That's Marcos Hanke.  
33

34 Then you have Michelle Scharer, who is talking about the  
35 conservation of habitats would exclude boating. Boating and  
36 anchoring have impacted coral nurseries in La Parguera, and now  
37 you're going into the waste disposal zone, and Nelson Crespo is  
38 saying that waste disposal from the boaters to the water is an  
39 impact, and so those are specific comments that we have on the  
40 chat.  
41

42 **JOE KIMMEL:** Thank you for that, Graciela. Okay. Marina activity  
43 and waste, I have a negative-one there, but I'm not sure why.  
44

45 **RICHARD APPELDOORN:** It should be positive-one.  
46

47 **JOE KIMMEL:** Positive-one? Let's change that to a positive-one.  
48 Any more comments about that or rationale or whatever? Okay.

1  
2 **RICHARD APPELDOORN:** I mean, it could be a zero, because we've  
3 already talked about boating being the source of the waste, and so  
4 I would make it zero.  
5  
6 **JOE KIMMEL:** Okay. Zero it is. Then the marina activity as it  
7 affects artificial reefs. Again, I think we're going in the  
8 opposite direction here, but that should probably be a zero there,  
9 too. Let's put a zero there until we get some comment.  
10  
11 **RICHARD APPELDOORN:** It would only be if you consider the marina  
12 itself an artificial reef.  
13  
14 **JOE KIMMEL:** Exactly.  
15  
16 **RICHARD APPELDOORN:** And I don't want to go there.  
17  
18 **JOE KIMMEL:** Yes, let's don't start a discussion about that. Okay.  
19 Marina activity and the energy sector, no relationship that I can  
20 see. Are there comments? We're getting close to getting to the  
21 end here, guys. We probably won't finish today, but marina  
22 activity and light contamination.  
23  
24 **RICHARD APPELDOORN:** Positive.  
25  
26 **JOE KIMMEL:** Positive, a positive-one. Any more comments? Okay.  
27 Marina activity and mariculture. I don't think marina activity  
28 generates any mariculture, and so that should probably be a zero  
29 there.  
30  
31 **RICHARD APPELDOORN:** Well, I would like to open up a scenario here.  
32 If you have in-water mariculture, like cage cultures and things  
33 like that, for some kind of bottom facility, that requires a boat,  
34 and you need a marina somewhere nearby.  
35  
36 **JOE KIMMEL:** So we've got a one there, and do you want to keep it  
37 as a one?  
38  
39 **RICHARD APPELDOORN:** I don't know whether it's -- I'm just raising  
40 that issue, and I don't know whether it's substantial enough that  
41 we actually have to worry about it.  
42  
43 **JOE KIMMEL:** I think it's a zero, myself.  
44  
45 **RICHARD APPELDOORN:** I am saying, for us, I think it is a zero,  
46 because I don't think anywhere in the islands that you're too far  
47 away from a place where you can launch a boat.  
48

1 **JOE KIMMEL:** Yes.  
2  
3 **RICHARD APPELDOORN:** If we were talking the coast of Alaska, or  
4 Chile or something like that, it's a different story.  
5  
6 **JOE KIMMEL:** Right. Okay. Let's put a zero there, under  
7 mariculture. Then marina activity and research. I've got a one.  
8  
9 **RICHARD APPELDOORN:** I think it's the same argument as mariculture,  
10 and so it would be zero.  
11  
12 **JOE KIMMEL:** Zero there. Marina activity and boating.  
13  
14 **RICHARD APPELDOORN:** I think that was the other way around.  
15  
16 **JOE KIMMEL:** Yes, and that should be a zero here, right? Let's  
17 put a zero there, and maybe that will generate some discussion, if  
18 we have any.  
19  
20 **WALTER KEITHLY:** I agree that's a zero.  
21  
22 **JOE KIMMEL:** Okay. Thank you. Okay. Marina activity and  
23 recreational diving.  
24  
25 **RICHARD APPELDOORN:** That's the same argument as before. That's  
26 zero.  
27  
28 **JOE KIMMEL:** Zero there. Marina activity and  
29 conservation/restoration, I think that's correct, a zero there.  
30 What do you think? Is Reni still hanging around?  
31  
32 **RICHARD APPELDOORN:** I think we're in recreational diving.  
33  
34 **JOE KIMMEL:** Okay. Recreational diving it is. That's Row 15,  
35 Column B. Okay. Recreational diving and marine development, I've  
36 got a one.  
37  
38 **RICHARD APPELDOORN:** You're thinking, the more diving going on,  
39 the more you need dock space and --  
40  
41 **JOE KIMMEL:** I mean, if you have a lot of recreational diving,  
42 there might be -- Well, it depends on the type of marine  
43 development that's out there, but divers are curious, and I don't  
44 know. What do you think? Zero?  
45  
46 **RICHARD APPELDOORN:** Well, the development would be like the pier  
47 structures for the boats, and perhaps mooring buoys and things  
48 like that out at the different sites.

1  
2 **JOE KIMMEL:** That warrants a one, don't you think?  
3  
4 **RICHARD APPELDOORN:** Well, I don't know the scale of it warrants  
5 anything, but a one is fine. Sure.  
6  
7 **JOE KIMMEL:** Okay. Recreational diving and coastal development.  
8 I don't really see a big relationship there. That's a zero, until  
9 we get comments.  
10  
11 **RICHARD APPELDOORN:** Well, I'm going to ask about the tourist  
12 business. If people are actually coming to dive in the islands  
13 here, that's going to generate hotel and restaurant construction  
14 and whatever around wherever the dive operations are going in and  
15 out of.  
16  
17 **JOE KIMMEL:** Okay. Do you want to keep it as a one?  
18  
19 **TARSILA SEARA:** If we argue for that, which is actually something  
20 that I was thinking about asking, at some point, shouldn't we argue  
21 the same for boating, because, if you increase the boating  
22 activity, wouldn't you also increase some of these sporting  
23 businesses that Richard is talking about as coastal development?  
24  
25 **JOE KIMMEL:** You mean going up two rows there?  
26  
27 **TARSILA SEARA:** Yes, if that makes sense to everybody.  
28  
29 **JOE KIMMEL:** It does make sense. I mean, you know, I guess what  
30 we're all arguing about is the scale of whether it's a zero or a  
31 one or a two or whatever, and so I can go with a one there. I  
32 don't think I would go with a two, but I would go with a one.  
33 Let's put a one under coastal development and boating. We've got  
34 the one under recreational diving and coastal development.  
35  
36 **RICHARD APPELDOORN:** I think they're somewhat different. I mean,  
37 we're saying coastal development would spur boating activity, and  
38 boating activities would spur recreational diving, and we're  
39 putting a feedback loop here, where recreational diving drives  
40 coastal development, and I was talking specifically about external  
41 tourists coming in to do diving, and I don't think external  
42 tourists come in to do boating, other than as an activity to do  
43 diving or something else, unless you want to count the banana boat  
44 business.  
45  
46 **TARSILA SEARA:** I guess I was just thinking in terms of if you  
47 were to increase boating activity in the area, and wouldn't that  
48 increase coastal development, in terms of supporting businesses

1 that would cater to that boating activity? That was my rationale,  
2 but, I mean, whatever you guys think.  
3  
4 **JOE KIMMEL:** Okay, Coach Appeldoorn. What do you think? You don't  
5 like the one under boating, do you?  
6  
7 **WALTER KEITHLY:** I don't like it, and I think that should be a  
8 zero, and, with respect to recreational diving, Rich has a point.  
9 If it's bringing external people to the island, it may lead to  
10 coastal development, but I have no idea whether it's a significant  
11 contribution or if tourists are a significant contribution to  
12 recreational diving.  
13  
14 **RICHARD APPELDOORN:** So we could just go with a blank there then.  
15  
16 **JOE KIMMEL:** Yes, and the same under boating up there too, it  
17 sounds like.  
18  
19 **RICHARD APPELDOORN:** The boating, yes.  
20  
21 **JOE KIMMEL:** Okay. Recreational diving and military use, no  
22 relationship that I can think of. Recreational diving and noise  
23 generation, they might bank on their tanks, but I don't think  
24 that's a big deal.  
25  
26 **RICHARD APPELDOORN:** The boat part of that is already taken care  
27 of.  
28  
29 **JOE KIMMEL:** Yes. Recreational diving and large-vessel activity,  
30 that should be a zero there. Recreational diving and waste, why  
31 do I have a negative-one there?  
32  
33 **RICHARD APPELDOORN:** Probably you were thinking the other  
34 direction, but I would make that blank, because, within the boating  
35 activity component of that, we've already taken care of it.  
36  
37 **JOE KIMMEL:** Okay. Let's put a zero there, or a blank there.  
38 Recreational diving and artificial reefs. There's a definite  
39 relationship, but direction? It is plus or minus?  
40  
41 **RICHARD APPELDOORN:** The relationship is the other way.  
42  
43 **JORGE GARCIA-SAIS:** It's in the opposite direction, because the  
44 artificial reefs may enhance recreational diving, but I don't see  
45 how recreational diving will enhance activity -- That the divers  
46 would ask for the reef, or would influence the construction of  
47 artificial reefs, and I haven't seen that in Puerto Rico, but that  
48 is the direction that it would go.

1  
2 **JOE KIMMEL:** Let's put a zero there, or a blank.  
3  
4 **RICHARD APPELDOORN:** Unless each diver is asked to bring a block  
5 down.  
6  
7 **JOE KIMMEL:** That has happened before. Recreational diving and  
8 the energy sector, I have a blank. Recreational diving and light  
9 contamination is blank. Recreational diving and mariculture is  
10 blank.  
11  
12 **RICHARD APPELDOORN:** Yes.  
13  
14 **JOE KIMMEL:** Recreational diving and research, that should probably  
15 be a blank as well.  
16  
17 **RICHARD APPELDOORN:** No, I would put that as a minus-one.  
18  
19 **JOE KIMMEL:** A minus-one? Okay. Let's do that. What's the  
20 rationale for you there?  
21  
22 **RICHARD APPELDOORN:** A recreational diver is going to interfere  
23 with research, but that might be a small enough thing that we just  
24 want to make it zero, but they do steal gear and mess up transect  
25 lines and things like that, but it is a very localized impact.  
26  
27 **JORGE GARCIA-SAIS:** Is it the recreational divers that affect  
28 research programs and things like that, and there are volunteers,  
29 essentially recreational divers, contributing to some aspects of  
30 research. If it's enough to merit a one, I'm not sure, and I'm  
31 not sure anymore.  
32  
33 **RICHARD APPELDOORN:** If they're doing research, they're research,  
34 and they're not recreational diving, even though it's obviously a  
35 recreational activity to do the research, and so I would make it  
36 a zero.  
37  
38 **JOE KIMMEL:** Okay. Let's go that, although, as you guys were  
39 talking, I was thinking about the program Reef Keeper, I think  
40 it's called, where they get the recreational -- It's like bird  
41 watching, except you do it underwater, and they train these people  
42 to try to identify the fish, and then they throw them all through  
43 the water. I think it's called Reef Keeper.  
44  
45 **GRACIELA GARCIA-MOLINER:** Reef Check.  
46  
47 **JORGE GARCIA-SAIS:** There are several, Joe.  
48

1 **JOE KIMMEL:** Okay. They're not there in Puerto Rico?  
2  
3 **RICHARD APPELDOORN:** Yes, they're here.  
4  
5 **JORGE GARCIA-SAIS:** They are, certainly.  
6  
7 **JOE KIMMEL:** All right. Let's go onto the next one, recreational  
8 diving and boating. There's definitely a relationship.  
9  
10 **RICHARD APPELDOORN:** We said boating increases recreational  
11 diving.  
12  
13 **JOE KIMMEL:** Recreational diving doesn't increase boating?  
14  
15 **RICHARD APPELDOORN:** Yes, it does.  
16  
17 **JORGE GARCIA-SAIS:** I think so, yes.  
18  
19 **JOE KIMMEL:** So is everybody okay with a one there?  
20  
21 **RICHARD APPELDOORN:** Yes. We have a feedback loop there, and so  
22 diving is increasing boating, and boating is increasing diving,  
23 and it will just balloon.  
24  
25 **JOE KIMMEL:** Yes, I understand. Okay. Recreational diving and  
26 marina activity, I would think that it would be the same as  
27 boating. Should we keep a one there? Is that okay with everybody?  
28  
29 **RICHARD APPELDOORN:** I would make that zero, because we have  
30 already accounted for the impact under boating.  
31  
32 **JOE KIMMEL:** Okay. It's a small effect, a small relationship.  
33 All right. Let's put a zero there, and there's a zero under  
34 conservation/restoration with recreational diving. Okay.  
35  
36 **RICHARD APPELDOORN:** Recreational divers sometimes are major  
37 promoters of conservation activities.  
38  
39 **JOE KIMMEL:** They are.  
40  
41 **RICHARD APPELDOORN:** But they also do a lot of damage, and so it  
42 really can go either way.  
43  
44 **JOE KIMMEL:** They also spear goliath grouper and Nassau grouper  
45 too, and so I would keep that as a zero.  
46  
47 **RICHARD APPELDOORN:** But then they fish, and so it's not  
48 recreational diving.

1  
2 **JOE KIMMEL:** I thought that recreational diving included  
3 spearfishing.  
4  
5 **RICHARD APPELDOORN:** No, and there is a separate recreational --  
6 Well, we'll have to deal with that when we get to the connections  
7 between models.  
8  
9 **JOE KIMMEL:** Okay. Let's go down to the last row,  
10 conservation/restoration.  
11  
12 **RICHARD APPELDOORN:** Just for the record, we're extending the  
13 agenda for today to finish this last row. Go ahead, Joe.  
14  
15 **JOE KIMMEL:** Okay. Conservation/restoration and marine  
16 development, I have a negative-two.  
17  
18 **RICHARD APPELDOORN:** It could even be a negative-three.  
19  
20 **JOE KIMMEL:** Yes, possibly. Okay.  
21  
22 **JORGE GARCIA-SAIS:** Can you repeat that one? What was it?  
23  
24 **JOE KIMMEL:** Conservation/restoration influencing marine  
25 development, I have a two, and Rich suggested that it possibly  
26 could be a three. What do you think, Reni?  
27  
28 **JORGE GARCIA-SAIS:** I think it's negative. I mean, if conservation  
29 -- I can only think about positive development, in terms of like,  
30 for example, a mariculture development. Mariculture development  
31 may enhance conservation and preservation policies, from my  
32 standpoint.  
33  
34 **RICHARD APPELDOORN:** Yes, but that's the wrong direction. If you  
35 have a conservation zone, are you more likely to enhance the  
36 development of stuff in the marine environment, such as a  
37 mariculture facility or whatever.  
38  
39 **JORGE GARCIA-SAIS:** How I see it, it goes both ways. If you want  
40 to make a conservation or preservation policy, you may think about  
41 developing the -- That's coastal development that favors that  
42 activity of that conservation policy.  
43  
44 **RICHARD APPELDOORN:** But we're not in coastal development. We're  
45 in marine development, and so would you put a windfarm in a marine  
46 reserve?  
47  
48 **JORGE GARCIA-SAIS:** No.

1  
2 **RICHARD APPELDOORN:** Neither would I.  
3  
4 **JOE KIMMEL:** Okay, and so we'll leave it as a --  
5  
6 **RICHARD APPELDOORN:** I would leave it as a minus-two, because  
7 sometimes we lose those battles.  
8  
9 **JOE KIMMEL:** Okay. Good point. Then, moving on, conservation and  
10 restoration to coastal development, I had a negative-two there as  
11 well, and maybe that should be a negative --  
12  
13 **RICHARD APPELDOORN:** That could go both ways. I am agreeing with  
14 Reni on that one. In fact, that's one of the selling points that  
15 NOAA uses for marine sanctuaries, because they actually spur  
16 economic activity, which translates into coastal development.  
17  
18 **JOE KIMMEL:** Okay, and so you think that should be a plus-two or  
19 what?  
20  
21 **RICHARD APPELDOORN:** No, and I could see it going both ways, but  
22 I would certainly think that, if you have a really nice reserve,  
23 that's also going to facilitate, and we'll get to that later,  
24 diving activities and things like that, and so maybe make it a  
25 one? I just really don't know how strong the relationship is. Is  
26 it a positive-one?  
27  
28 **JOE KIMMEL:** Okay. Let's do a positive-one. Are you okay with  
29 the black there, or do you want a different color?  
30  
31 **RICHARD APPELDOORN:** No, black colors matter.  
32  
33 **JOE KIMMEL:** Well, blue is something that we need to come back to  
34 and talk about.  
35  
36 **RICHARD APPELDOORN:** I don't want to come back and talk about  
37 anything.  
38  
39 **JOE KIMMEL:** Okay.  
40  
41 **RICHARD APPELDOORN:** That doesn't mean that we don't have to.  
42  
43 **JOE KIMMEL:** Okay. Conservation/restoration and military uses, I  
44 have zero there. I also have a zero under conservation/restoration  
45 and noise generation.  
46  
47 **RICHARD APPELDOORN:** Wait a minute. Would conservation and  
48 restoration impede the military from doing something in a certain

1 area?  
2  
3 **JOE KIMMEL:** Yes, I guess it would be, and so that would be, what,  
4 a negative-one?  
5  
6 **RICHARD APPELDOORN:** At least.  
7  
8 **JORGE GARCIA-SAIS:** Well, if you consider Vieques and the whole  
9 struggle on Vieques, that is significant.  
10  
11 **JOE KIMMEL:** Would you prefer to have a negative-two there, Reni?  
12  
13 **JORGE GARCIA-SAIS:** I would be happy with one. I would be happy  
14 with one, because of the scale, of the spatial scale.  
15  
16 **RICHARD APPELDOORN:** Okay, and it wasn't conservation that drove  
17 that, but that was an outcome.  
18  
19 **JORGE GARCIA-SAIS:** That depends on how you look at it, because  
20 one of the reasons why the marina in Vieques was in conflict was  
21 because of the conservationist concepts.  
22  
23 **JOE KIMMEL:** Okay. Graciela had something, and I didn't hear what  
24 she said.  
25  
26 **GRACIELA GARCIA-MOLINER:** The issue with the whales and the Navy  
27 and the bombing and stuff like that, that they have to keep away  
28 and they have to -- Because of conservation, military uses are  
29 restricted, and, on that note, Michelle says that that would be  
30 regulatory-based.  
31  
32 **RICHARD APPELDOORN:** It would be what based?  
33  
34 **GRACIELA GARCIA-MOLINER:** Regulatory-based. It would be a  
35 regulations issue.  
36  
37 **JOE KIMMEL:** Okay, but, still, wouldn't we keep a minus-one in  
38 that column? Anybody?  
39  
40 **RICHARD APPELDOORN:** I would for now. I see her point, and we're  
41 going to have to deal with it.  
42  
43 **JOE KIMMEL:** Okay. Conservation/restoration and noise generation.  
44 I don't think conservation and restoration causes increased or  
45 decreased noise generation, and so I left that at a zero, or a  
46 blank.  
47  
48 **RICHARD APPELDOORN:** I agree, but with a different rationale that

1 it could either increase or decrease noise, and, therefore, the  
2 average is zero.  
3  
4 **JOE KIMMEL:** Okay. Conservation/restoration and large-vessel  
5 shipping, and I think I was looking at it from the opposite  
6 direction, but I put a negative-one there. What do you think, a  
7 zero or a one? Anybody?  
8  
9 **RICHARD APPELDOORN:** This is a small-scale example, but they have  
10 been talking about, if we can predict the spawning date of corals,  
11 that they're actually warning captains to avoid being nearing reefs  
12 during those specific nights. On a temporal basis, that's so small  
13 that we wouldn't worry about it.  
14  
15 There have been issues where they've been trying to get protected  
16 areas onto nautical charts, to have big ships, particularly, avoid  
17 those and know that, if they hit there, they are really going to  
18 get sued, versus someplace else, and so there might be some impact  
19 in those activities, in terms of at least detouring around those  
20 areas, and I don't think it reduces anything or increases anything.  
21  
22 **JOE KIMMEL:** So are you okay with that negative-one?  
23  
24 **RICHARD APPELDOORN:** Yes.  
25  
26 **JOE KIMMEL:** Okay. Conservation/restoration and waste, the famous  
27 waste column. I think that should probably be a zero there.  
28  
29 **RICHARD APPELDOORN:** Yes. We would like it to be a minus-three,  
30 but --  
31  
32 **JOE KIMMEL:** Yes, but I think it should be blank.  
33  
34 **RICHARD APPELDOORN:** Well, there might be instances where, because  
35 of conservation issues, we're going to do something that's going  
36 to affect waste, and that's going to go to regulatory structure,  
37 and so, yes, zero.  
38  
39 **JOE KIMMEL:** Okay. Conservation/restoration and artificial reefs,  
40 that goes both ways, too. I mean, either a zero or a plus or  
41 minus-one, and I'm not sure which one we want. What if I change  
42 it to a blank? Would anybody complain about that?  
43  
44 **RICHARD APPELDOORN:** I would not, and I think it's the average.  
45  
46 **JOE KIMMEL:** Okay. Let's put a blank there. Okay.  
47 Conservation/restoration and the energy sector, no interaction.  
48 Conservation/restoration and light contamination, I don't think

1 there's a --  
2  
3 **RICHARD APPELDOORN:** I would go back. It's the same question.  
4 Would you put a windfarm in a marine reserve?  
5  
6 **JOE KIMMEL:** No.  
7  
8 **RICHARD APPELDOORN:** So I would leave that a negative something.  
9  
10 **JOE KIMMEL:** Negative-one under energy sector?  
11  
12 **RICHARD APPELDOORN:** Okay.  
13  
14 **JOE KIMMEL:** Okay. Conservation and restoration and light  
15 contamination, I have a zero there.  
16  
17 **RICHARD APPELDOORN:** There is a lot of work trying to reduce light  
18 contamination, because of conservation and restoration issues with  
19 turtles. I would make it a negative something.  
20  
21 **JOE KIMMEL:** Negative-two, since turtles are an endangered species.  
22 What do you think? Vance would agree with me, I bet.  
23  
24 **RICHARD APPELDOORN:** Well, almost every beach is used.  
25  
26 **JOE KIMMEL:** Yes, and it's the same here, at least in the central  
27 Florida area. Most of the beaches have turtle nests during the  
28 seasons, and so, yes, I would agree with two.  
29  
30 **WALTER KEITHLY:** How do we see a relationship there? The question  
31 is has conservation and restoration influenced light  
32 contamination, and I am doubtful that it's had any significant  
33 effect yet.  
34  
35 **RICHARD APPELDOORN:** I can give two specific examples, both the  
36 phosphorescent bay in Parguera and bioluminescent bay in Vieques  
37 have had strong impacts on the amount of light pollution. Most of  
38 the areas that directly illuminate phosphorescent bay have been  
39 bought up people to keep lights from being there, and, in Vieques,  
40 I am not sure what the regulatory structure is, but you just  
41 basically can't put lights up that are going to be a source of  
42 illumination into bioluminescent bay there, to the degree that  
43 they built this huge sports complex on the south side, and it's  
44 never been used, because they couldn't illuminate it at night.  
45  
46 **WALTER KEITHLY:** Those are two specific examples, but --  
47  
48 **RICHARD APPELDOORN:** There is a lot of conservation groups that

1 work with turtles, and they work with businesses and hotels to  
2 reduce the amount of lighting and to change the nature of the  
3 light, and so, around Puerto Rico now, you're seeing a lot of the  
4 streetlights are now red lights, instead of white, in an effort to  
5 reduce the impacts on nesting turtles and things like that, and so  
6 I think there's a lot of effort there to reduce that.

7

8 **WALTER KEITHLY:** Okay. You sold me then. Thank you.

9

10 **GRACIELA GARCIA-MOLINER:** Let me read what Michelle has to say on  
11 the subject. To allow this activity in an MPA would depend on the  
12 regulations or goals, since it would be permitted, and so turtle  
13 lights are also regulatory.

14

15 **JOE KIMMEL:** Okay. Yes, I know there is lots of at least  
16 conservation effort to limit lights on the west coast of Puerto  
17 Rico, and I assume it's the same on the east coast, but I'm not  
18 sure how successful they have been, and there's lots of hotels and  
19 whatever, and so, anyway, there is an effort to limit the amount  
20 of lights that are put up and where you can put them. Okay. Let's  
21 move on to -- That should be a negative-two.

22

23 Let's move on to conservation and restoration and mariculture. I  
24 don't know why I've got a two there. Rich, can you think of why  
25 I did that?

26

27 **RICHARD APPELDOORN:** That's between you and God.

28

29 **WALTER KEITHLY:** It all comes back to what Rich was saying earlier,  
30 and I'm looking to see if it can remember it, but he basically say  
31 he wouldn't put a windfarm in a conservation area, and I would  
32 argue the same thing with mariculture, that you would not be --  
33 You wouldn't put a mariculture facility in a conservation area.

34

35 **JOE KIMMEL:** So that should probably be a blank, don't you think?

36

37 **RICHARD APPELDOORN:** He's arguing it --

38

39 **JOE KIMMEL:** You're arguing a negative, and so that's why the  
40 negative-two might be okay. What do you think? Has anybody got  
41 a problem with negative-two under that one? Okay. We're getting  
42 close.

43

44 Conservation and restoration and research, conservation and  
45 restoration efforts do require a lot of research, and it generates  
46 research, and so I put a three, positive-three, there.

47

48 **RICHARD APPELDOORN:** All right, and so I'm going to argue against

1 that, in the same way we said that marine and coastal development  
2 and the energy sector also require lots of research for their  
3 activities, but that's not really the way we're viewing the  
4 research.

5  
6 Now, having said that, one of the arguments for having marine  
7 reserves, besides trying to restore fish stocks, was that they  
8 would become a focus for research activities and educational  
9 activities and things like that, because they are not disturbed by  
10 other activities, and so, apart from the research that's done  
11 during the phase where you're implementing something like that,  
12 the fact that you have a conservation area might stimulate more  
13 research in that area.

14  
15 Now, the final part of that is we're talking about competing uses  
16 of the marine environment relative to fishing, and, if you already  
17 have the area as a conservation zone, the enhanced research that's  
18 going on there doesn't impact that competing use at all, and the  
19 competing use is from it being a conservation zone, and so I would  
20 argue for it being a zero.

21  
22 **JOE KIMMEL:** I am not opposed. That was good rationale.

23  
24 **WALTER KEITHLY:** I would agree.

25  
26 **JOE KIMMEL:** Let's put a blank there. Okay. Conservation and  
27 restoration and boating. I have a negative-one. I still can't  
28 remember why I did that.

29  
30 **RICHARD APPELDOORN:** I think you've got it right under the  
31 recreational diving, where it's going to enhance that, and I  
32 suspect it would enhance it.

33  
34 **JOE KIMMEL:** So it should be a positive-one?

35  
36 **RICHARD APPELDOORN:** Yes.

37  
38 **JOE KIMMEL:** Okay. Anybody else, Walter or Reni or anybody that's  
39 still here?

40  
41 **WALTER KEITHLY:** I'm not sure that I agree, but --

42  
43 **JORGE GARCIA-SAIS:** I am here, but I believe that it can go both  
44 ways. It depends on what is the quality of the boating population  
45 that you have there.

46  
47 **RICHARD APPELDOORN:** Absolutely. Walter, what was your objection?

48

1 **WALTER KEITHLY:** I do object, but I don't have a good rationale.  
2 I'm just not convinced that conservation and restoration  
3 influences your overall boating activities.  
4  
5 **RICHARD APPELDOORN:** Like I said, it could go either way, and I  
6 would be just as happy with a zero.  
7  
8 **JOE KIMMEL:** Let's make it a zero.  
9  
10 **RICHARD APPELDOORN:** I think that makes sense.  
11  
12 **GRACIELA GARCIA-MOLINER:** Let me read something from the chat.  
13 Vanessa asked the person in charge of the registration of vessels  
14 in Puerto Rico, and he states that there are 71,100 recreational  
15 vessels registered in Puerto Rico alone, and so we will check on  
16 all of these numbers and get back to you at some point, and that's  
17 more than what I said before.  
18  
19 **RICHARD APPELDOORN:** I would point out, Graciela, that, if you  
20 scribble a seven, it could end up looking like a two. Maybe that's  
21 where it --  
22  
23 **GRACIELA GARCIA-MOLINER:** Vanessa asked the commissioner, and so  
24 that's what he said, but we're checking on all of that, and that  
25 might have to do with what Walter mentioned about the difference  
26 between the U.S. Coast Guard very large vessels, tonnage and things  
27 like that, versus the regular stickers that they get for any kind  
28 of smaller vessel.  
29  
30 **JOE KIMMEL:** Okay. Conservation and restoration and marina  
31 activity, I have a blank in that column.  
32  
33 **RICHARD APPELDOORN:** Almost by definition, since boating is zero,  
34 marina activity would have to be zero.  
35  
36 **TARSILA SEARA:** What was the rationale for it being zero between  
37 conservation/restoration and boating?  
38  
39 **RICHARD APPELDOORN:** Basically, it could go either way, and,  
40 therefore, zero was the --  
41  
42 **JOE KIMMEL:** It was the average. Then conservation and  
43 recreational diving, I have a one there, but, again, I don't recall  
44 why, except it was the last thing that --  
45  
46 **RICHARD APPELDOORN:** If it's a really well-conserved or restored  
47 area, you're going to generate recreational diving interest.  
48

1 **JOE KIMMEL:** Yes, I agree.

2

3 **RICHARD APPELDOORN:** So it's at least a one.

4

5 **GRACIELA GARCIA-MOLINER:** Another comment from the chat is Michelle  
6 said earlier that -- I missed three comments before, and so this  
7 is the one on recreational divers, but they do contribute to the  
8 removal of debris from diving areas.

9

10 **JOE KIMMEL:** Okay. Thanks, Michelle. Good comment. Well, Mr.  
11 Chairman, unless you want to talk about conservation/restoration  
12 and its effect on conservation and restoration, we might be done.

13

14 **RICHARD APPELDOORN:** I do, and I see that being a long  
15 conversation, and so we should probably put that off into another  
16 day.

17

18 **JOE KIMMEL:** All right. Listen, everybody, and everybody that  
19 left too. I really appreciate your help. None of these numbers  
20 I was wed to, because I don't feel like I'm competent to really  
21 talk about any one of these categories, with no expertise and no  
22 library to look at, and I have to admit that I didn't go to the  
23 library and look up these things, and so I put in the numbers that  
24 came off the top of my head, and some of them are right, and some  
25 of them are wrong, and I appreciate all of your effort to help get  
26 them back in the right place. Thank you.

27

28 **RICHARD APPELDOORN:** Thank you, Joe, for taking on that task. I  
29 think I can tell your frustration, since I haven't had a computer  
30 for two months, and that makes things difficult to look up even on  
31 the internet, although I do have an iPad. Thank you, everybody.  
32 Thank you, Liajay, for your work on the screen, even though I  
33 personally couldn't see it, and Graciela for monitoring the chat,  
34 and everybody else for your comments. We will meet again tomorrow  
35 at 10:00 a.m.

36

37 **JOE KIMMEL:** Thanks again to Graciela and Liajay. I really  
38 appreciate your efforts. You follow me better than I can follow  
39 me.

40

41 **RICHARD APPELDOORN:** All right. We are adjourned.

42

43 (Whereupon, the meeting recessed on July 27, 2020.)

44

45

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46

47

July 28, 2020

48

TUESDAY MORNING SESSION

- - -

The Scientific and Statistical Committee of the Caribbean Fishery Management Council reconvened via webinar on Tuesday, July 28, 2020, and was called to order by Chairman Richard Appeldoorn.

**RICHARD APPELDOORN:** Today is Tuesday, July 28, 2020. It's 10:02, and this is the SSC meeting, day two, and we'll start off with a roll call and audio check for everybody. I am Rich Appeldoorn, SSC Chair. I will go down the SSC people first, and so Doug.

**JOE KIMMEL:** Good morning, everybody. This is Joe Kimmel, SSC.

**DOUGLAS GREGORY:** This is Doug. Let's have a good day.

**RICHARD APPELDOORN:** Walter.

**WALTER KEITHLY:** Good morning.

**RICHARD APPELDOORN:** Churchill.

**CHURCHILL GRIMES:** Good morning. This is Church.

**RICHARD APPELDOORN:** Tarsila.

**TARSILA SEARA:** Good morning. Tarsila Seara, SSC.

**RICHARD APPELDOORN:** J.J.

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

**RICHARD APPELDOORN:** Vance.

**VANCE VICENTE:** Yes, I'm here, with the beautiful background noise.

**RICHARD APPELDOORN:** Kevin.

**KEVIN MCCARTHY:** Good morning. Kevin McCarthy, SSC.

**RICHARD APPELDOORN:** Jason.

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

**RICHARD APPELDOORN:** Reni.

**JORGE GARCIA-SAIS:** Reni Garcia, SSC, present.

1  
2 **RICHARD APPELDOORN:** Now for the others. Liajay.  
3  
4 **LIAJAY RIVERA:** Liajay Rivera, council staff.  
5  
6 **RICHARD APPELDOORN:** Graciela.  
7  
8 **GRACIELA GARCIA-MOLINER:** Graciela Garcia-Moliner, council staff.  
9 Buenos dias.  
10  
11 **RICHARD APPELDOORN:** Iris.  
12  
13 **IRIS OLIVERAS:** Iris Oliveras, council staff.  
14  
15 **RICHARD APPELDOORN:** Nelson.  
16  
17 **NELSON CRESPO:** Good morning. Nelson Crespo, DAP Chair, Puerto  
18 Rico.  
19  
20 **RICHARD APPELDOORN:** Thank you. Bill Cordero.  
21  
22 **BILL CORDERO:** Good morning. Bill Cordero, staff interpreter.  
23  
24 **RICHARD APPELDOORN:** Sarah Stephenson.  
25  
26 **SARAH STEPHENSON:** Good morning. Sarah Stephenson, NOAA Fisheries.  
27  
28 **RICHARD APPELDOORN:** Christina.  
29  
30 **CHRISTINA OLAN:** Christina Olan, council staff.  
31  
32 **RICHARD APPELDOORN:** Vanessa Ramirez.  
33  
34 **VANESSA RAMIREZ:** Vanessa Ramirez, council member.  
35  
36 **RICHARD APPELDOORN:** Marcos.  
37  
38 **MARCOS HANKE:** Marcos Hanke, present. Good morning, everyone.  
39  
40 **RICHARD APPELDOORN:** Good morning. Julian.  
41  
42 **JULIAN MAGRAS:** Julian Magras, DAP Chair, St. Thomas/St. John.  
43 Good morning, everyone.  
44  
45 **RICHARD APPELDOORN:** Good morning. Orian.  
46  
47 **ORIAN TZADIK:** Orian Tzadik, Pew Charitable Trusts.  
48

1 **RICHARD APPELDOORN:** Carlos Farchette.  
2  
3 **CARLOS FARCHETTE:** Good morning. Carlos Farchette, council member.  
4  
5 **RICHARD APPELDOORN:** Okay. That's all I have. If I missed anybody,  
6 announce yourself, but, otherwise, I think we're there.  
7  
8 **GRACIELA GARCIA-MOLINER:** I think that's it.  
9  
10 **RICHARD APPELDOORN:** Okay. We have a split screen agenda.  
11  
12 **GRACIELA GARCIA-MOLINER:** Correct. On the left-hand side, you  
13 have the Word document that we have been modifying for you, and,  
14 on the right-hand side, that's the Federal Register official  
15 notice. From yesterday, you just missed reviewing all of the sub-  
16 models, and so we have moved that into the next day, along with  
17 what is missing and how to address these gaps, and that would be  
18 the first item in the agenda today. Then everything else just  
19 moves down the line, and so finalize the sub-models and review the  
20 intra-connections.

21  
22 **REVIEW ALL SUB-MODELS (6:10)**  
23

24 **RICHARD APPELDOORN:** Okay. From my perspective, all of that is at  
25 least one kind of giant list of questions we're going to go through  
26 as we go through the sub-models. In our goal to finalize the sub-  
27 models, we have to see what's missing and what are some of the  
28 gaps, and some of these have been identified already, and some of  
29 them I'm sure will come up, and we'll look at some of the sub-  
30 models and ask ourselves like why did we do that, or why didn't we  
31 do that.

32  
33 In the process, we will then be just finalizing those intra-  
34 connections, and so that's sort of the approach we need to do, and  
35 I don't think there is any clear way to do this, other than  
36 basically jump into a model, or sub-model, and see what we would  
37 like to change or what were some issues that were mentioned in the  
38 previous meetings that we have to attend to.

39  
40 I will be clear with you that my notes on this -- I have a number  
41 of things that I have identified from yesterday and the previous  
42 meeting that we need to go back and look at, but I'm sure I don't  
43 have all of them, and I think, in addition, as we start looking at  
44 things and how they are going to potentially link, that new stuff  
45 will come up. Liajay, can you put up the model, the matrix, we  
46 were working on yesterday? Thank you.

47  
48 This got really complicated, and we actually spent more time on

1 this one, and this is just some comments about yesterday that will  
2 point to kind of the issues that we're dealing with, and so we  
3 spent more time on this sub-model than we did on any other sub-  
4 model.

5  
6 I am not sure whether that is because it was in fact or more  
7 complicated, or bigger, than all the others, but, in my mind, what  
8 we were initially doing with this sub-model was basically dumping  
9 all the other things that could affect fishing, in one way or  
10 another, and these would be connecting to other sub-models,  
11 particularly fishing, in the same way that our sub-model that we  
12 called I think it's abiotic factors was basically a holding place  
13 for a lot of factors that would connect into other sub-models and  
14 not have a lot of connections within them, yet we spent most of  
15 yesterday putting together something that had a lot of connectivity  
16 in it, and so the complexity of this is growing as we've looked at  
17 it, and maybe for the good and maybe for the not, but this is  
18 something we're now going to have to work with.

19  
20 For example, almost all of the cases here are affected by  
21 regulatory structure, and that's the non-fishing regulatory  
22 structure, which was a box in the socioeconomic and cultural  
23 drivers sub-model that we talked about potentially moving, or even  
24 getting rid of, and yet all that plays a major role here, and so  
25 that's kind of an example of some of the stumbling things that we  
26 need to do, and some of these may not be straightforward, and I  
27 certainly probably don't have answers for these things, but my  
28 suggestion is maybe that we go back to something simpler, to start  
29 with, and see how it goes.

30  
31 My suggestion would be to go back to fishing, because that's the  
32 core matrix, and there were some -- The things that were talked  
33 about in that, and so can we see the actual graphical form? Can  
34 you just blow that up?

35  
36 Jason, you were the person who had presented this, and I think you  
37 had mentioned a couple of things, or things came up in discussion,  
38 and I actually don't know whether you raised them, but I have some  
39 things here, and so there was talk about effort and how we captured  
40 effort there, and was there a feedback mechanism, so that, as  
41 fishing mortality and effort increases, that would affect  
42 population size, and we had nothing on growth, and a number of  
43 factors would affect the growth of species, and there is a question  
44 of where should that be located?

45  
46 **JASON COPE:** Rich, when you say growth, you're talking about like  
47 individual like von Bertalanffy growth and not population growth?  
48

1 **RICHARD APPELDOORN:** Correct.  
2

3 **JASON COPE:** I mean, just to address that issue, because, as we  
4 pointed out with this sub-model before, it's basically a cascade,  
5 ultimately, mostly, down to fishing mortality, and everything is  
6 kind of funneling into that one, which I think is unique to the  
7 sub-model, and you don't necessarily see that in the other ones,  
8 and then it's that F value which would then feed itself into a  
9 population model and add itself to natural mortality and growth  
10 and all those kind of individual traits of the individuals in a  
11 population, and so I don't know if putting life history  
12 characteristics into this sub-model is the way it was designed,  
13 and I think it was designed to kind of capture that F, which would  
14 then feed, ultimately, into the biological sub-model, and is that  
15 other people's impressions?  
16

17 **RICHARD APPELDOORN:** Speaking for myself, I think it was not an  
18 impression, but it just not had been thought of. I mean, there is  
19 several solutions for that, and one would be we just have a box  
20 that says population size, or something like that, and another box  
21 that says that life history characteristics, and we just dump that  
22 other kind of model of population growth into that one box.  
23

24 **JASON COPE:** Yes, because there are, obviously, other things that  
25 are going to feed into that box, environmental conditions and so  
26 forth, things that are outside of the sub-model, and so you  
27 probably want to do something more like what you just --  
28

29 **TARSILA SEARA:** What do we have right now in the ecological -- I  
30 forget what it's called, but the ecological biological model that  
31 could play that role, or do we have anything in there?  
32

33 **RICHARD APPELDOORN:** The marine components model?  
34

35 **TARSILA SEARA:** Yes.  
36

37 **RICHARD APPELDOORN:** We can go look at that, if Liajay will put  
38 that up. This is basically trophic structure, and, obviously,  
39 this is where predation and natural mortality is occurring, but we  
40 don't have things like growth and whatnot, which is going to be  
41 affected by things like, specifically, temperature, which is now  
42 going to affect oxygen availability, and also potentially  
43 reproduction and further changes in say habitat use or something  
44 like that for species, as climate change continues.  
45

46 **TARSILA SEARA:** So would this box that you are proposing, and so  
47 growth and reproduction, would that then feed into these other  
48 boxes? Like, for instance, we have this box for reef fishes, and

1 how would they be connected, or what is inside of this reef fishes,  
2 for instance, box?

3

4 **RICHARD APPELDOORN:** The pooled population of reef fishes, which  
5 we said is not just fish, but conch and lobster, for example.

6

7 **TARSILA SEARA:** There would be a box from mortality to -- A separate  
8 variable would be growth or population size or -- I'm not sure  
9 exactly what you said, but then that would then connect to reef  
10 fishes, or how would that work?

11

12 **JASON COPE:** This seems to be a fairly fundamental issue that I  
13 feel like others who have put together these models may already  
14 have that perspective in more clarity than we do, and is it  
15 possible to get information about how others have addressed this?  
16 I feel like, if we do it a little bit different, it's going to  
17 kind of -- It's going to frame how everything else is sort of maybe  
18 thought of and put together and so forth, and we would want some  
19 level of consistent treatment, and is it possible to get input on  
20 that?

21

22 **RICHARD APPELDOORN:** Well, in the short run, I would say probably  
23 not, that is to say today. In the long run, sure.

24

25 **JASON COPE:** I didn't know if we had anyone online that -- At  
26 times, we have had others who have done this in other places with  
27 other groups.

28

29 **RICHARD APPELDOORN:** If anybody has been involved in the South  
30 Atlantic or Gulf, for example, chime in. That would include  
31 somebody like Orian, who has been studying this kind of stuff, and  
32 I assume has looked at the approaches from other councils.

33

34 **DOUGLAS GREGORY:** The Caribbean is ahead of the Gulf, and I am not  
35 familiar with the South Atlantic.

36

37 **CHURCHILL GRIMES:** The same for -- We have not done this in the  
38 South Atlantic SSC, and I guess you are ahead of us, like Doug  
39 said.

40

41 **ORIAN TZADIK:** Rich, I could speak to that briefly, just to echo  
42 what was just said. The Gulf has an interest in getting this kind  
43 of thing going, but is behind the Caribbean, and, as far as I  
44 understand, the South Atlantic doesn't actually have plans to do  
45 anything like this, as of now.

46

47 **RICHARD APPELDOORN:** So we could be ruining it for everybody.  
48 That's great, but the Gulf does have the Atlantis model, right,

1 and so they obviously have, at least for the water side of the  
2 ecosystem things, something already fairly well worked out, and  
3 the core of that is an Ecopath, which is dealing with boxes of  
4 biomass, and so that's not exactly the structure of ours, but  
5 that's also -- A simple Ecopath model doesn't deal with the  
6 environmental change, and it probably assumes that life histories  
7 are static, and so it's just really a trophic-based approach as  
8 well.

9  
10 **DOUGLAS GREGORY:** Mandy and her colleagues at the Center have been  
11 working on Gulf ecosystem concept models for a while now, and they  
12 have been pulling the Gulf Council along in the direction of doing  
13 something, and I know the council has formed an ecosystem special  
14 committee, or taskforce, but I'm not on it, and so I don't know  
15 what they've done, and nothing has come to the SSC yet, but most  
16 of what -- We're going with probably being pulled in the direction  
17 that the Center is leading.

18  
19 **JASON COPE:** My understanding, in looking at this the whole time,  
20 has been that this is a coarse-level look at the biology, and you  
21 have these marine ecosystem components that, for instance, are  
22 reef fishes, and the diversity of life history contained just  
23 within that component is immense, and there is no way that we would  
24 be able to capture all of that detail in something like this, and  
25 so a strategic model like this was meant only to kind of understand  
26 the kind of bigger-level things that are flowing in and out and  
27 the bigger connections, because you can kind of rotate this model  
28 to look at it in any sort of angle that you want, maybe at the  
29 socioeconomic angle versus the biological or marine ecosystem  
30 component angle.

31  
32 I feel like each of these components has always been this kind of  
33 dump of life history, and it's just a big container that contains  
34 a whole lot of diversity of life history, and some arrow is going  
35 to point into it that says this would get added to that, and so  
36 the idea of capturing growth, which is obviously enormously  
37 important, it seems, I don't know.

38  
39 It just seems kind of hidden within this component, and there isn't  
40 a real easy, convenient way to open up that box and make it in any  
41 way sort of kind of a universal -- Other than arrows coming in and  
42 out to actually capture the diversity of life history, in any of  
43 these boxes, and so I don't know. I feel like we're kind of stuck  
44 with the coarse-level look at the components, and we can't really  
45 go into much detail about how some of these other sub-models could  
46 affect something like growth specifically within any given  
47 population.

48

1 **RICHARD APPELDOORN:** So it ends up with something that,  
2 conceptually, is simple, but, at least pictorially, would be a  
3 mess, because, basically, fishing mortality would then have an  
4 arrow going to all the boxes here where fishing is being done, and  
5 so not turtles and seabirds and that kind of stuff, but certainly  
6 the reef fishes and some of the other groups that are supplying  
7 bait and forage fishes, for example, and so those lines are coming  
8 in from fishing mortality, and then we have the abiotic factors,  
9 which can be affecting growth, reproduction, settlement, and some  
10 spatial dynamics, and those are --

11  
12 If these boxes are basically sort of representing population sizes,  
13 then those are going to feed arrows into all of these, or some of  
14 these, and that will be the linkage of where we bring in those  
15 abiotic factors, and so each of these boxes -- Inside each of one  
16 of the boxes in this sub-model, like reef fishes, is subsumed all  
17 the population dynamics stuff that's not driven by fishing  
18 mortality or by abiotic factors, which we can link into it, but  
19 the actual dynamics of how that interaction goes is basically in  
20 the reef fishes black box, for example. Does that sound like a  
21 way to deal with this?

22  
23 **JASON COPE:** Yes, and I think that's probably, at this -- Yes, I  
24 think that's probably the way to do it, the only way you can do  
25 it, really. Just to add to it, like you said, there's a simplicity  
26 to it.

27  
28 It's obviously missing a lot of intricacies, but there's a  
29 simplicity to it that, if we take that more simplified approach  
30 and break it up that way, and then, at a later time -- If at any  
31 point we step back and say, you know what, given everything else  
32 with it, everything else is kind of settling, that is not fully  
33 sufficient to what we want to get to, and you could dig in more,  
34 but, at this point, I think, just because there's a lot of  
35 complexity here of connections, that might be the most prudent way  
36 to go forward now, with the ability to reserve the opportunity to  
37 dig in deeper if we wanted to, if that meets goals later.

38  
39 **RICHARD APPELDOORN:** Sure. I agree with that. One could certainly  
40 make an argument that we've already been digging deeper than we  
41 should be doing within some of these things, but, obviously, the  
42 fishery model is really the core of what we're trying to get at  
43 and being able to see, ultimately, what is affecting that and how  
44 that is ramified, that it branches out through not only the fish  
45 population, but also the communities that are dependent upon them.  
46 Can we go back to the fishing model? I prefer looking at the  
47 graph, myself.

48

1 I have in my notes that there was a question about effort, and I  
2 don't actually know what the question was, but how are we dealing  
3 with effort, but I thought effort was coming in from all the  
4 factors that we talked about in the socioeconomic and cultural  
5 drivers sub-model, in terms of -- We would have to go back to that  
6 model to see what the actual components were, but we talked a lot  
7 about that, but then there was a question of where does that link  
8 into here, and should there be a box that would say effort here,  
9 or are we having stuff that's going to actually just lead into  
10 gear and IUU fishing and things like that that will then work its  
11 way through the model, over to fishing mortality, which is where  
12 the effort would be, and I'm not sure we have that.

13  
14 **JASON COPE:** I think that's how we designed this, and so something  
15 like fishing gear, obviously, if you turn that into a management  
16 lever, that would affect effort, and the same with any management  
17 measures affecting fishing, like seasonality, access to fishing  
18 grounds, and all of these things are going to kind of tweak the  
19 effort going in, and I do recall, when we talked about the sub-  
20 model, that we spoke about that and having these exogenous factors  
21 outside the sub-model come in and be the things that change that,  
22 those things, which all of those then feed -- As we said, feed  
23 into either recreational and commercial, which then move over to  
24 fishing mortality, and so I think this was built with those  
25 specific effort levels via management in mind.

26  
27 **RICHARD APPELDOORN:** Right, and so it's sort of left then that the  
28 model is okay, pending how we -- When we start linking it with the  
29 sociocultural and economic driver model, if we see gaps that are  
30 not linking the way we think we were envisioning.

31  
32 **JASON COPE:** That's exactly right. That effort thing was going to  
33 be very dependent on our connections to the other sub-models, and  
34 so just being alert to making sure that those connections going  
35 into this model are fulfilled, and then I think we've done all  
36 right.

37  
38 **RICHARD APPELDOORN:** I have in my notes a question from the last  
39 meeting of what is the effect of the economy on effort, and so we  
40 need to, I guess, look at that when we get over to that sub-model,  
41 but, at this point, what I am hearing and seeing is that we don't  
42 need to make a major change to this, or even a subtle change to  
43 this, model, at the moment, in terms of a new box or some kind of  
44 connections or whatever. At some gross level, we've built in a  
45 way to handle those connections.

46  
47 Liajay, if you could put the matrix back up, and do we have any  
48 places there where we said there was uncertainty in the values?

1 No.  
2  
3 **JOE KIMMEL:** Is it possible to blow that up just a little bit more?  
4 I am having a hard time reading the blocks in the graphic.  
5  
6 **RICHARD APPELDOORN:** Remember, Joe, that you should be also able  
7 to blow it up. You have the plus and minus bar on the right-hand  
8 side someplace.  
9  
10 **GRACIELA GARCIA-MOLINER:** Everything that you see in red are  
11 changes that we have made from meeting to meeting, and so, if you  
12 accept the changes that have been made, the names in the columns  
13 and the rows, and the numbers that you have ascribed to the model,  
14 then we will put this into the almost final format. Richard, are  
15 you connected to the internet today, to see what we're projecting,  
16 or are you still --  
17  
18 **RICHARD APPELDOORN:** No, I can see.  
19  
20 **GRACIELA GARCIA-MOLINER:** Great. Thanks.  
21  
22 **RICHARD APPELDOORN:** They won't cut off the power until tomorrow  
23 for the storm. I am not seeing any blue here. Unless somebody  
24 wants to raise another issue, I would say we put this one away, as  
25 Graciela said, in the category of almost done. The almost done is  
26 when we have to start dealing with the linkages between sub-models,  
27 and, if we find problems there, then --  
28  
29 **GRACIELA GARCIA-MOLINER:** Correct.  
30  
31 **RICHARD APPELDOORN:** Another simple model we could look at might  
32 be the abiotic, and there were some questions there.  
33  
34 **GRACIELA GARCIA-MOLINER:** Do you want to see the graphic first?  
35  
36 **RICHARD APPELDOORN:** Yes, let's see the graphic first, just to get  
37 that pictorial view. The question I had about that -- There was  
38 a couple. There is oxygen, and there's a number of things here,  
39 obviously, that we don't have interconnections to it, and, to me,  
40 that's okay, because this was a sub-model that was lumping in other  
41 components, not all of which are interconnected, but it was a  
42 holding place where they would then connect into either the  
43 habitat, the marine components, or the fishing sub-models, I would  
44 assume.  
45  
46 All of these boxes, or most of these boxes anyway, would be  
47 expected to link into some other sub-model, and, if they don't,  
48 they don't really need to be there, and so ocean acidification

1 could affect habitat.  
2  
3 **VANCE VICENTE:** Richard, I have a comment on that one. Regarding  
4 the connection between circulation and major disturbances, there  
5 is only one arrow from major disturbances to circulation. However,  
6 circulation involves the dissipation of heat in the ocean and the  
7 direct effects on the formation of hurricanes and the like, and  
8 there should be an arrow from circulation to major disturbances.  
9  
10 **RICHARD APPELDOORN:** That would be basically temperature affecting  
11 circulation affecting major disturbances?  
12  
13 **VANCE VICENTE:** On that line, yes.  
14  
15 **RICHARD APPELDOORN:** Okay. I don't have a problem with that. This  
16 is a snapshot, and so we can't put the line in here, but, when we  
17 do move up to the actual matrix, we have to remember, or we could  
18 do it now.  
19  
20 **GRACIELA GARCIA-MOLINER:** Whatever you prefer. We can go back to  
21 the graphic or change it now, whichever you prefer. Let us know.  
22  
23 **RICHARD APPELDOORN:** The graphic is a snapshot, right?  
24  
25 **GRACIELA GARCIA-MOLINER:** That's correct, but we could pull up  
26 Mental Modeler and do the changes, but, if you change the matrix,  
27 during the break, we can bring you back the complete picture.  
28  
29 **RICHARD APPELDOORN:** Circulation, Row 2, is affecting something  
30 off to the right, major disturbances, Column C. Vance, do you  
31 want to put a value there?  
32  
33 **VANCE VICENTE:** Between a one and a two. It would be a positive  
34 number, and so not a blank, not a zero.  
35  
36 **RICHARD APPELDOORN:** Okay.  
37  
38 **VANCE VICENTE:** I remember we discussed this, and we looked at it  
39 a different way. We looked at how hurricanes, for example, changed  
40 local circulation patterns, by causing local upwelling, and I think  
41 Reni brought that up, and the formation of new islands and changes  
42 in the shoreline and along that line, and that's the way that we  
43 discussed it last, and I'm looking at it more on a mega-scale.  
44  
45 **KEVIN MCCARTHY:** Mr. Chairman, that's one of the issues maybe we're  
46 having, is that these boxes, these nodes, are -- Except in a couple  
47 of instances, they are pretty broad, and so we're clearly, perhaps,  
48 talking about a couple different things when we talk about

1 circulation, that we haven't -- Depending upon the course of the  
2 conversation, maybe we're talking about local circulation, and at  
3 other times, like now, as Vance says, we're -- He is thinking more  
4 in terms of larger-scale circulation, and so I'm wondering if we're  
5 not getting ourselves into trouble because we have got these things  
6 not particularly well defined. They are sort of -- Depending on  
7 the moment, they can mean different things. With circulation, for  
8 example, in any given --

9  
10 **VANCE VICENTE:** I think -- Sorry to interrupt, but I think that we  
11 will be in trouble if we don't find a better definition of the  
12 components within the conceptual model in general, and this is  
13 just a general comment, and we have been discussing this back and  
14 forth, and we can define them, and they can be broad, but they  
15 have to be well defined, and the broadness needs to be defined,  
16 and this is true for everything, all the boxes and all the  
17 components, and that's just my general comment, after looking at  
18 the different sub-models and looking at it from an outside,  
19 holistic point of view.

20  
21 Then, second, just in case I have to step out, and I have a problem  
22 with the weather and rescheduling all my diving activities, et  
23 cetera, boats, and my other general comment is that, when I worked  
24 at the Puerto Rico Nuclear Center and Center for Energy and  
25 Environmental Research, we were doing an ecosystem-type of a study  
26 of Guayanilla Bay, looking at every component, from mangrove to  
27 seagrass to plankton and heavy metals and the like, and things got  
28 complicated.

29  
30 The way we partially solved the problem is we contacted, or,  
31 actually, we hired people from outside to look and comment, and  
32 that brought me to think about the Institute of Ecology, and I was  
33 a research scientist for a while there, and now it's called the  
34 Institute of Ecology, and they have done this ecosystem approach,  
35 and they got a lot of funding from the NSF Ecosystem Branch, and  
36 they are specializing in looking at this ecosystem approach to  
37 ecology in general.

38  
39 Just as a suggestion, we might want to -- After we wrap this thing  
40 up, we might want to have an outside opinion, outside of NOAA and  
41 outside of councils and outside of everything, and see what they  
42 have come up with, in similar types of situations, and that's just  
43 a general suggestion, and those were my two major points, after  
44 looking at the conceptual model earlier this morning.

45  
46 **RICHARD APPELDOORN:** Vance, that's actually a nice idea. Going  
47 back to the issue, we did have that discussion about the definition  
48 of circulation before and what scale we were talking about, and we

1 do also have a direct link between temperature and major  
2 disturbances, and we gave it a three, the highest you can give it,  
3 and so that bypasses the mechanism going through circulation, and  
4 that's okay, and, if circulation is really referring to let's say  
5 another scale of things, then we're actually okay with this,  
6 because it's clear that we're lumping or simplifying or otherwise  
7 not putting in details about the actual mechanisms that these  
8 happen, that drive these things.

9  
10 As we discussed with looking at the population sizes, there is  
11 lots of internal models about how these drive the growth of  
12 populations and the growth of individuals, et cetera, that it's  
13 all lumped into a box that says forage fish or reef fish or  
14 whatever.

15  
16 I would argue that our linkage from temperature directly to major  
17 disturbances is strong, and, if that encompasses the effect that  
18 change that circulation might have, then we really don't need to  
19 do that. If you are arguing that there is something important  
20 that is fundamentally different from that, or not subsumed into  
21 that, then we need to deal with it.

22  
23 **VANCE VICENTE:** I had a different way of looking at it, but that's  
24 okay. We need to take into account the effect of temperature  
25 directly on major disturbances and the like, and so you may be  
26 right, just to keep things simple for the time being.

27  
28 **RICHARD APPELDOORN:** I find myself leaning more and more towards  
29 simplicity, as we make this thing more and more complex. It's one  
30 of the things that I was pushing a lot of blanks yesterday, and  
31 it's just the level of detail that I was thinking was not necessary  
32 to capture what we really needed to capture.

33  
34 **VANCE VICENTE:** In that case, I'm okay with it, with leaving a  
35 blank there.

36  
37 **RICHARD APPELDOORN:** Okay. Another criticism of abiotic, I think,  
38 is something that we have actually already discussed, that there  
39 was no link to anything affecting fish growth, but then the link  
40 is going to go to the boxes in the marine components, and we view  
41 those as black boxes of biomass affected by things other than --

42  
43 Well, in the boxes, everything other than fishing, basically, that  
44 affects population size, but temperature would go into those boxes,  
45 as would some of these other variables, and so that's where I think  
46 we just kind of agreed that a lot of these abiotic factors are  
47 going to go into those -- They will point to those boxes that  
48 represent the populations. With that, then I'm not sure that we

1 need to make any more changes. Are there any other comments from  
2 anybody?

3  
4 **MANDY KARNAUSKAS:** I am just watching the process, and it's coming  
5 along nicely, and I just wanted to make a comment on the issue of  
6 simplicity, and I think simplicity is a good goal, because,  
7 obviously, as you add more factors, you are getting factorially  
8 more complex, but I also think, to Kevin and Vance's point, I think  
9 it is important to try and define these nodes in terms of the  
10 attribute or the aspect of the node that's being affected,  
11 particularly if you're trying to score these, because, depending  
12 on the type of circulation that you're talking about, is this  
13 frequency of circulation, and what scale is it, and are you talking  
14 about deepwater or tidal circulation, and I think that might help  
15 simplify the scoring, if you could phrase these in terms of the  
16 attributes, because some of these are clearly phrased in terms of  
17 the attribute, like water temperature or sea-level rise.

18  
19 That's clear that you're talking about the rate or the particular  
20 aspect, but others of these are more general, and I think I see  
21 the conversations getting a little bit circular, because I think  
22 different folks have different ideas about what aspect of the node  
23 is being scored. That's just a general comment, if it's helpful.

24  
25 **RICHARD APPELDOORN:** That's a good point, and, at some point, we  
26 really need to look at definitions. Now, as far as I know, and,  
27 Graciela, correct me if I'm wrong, or Orian, but there are  
28 definitions for each of these boxes that have been developed coming  
29 out of the conversations and discussions that we've had, but we  
30 have not gone through that list and -- We have identified a few  
31 that we know there are problems with, but there's been basically  
32 kind of a general discussion that's been captured, and it's really  
33 hard to deal with all of this remotely with one screen, because we  
34 would like to see that, okay, here's the model, and here are all  
35 the definitions to that, and we can see them all at the same time,  
36 but that's not something you can do on a --

37  
38 **GRACIELA GARCIA-MOLINER:** There is a glossary that you should have  
39 received a while ago, and it needs to be updated, as the discussion  
40 has continued with the SSC, and so, I mean, at this point, we don't  
41 have everything from the last meeting, because there were some  
42 delays in getting everything together, but the glossary is going  
43 to be updated.

44  
45 You should have a copy, everyone, from one of the emails sent  
46 before, and do you want me to -- We could put it up, or we can  
47 hold off until we have it updated and available with all the  
48 matrices and everything else, but, pretty much, we have been

1 telling you. Every time you discuss something, we go back to the  
2 glossary, and, if there is something that you missed, we will tell  
3 you, but, so far, you have mentioned everything that is in that  
4 glossary of terms.

5

6 **KEVIN MCCARTHY:** Graciela, is it possible to re-send that?

7

8 **GRACIELA GARCIA-MOLINER:** Certainly.

9

10 **KEVIN MCCARTHY:** That would be terrific.

11

12 **RICHARD APPELDOORN:** Nevertheless, it's really difficult to deal  
13 with. It's one thing when we're present and we have the model up  
14 on the screen, and each one of us can call up the definitions and  
15 visually look back and forth. When you have one computer screen,  
16 that becomes exceedingly difficult, and, when you don't have a  
17 computer, and you're borrowing one, like I am, it's even more  
18 difficult, because most of the stuff that you have is on the hard  
19 drive in the computer that is going to be repaired, or was trying  
20 to be repaired.

21

22 I will put this to the committee, and do we want to go through the  
23 models like we've been doing, making note where we have some issues  
24 about the definitions of the boxes, and come back to those at a  
25 later time, or do we want to hash these things out right now, which  
26 would require the definitions to be brought up as they exist now  
27 in the glossary, and perhaps not containing the information that  
28 we had discussed in the past meeting, which we discussed a lot.  
29 Are there any comments?

30

31 **JUAN CRUZ-MOTTA:** I have a comment.

32

33 **RICHARD APPELDOORN:** Go ahead.

34

35 **JUAN CRUZ-MOTTA:** Perhaps the notes that you have made about things  
36 that we need to review could be looked at during the process of  
37 connecting the sub-models, and that's one thing, a suggestion, and  
38 the second thing is, when trying to connect the models, may I  
39 suggest starting from the general point of view, I mean starting  
40 with connecting the big boxes, and, then, after we do that, we  
41 look into the details of those big boxes, and the rationale behind  
42 this second suggestion is the very first reason that the council  
43 commissioned the SSC to do this work, and also the DAP, and it has  
44 to do with that Lenfest look, and I don't know if, Graciela, Liajay  
45 could put that up, but that's just to remind ourselves why the  
46 council asked us to do this modeling.

47

48 **GRACIELA GARCIA-MOLINER:** Liajay, I can share that screen, because

1 I have it here, if you want me to.

2

3 **LIAJAY RIVERA:** Sure.

4

5 **JUAN CRUZ-MOTTA:** Thank you. Basically, the council wants to  
6 develop this -- If you see Step 1, where are we now, the council  
7 wants to develop these conceptual models to know what the  
8 stakeholders believe is the system we're trying to manage, and so  
9 the first thing is general information, and then, for that first  
10 objective, with a broad model, only connecting the big boxes would  
11 be enough.

12

13 Then the second thing that the council wants is to select and  
14 calculate indicators, and that's the reason why we need the  
15 indicators, and so, basically, we need both things, a broad view,  
16 and so to see where are we standing and what do we have and what  
17 we want to manage, and, second, get into the details of the sub-  
18 models to select those indicators, and similarly for the potential  
19 threats.

20

21 With all that information, the next thing the council will do,  
22 based on the information that we provide them with these conceptual  
23 models, and also the DAP and any other conceptual model that the  
24 council might commission to do, then they are going to develop a  
25 series of objectives and goals, very, very similar -- Not similar,  
26 and it will be different, but following the same process that has  
27 been used in the past to develop the island-based management plans,  
28 the objectives for those plans.

29

30 With this long story, Rich, it's to suggest that we move into  
31 looking at connecting the sub-models, from a general point of view,  
32 and, after we do that, then perhaps we could go into the details,  
33 at which time I might have another suggestion of how to go into  
34 the details. Thank you.

35

36 **RICHARD APPELDOORN:** Thank you for those comments. They were good  
37 to remind us where we are and what we're trying to do. Obviously,  
38 connecting the sub-models is going to be interesting, but the way  
39 it's sort of structured is those sub-models almost connect, and,  
40 I mean, connecting sub-model to sub-model level I think is a fairly  
41 simple process, because we only have a dozen or whatever, fifteen,  
42 things, and they were created with an idea of how they were  
43 supposed to link together in the first place, and so I don't see  
44 that as something that's going to take us a lot of time.

45

46 I think the intermediate step that we talked about for the homework  
47 assignment is a way to start looking at the issue of how we're  
48 connecting these things sub-component to sub-component, or

1 component to component, across the sub-models. That's where we're  
2 going to identify -- If there are problems, that's where it's going  
3 to show up.

4  
5 **JUAN CRUZ-MOTTA:** Rich, you are totally right. I did a little  
6 exercise before doing this suggestion, and the connections of the  
7 general model, the broad model, is quite high, and the connections  
8 is the number of actual connections divided by the total possible  
9 connections, right, but not necessarily all the boxes are  
10 connected. That's one thing.

11  
12 The second thing is, doing this exercise, it will allow us to  
13 prioritize, and I will give an example, if that's okay. For  
14 example, we all agree that we're all doing this for the fishing  
15 component of the model, and so we could start by, for example,  
16 putting the fishing box in the middle, the first box, and then  
17 decide which is the most, or the two-most, or the three-most,  
18 important boxes that affect fishing, and I would mention one, for  
19 example, the socioeconomic, right, or perhaps the marine ecosystem  
20 components.

21  
22 Other boxes, for example the habitat, we could argue that will  
23 affect fishing, but through an indirect effect of the marine  
24 ecosystem components, and so that box wouldn't be important, and  
25 so I'm not saying this is true, what I'm saying, and people might  
26 disagree with this example, and this is just an example of how we  
27 could build this general model where not all boxes are directly  
28 connected, and you're right in the fact that they are all somehow  
29 connected, but that could be indirectly, but, directly, they are  
30 not all connected, one.

31  
32 Second, this exercise would allow us to prioritize, because I have  
33 the feeling that, in this four or five, or, if you decide to  
34 extend, six or seven, and I don't know, but this exercise, at least  
35 we will be focusing on the boxes that we believe are important,  
36 and, as said at the beginning, this is just only a suggestion for  
37 you and the committee. Thank you.

38  
39 **JORGE GARCIA-SAIS:** I pretty much agree with J.J.'s vision of this,  
40 but I would also like to add something that I expressed before,  
41 and that is not just to look for indicators, or I know that the  
42 word is catchy, and it's probably a good way of thinking about it,  
43 but, more than an indicator, I would suggest looking for drivers,  
44 for drivers that we can describe with quantitative measures.

45  
46 The social box, for example, the socioeconomic box, for example,  
47 I think it's excellent, and it's probably the most important aspect  
48 of this entire exercise, if we test, perhaps, the relationship

1 between socioeconomics and fisheries, because we have gone through  
2 this for the last many years that we've been doing this,  
3 particularly since the fishermen, in many instances, have  
4 expressed that their fisheries are actually demand-driven, and so,  
5 this time, and this time and setup that we have right now, with  
6 the pandemic, they all push toward essentially a baseline, a new  
7 baseline, of demand.

8  
9 Our demand probably has not been as low as it has ever been, and  
10 so we can -- The entire pandemic situation has given us an  
11 extraordinary good tool, good setup, and a baseline for us to  
12 depart in making these connections, but, for the drivers, we need  
13 to establish how are we going to quantify these drivers and depart  
14 from here.

15  
16 We are not going to be able to have the answers right away, but we  
17 do have a baseline now to depart with, and there are some other  
18 processes that are going on that are extremely important that we  
19 catch them now. For example, just how it was mentioned, the  
20 habitat, well, we have a series of problems with the habitat, with  
21 the coral reef habitat right now, that may be the lowest quality  
22 of habitat that we have had in the history of coral reefs, at least  
23 in the era that we have been living at, with all the coral diseases  
24 and the continuous bleaching, and coral cover is probably as low  
25 as we have seen it in our lifetimes.

26  
27 We need to catch these baselines now, before they change, and,  
28 before doing that, we need quantitative drivers that we can set up  
29 and see how changes -- How one box, or one compartment, changes in  
30 relation to others, and I believe that J.J.'s vision of having  
31 fishing, or perhaps landings, at the Center of everything might  
32 give us a good tool for where to depart, because landings have a  
33 quantitative measure, and there are other things that affect  
34 landings that we can also start to quantify from these boxes.

35  
36 In fact, I believe that this approach is the best approach, the  
37 best potential approach, that I have seen since I am a member of  
38 this committee, because we can actually not only -- We don't have  
39 to rely upon a lot of assumptions, of model assumptions and all  
40 things that are sometimes, from my standpoint, esoteric. I mean,  
41 they depend on so many questions that don't have any solid grounds  
42 that, in my opinion, the validity of those are highly questionable,  
43 but, in this process, the chance to make some very simple  
44 relationships and go with them.

45  
46 For example, how does landings relate to number of ships arriving  
47 to the islands and number of passengers and number of hotel rooms  
48 and number of -- If it's demand driven, then we need a unit that

1 qualifies demand and a unit that qualifies landings, and so, from  
2 that very basic, simple step, we can then start going around and  
3 looking for all the main drivers, or indicators, if you want, from  
4 all these boxes and try making the most strong and significant  
5 relationships, or connections.

6  
7 We can start building up a working model, in which we say, okay,  
8 well, the landings were so much, and let's see what are the  
9 variables, or the drivers, that are associated with that change in  
10 landings, and then, instead of looking at certain management  
11 options, we look at other management options, because the  
12 management options will probably be related to those drivers, and  
13 so that is kind of like I see it, and, obviously, I don't see it  
14 completely, and what I know is that there are some unknowns that  
15 are really, really important that we have not considered and that  
16 we should at least recognize them, so that we can direct some  
17 research efforts towards them.

18  
19 For example, the recruitment dynamics of all these fishes of  
20 commercial value that we have been to trying to establish, and we  
21 know we are really -- We know that they are really in trouble, for  
22 example the large demersal predators, groupers, for example, and  
23 what's going on with the groupers. We have so many closed areas,  
24 and we have very few information about the replenishment of their  
25 populations, and why are they not being replenished?

26  
27 What do we know about their recruitment dynamics and the larval  
28 stages? Where are they being dispersed, where are they being  
29 distributed? All of these things are unknowns that are critically  
30 important to answer the questions about replenishment of these  
31 populations.

32  
33 What is driving coral disease? Why is coral disease being now so  
34 widespread? How are they affecting corals, and how is the habitat,  
35 at the end, going to be affecting our fish stocks? These are the  
36 things that are in my mind right now, because I am diving almost  
37 every day, from three feet to 165 feet, and I am watching changes  
38 that I have never seen, things that are changing that are new  
39 changes, things that I have not seen before.

40  
41 Looking at it from that perspective, I think that we have a very,  
42 very important and very useful tool here with these things, but we  
43 have to go a little bit beyond the conceptual stage and start  
44 looking at drivers, or indicators, and things that we can put  
45 numbers in, and know that they will vary in time and in place and  
46 for the different islands, and start giving them the main focus of  
47 attention, so that we can start then making connections between  
48 the boxes. That's all.

1  
2 **RICHARD APPELDOORN:** Okay. Thank you, Reni. Yesterday morning,  
3 before you were able to log on, I had actually mentioned to the  
4 committee, reminded them, of the presentation that you had given  
5 at the last meeting, and also the one that Vance had given at the  
6 last meeting, that we should keep on eye both on the drivers and  
7 also on the data sources and the fact that there are nuances  
8 between these paths that are important.

9  
10 That was one of the things that Vance was pointing out as well,  
11 and it's really tough to grab all of this into something that's  
12 supposed to be conceptual and fairly coarse-scale, but you're  
13 right, in that we want to capture, as much as we can, so that we  
14 can focus on the things that are actually affecting the fisheries,  
15 of which there are both natural and anthropogenic factors involved,  
16 and so thank you for that.

17  
18 I am suggesting that we move on to another model, because I don't  
19 think we were having any further discussion, other than  
20 identifying, again, the needs that we will at some point have to  
21 converge on definitions of our boxes.

22  
23 My recommendation would be to have the discussions from the last  
24 meeting and this meeting incorporated into the current definitions  
25 and then we review those.

26  
27 **GRACIELA GARCIA-MOLINER:** Yes, we need to include everything that  
28 has been discussed to date and update that, and I think I might  
29 have to drive now, and so where do you want to go? We will do the  
30 glossary as soon as we have all the notes from Sarah and Orian and  
31 Liajay and myself, and we do have the verbatim minutes coming in,  
32 and I believe we got the second day of the last meeting today, and  
33 so, yes, we will do that.

34  
35 **RICHARD APPELDOORN:** Okay, and, in that, questions that were left  
36 open would be identified, for us to go back to?

37  
38 **GRACIELA GARCIA-MOLINER:** Yes, we can also do that. I think that  
39 we've pretty much covered everything that was left open, especially  
40 for the socioeconomic sub-model. That was the one that had the  
41 most open questions, but, for everything else, we can review  
42 everything up-to-date and bring you back any open questions that  
43 we can find.

44  
45 **RICHARD APPELDOORN:** Okay. Another simple model we might try to  
46 get out of the way soon I think is the habitat model.

47  
48 **GRACIELA GARCIA-MOLINER:** Can you see my screen?

1  
2 **RICHARD APPELDOORN:** If you're moving your cursor around, then,  
3 yes, I can see your screen. It's very small though.  
4  
5 **GRACIELA GARCIA-MOLINER:** Okay, and so that's habitat.  
6  
7 **RICHARD APPELDOORN:** Can you actually put the bottom of the model  
8 at the bottom of the page? We might get the model and the matrix  
9 on the same view. Can you move the model up?  
10  
11 **GRACIELA GARCIA-MOLINER:** Okay.  
12  
13 **RICHARD APPELDOORN:** This is how it looks, and there are no --  
14 I've got to tell you that I have trouble differentiating black and  
15 blue, but I don't see anything that looks blue here.  
16  
17 **GRACIELA GARCIA-MOLINER:** There wasn't anything blue on this one.  
18  
19 **RICHARD APPELDOORN:** So, again, there will be questions about how  
20 this is going to link into, for the most part, I assume, into the  
21 marine components thing, but there will also be things coming out  
22 of competing uses, for example, that probably affect habitats, and  
23 habitat might link into fishing into spatial distribution, but  
24 that's -- These are all questions that will come up when we start  
25 linking across sub-models, but, within this, is this is where we  
26 were, and I don't recall any controversies here in what we had  
27 done.  
28  
29 **GRACIELA GARCIA-MOLINER:** I don't either, and I don't see any --  
30  
31 **RICHARD APPELDOORN:** I notice that all the relationships are  
32 positive. You have an asterisk under "habitats", and is that --  
33 It was like other habitats, and then there's a -- You have an  
34 asterisk there, and there is a meaning for that asterisk?  
35  
36 **GRACIELA GARCIA-MOLINER:** Let me look through the notes. It was  
37 all of the -- You had, at that point, put together all of the other  
38 habitats that are not present in the table, and so algal turfs and  
39 everything that is not here.  
40  
41 **JASON COPE:** I have a question about the habitats. It does seem,  
42 as Rich just mentioned, that everything is positive, and there are  
43 -- It seems to be there are states of nature of the habitat that  
44 aren't going to be beneficial to everything, and I don't know.  
45  
46 Like, if you lost all the herbivores, I am assuming a different  
47 sort of habitat would place, and that wouldn't be as beneficial to  
48 the other things that are around, and is that getting mixed up in

1 the other habitats, to where a one is actually reflective of a  
2 balancing between negatives and positives, and therefore kind of  
3 downgrading to one, or are all of those things in other habitats  
4 all just lightly positive, and therefore they add up to one?

5  
6 If that's the case, maybe it's worth having a couple of different  
7 other habitats, and so a mix, but maybe some that are more  
8 negative-contributing and other ones that are more positive-  
9 contributing.

10  
11 **VANCE VICENTE:** Richard, I don't recall well, but macropores and  
12 seagrass were like a positive-two, and I believe that I mentioned  
13 that earlier study that demonstrated that macropores specifically  
14 are the borderline between the shore and the water column, and  
15 they have a negative effect on the seagrass beds, because of the  
16 shading caused by the canopy of specifically the red mangrove  
17 forests, and I don't recall why having a positive-two comes in  
18 there, and I may have forgotten. Do you recall?

19  
20 **RICHARD APPELDOORN:** Here's what I would say. When you're talking  
21 about the shading of mangroves, the spatial scale of that relative  
22 to say the extent of the spatial scale of seagrass beds is trivial.  
23 Now, this is not to say that there is not important biological --  
24 It's basically a halo effect, and there might be biological  
25 processes that are important in that.

26  
27 For instance, if there's a gap in coverage, that would leave small  
28 juveniles open to predation as they cross the mangroves, but I  
29 think this is all just subsumed into whatever your seagrass bed  
30 extent is. The shading of that by mangroves, just on that larger  
31 scale, just is trivial.

32  
33 Again, for all of these things, we're lumping a lot of processes  
34 into these boxes, and that's just the nature of the problem we're  
35 dealing with. I was trying to think of -- Somebody commented about  
36 parrotfish and coral reefs, and, if you degraded coral reefs, are  
37 you then -- That would say that you are reducing your pelagic  
38 habitat, or you're basically reducing everything across the board,  
39 because you are having a degraded coral reef of some sort, and a  
40 lot of these are driven by the connectivity between these different  
41 habitats.

42  
43 If you degrade a coral reef, you don't necessarily degrade say a  
44 seagrass bed, per se, although the process that's leading to  
45 degradation could affect both, but, if you were just to degrade a  
46 coral reef environment, you would be lessening the connectivity  
47 across those, and that's where those impacts are being picked up,  
48 and so I think the whole matrix is largely driven by connectivity

1 issues.  
2  
3 **VANCE VICENTE:** I recall that my comment was very marginal, because  
4 we are indeed talking about a very small spatial scale effect,  
5 negative effect, on macropores and seagrass, but the value of two  
6 is what I don't remember, why we gave it a high rank, and I don't  
7 remember the rationale, specifically the rationale of mangrove  
8 forests enhancing or having a positive effect of two on seagrass  
9 beds, and I don't recall. I'm not saying that it's not there, but  
10 I just don't remember.  
11  
12 **RICHARD APPELDOORN:** Well, in my mind, there was a substantial  
13 degree of connectivity going on between mangroves and seagrass,  
14 mostly mediated by movements of organisms, be they newly settled  
15 things, be it feeding migrations, ontogenetic migrations.  
16  
17 **VANCE VICENTE:** Okay. I remember, Richard. I remember. Thank  
18 you.  
19  
20 **RICHARD APPELDOORN:** So can we put this one sort of to maybe  
21 siesta, but not totally asleep, and go on to something like the  
22 marine components model, sub-model? Right away, I'm going to ask,  
23 before you do anything else, is there any blue there? Like I said,  
24 I have trouble distinguishing the black and the deep blue.  
25  
26 **GRACIELA GARCIA-MOLINER:** No. These are all black, and the red  
27 just means that we've changed it from the last May meeting, and so  
28 I don't see anything blue. Do you want the picture before the  
29 matrix?  
30  
31 **RICHARD APPELDOORN:** Well, I like pictures. When they start  
32 getting complicated, they're not useful, but --  
33  
34 **GRACIELA GARCIA-MOLINER:** So expand the matrix or just the picture?  
35  
36 **RICHARD APPELDOORN:** Well, expand the picture for a minute and let  
37 everybody take a look at it, but then we will have to go to the  
38 matrix, if we want to discuss it. Okay, folks. That's the model.  
39 Blue lines represent a positive association, and red lines  
40 represent a negative relationship. I think there is variability  
41 in the thickness of these lines that represent the strengths.  
42  
43 **GRACIELA GARCIA-MOLINER:** That is correct.  
44  
45 **RICHARD APPELDOORN:** What we have said, in our earlier discussions  
46 today, was that these boxes are basically representing not only  
47 biomass, but all the -- Let's say the biological processes that  
48 affect population size, and so that's going to affect things like

1 growth and natural mortality and things like that, and there will  
2 be factors that feed into these that affect growth and other  
3 factors affecting natural mortality and whatnot, and so just keep  
4 that in mind, but the boxes themselves are very broad, and they  
5 encompass a tremendous amount of variability, because,  
6 essentially, life history for a lot of these organisms is very  
7 variable across species.

8  
9 The one question that I had here, from my notes before, was the  
10 definition of HMS, and the issue is that the council -- Our initial  
11 thinking was, well, the council has to deal with HMS, and so we  
12 actually should have an HMS block here, because it is affected in  
13 part of the ecosystem, and so there it is, but it turns out that,  
14 in an ecological sense, the definition of HMS makes little  
15 ecological sense, and so the question is do we -- Does this  
16 represent an exact representation of the definition of HMS within  
17 NOAA, or does it represent truly HMS species?

18  
19 Maybe the poster-child for this question is the nurse shark, which  
20 is in HMS, but, ecologically, we would not consider that HMS, and  
21 I would consider, ecologically, yes, we're talking about the  
22 oceanic pelagics, and we're also talking, however, about dolphin  
23 and wahoo and maybe things like some of the mackerels as well would  
24 be in HMS, but something like a nurse shark, or even some of the  
25 reef sharks and whatnot, would not be highly migratory, even though  
26 they're big and they do move around.

27  
28 That's the question for the committee, is what is our definition  
29 for HMS, and, personally, I lean towards that it should be the  
30 ecological definition of HMS and not the straight NOAA definition  
31 of HMS.

32  
33 **VANCE VICENTE:** Regarding the definition, HMS stands for Her  
34 Majesty's Ship, but, other than that, regarding sharks, the nurse  
35 shark, I don't believe it's a highly migratory species, and it  
36 does have a very localized ecological impact.

37  
38 **KEVIN MCCARTHY:** Rich, I would agree with you that we don't want  
39 to get -- I think we're trying to have a conceptual model of an  
40 ecological system, where we don't need to get caught up in the  
41 regulatory definitions, and maybe we want to stick a different  
42 name on that, so it avoids confusion, but I agree with you.

43  
44 **RICHARD APPELDOORN:** Right, and there's a comment in the chat from  
45 Michelle that gives an example of Caribbean reef sharks are  
46 prohibited under the HMS and not nurse sharks, and so the  
47 regulatory definition is different from ecological. That's just  
48 reiterating the issue here. Anybody else? Do want to slightly

1 rename this to like ecological HMS or something like that?  
2

3 **JOE KIMMEL:** Rich, I agree with Kevin and the comment in the chat  
4 group, because, to me, HMS species have been driven into my head  
5 so much over the years that I think we need to change the name of  
6 the category that we're using, and maybe the ecological HMS, or  
7 HMS eco or whatever you want to call it, and then write a definition  
8 for it, and that might serve to help us finish looking at this  
9 model.

10  
11 **RICHARD APPELDOORN:** We have two more comments again from Michelle.  
12 Reef fishes could be grouped with coastal pelagics if the  
13 interactions were different for habitats that they occupy, and  
14 Marcos Hanke followed that up by saying that, based on ecological  
15 function, all sharks, rays, tunas, billfishes, coastal pelagics -  
16 - I am not sure that I'm getting all the whole chat here, because  
17 it seems to end abruptly. Marcos, I don't know if you want to get  
18 on and --

19  
20 **MARCOS HANKE:** Thank you, Richard. I think, by using only HMS,  
21 like the regulatory statement that HMS makes and the list of  
22 species that they have, we are eliminating some of the species  
23 that should be included there, because of the function that they  
24 perform on the habitat and interaction with the other resources  
25 and the way they are -- I think we should be more inclusive on  
26 that box, by changing the name or just including the things that  
27 otherwise are going to be excluded if we just use "HMS". Thank  
28 you.

29  
30 **RICHARD APPELDOORN:** I think your comment and Michelle's are well  
31 taken. We do have coastal pelagics, and some things would fall  
32 into that, and I'm not sure that I want to get into exact  
33 definitions of where like every species falls into what box, and  
34 that gets fairly complicated, and so can we come up with a  
35 different name, other than HMS?  
36

37 **GRACIELA GARCIA-MOLINER:** Richard, you had -- Under coastal  
38 pelagics, you had defined the small tuna, mackerels, dolphin, and  
39 wahoo. Under HMS, the highly migratory species, managed tunas,  
40 sharks, swordfish, and billfish. That had been in your glossary,  
41 but, again, you can change it, and something like all HMS species  
42 will include anything that is not regulated, and so let me know  
43 what you want to do.  
44

45 **RICHARD APPELDOORN:** Well, the issue was that sharks thing, and  
46 some of the rays, and, well, the rays certainly fall into that.  
47 They are clearly just not highly migratory, and they should not,  
48 ecologically, be considered a highly migratory species. Some of

1 them you could actually consider reef fish species, and others  
2 coastal pelagics, and like reef sharks would be like coastal  
3 pelagics, but some of the rays -- I'm not sure exactly where they  
4 fit, but they're not actually on the reefs so much, but they're a  
5 reef species, in terms of being associated with that larger  
6 grouping of things that use the reef environment.

7  
8 I think I just want to redefine this group to take out those sharks  
9 and rays that are not like the really highly migratory species,  
10 and we still have problems, because I have no problem having  
11 dolphin and wahoo in coastal pelagics, but there is highly  
12 migratory, as a lot of big tunas and billfishes, and so, again,  
13 we're trying to put things in the boxes, and nature doesn't like  
14 to be put into boxes, and so it gets messy. There was a comment  
15 from somebody.

16  
17 **KEVIN MCCARTHY:** I am just looking at the other names we've used  
18 here, and so we've used things like inshore and coastal and  
19 offshore, and we can do something like offshore pelagics, just to  
20 get away from the HMS name.

21  
22 **RICHARD APPELDOORN:** I like that idea. Anybody else?

23  
24 **JASON COPE:** I like it, too.

25  
26 **RICHARD APPELDOORN:** Do you want to stick a "BF" in front of that  
27 or -- Only kidding.

28  
29 **GRACIELA GARCIA-MOLINER:** Okay. I cannot change the Mental Modeler  
30 right now, but we'll make that change. Anything else?

31  
32 **RICHARD APPELDOORN:** I was going to ask you to read Mandy's  
33 comments, since I'm having some difficulty.

34  
35 **GRACIELA GARCIA-MOLINER:** Mandy says what attributes are being  
36 captured here? Is it abundance, mortality, distributions?  
37 Earlier, it was noted that these nodes were encompassing many  
38 different processes, but the scoring will be affected by the  
39 particular attribute. For example, if birds are eating forage  
40 species, bird abundance will affect forage abundance as a negative  
41 link, but bird mortality affecting forage mortality would be a  
42 negative link.

43  
44 **MANDY KARNAUSKAS:** I was just saying that there is -- Right now,  
45 there is positive and negative scores, and I was just noting that,  
46 depending on what particular attribute that the nodes were  
47 capturing and the process that is trying to be indicated, the  
48 arrows would be flipped, or the positives and negatives would be

1 flipped, depending on if you're talking about abundance or  
2 mortality or some other aspects of the population.

3  
4 **RICHARD APPELDOORN:** Can we put the matrix up, because that might  
5 be easier to actually address looking at that. What we had said  
6 earlier, Mandy, was that each of these boxes basically is a biomass  
7 box and that a lot of the processes, like growth, that affect  
8 biomass are embedded in the box, and the connections are pretty  
9 much trophic.

10  
11 **MANDY KARNAUSKAS:** Okay.

12  
13 **RICHARD APPELDOORN:** Does that affect what you were -- Because it  
14 sounded like you had some questions about how things were  
15 connected, and, if we're not capturing that properly, please let  
16 us know.

17  
18 **MANDY KARNAUSKAS:** That helps give meaning to the scores, and I'm  
19 sorry if I missed that, and I stepped away for a minute, and so  
20 that makes sense, that these are abundances, and the nodes are  
21 abundances, and the connections are trophic, and then it's clear  
22 what the meaning of those are. Thanks.

23  
24 **RICHARD APPELDOORN:** Okay. Any other issues and comments for this?  
25 I will make a comment from Julian, that tropical storm warnings  
26 have now been posted in the Virgin Islands, and so, everybody who  
27 needs to deal with that, please be advised.

28  
29 Since I don't have a view of this, is there another simple sub-  
30 model that we can look at quickly? Otherwise, this might be a  
31 good time to break for lunch, even though it's a little before  
32 twelve.

33  
34 **GRACIELA GARCIA-MOLINER:** You have the land-based uses and the  
35 water quality that both had provided -- Actually, it was a simpler  
36 view, but you have not decided what to do with that, but it would  
37 be nice to break for lunch.

38  
39 **RICHARD APPELDOORN:** All right, because I think there's going to  
40 be some discussion on those, and so, rather than have that split,  
41 why don't we break for lunch and meet back at 1:00.

42  
43 (Whereupon, the meeting recessed for lunch on July 28, 2020.)

44  
45 - - -  
46  
47 July 28, 2020

2  
3 - - -  
4

5 The Scientific and Statistical Committee of the Caribbean Fishery  
6 Management Council reconvened via webinar on Tuesday, July 28,  
7 2020, and was called to order by Chairman Richard Appeldoorn.  
8

9 **RICHARD APPELDOORN:** Okay. Welcome back, everybody. It's 1:05,  
10 and we're going into the afternoon of our second and last day of  
11 this meeting. What we're doing, if you've forgotten already, is  
12 going through the various models and trying to clean up issues, be  
13 they scores or definitions or missing components or whatever.  
14

15 Since we have about four hours, I would like to tackle I think one  
16 of the most important ones, and that's the socioeconomic and  
17 cultural drivers, because that's probably going to take us a while.  
18 Just for grins, put up the figure for a minute, and I think that's  
19 going to be split, and it's not going to help us too much, but  
20 just to let everybody see it.  
21

22 **LIAJAY RIVERA:** Should I zoom in a little bit more, or is this  
23 okay?  
24

25 **RICHARD APPELDOORN:** Well, I think that's okay, but I have plenty  
26 of room on the top, and I can't see the bottom, and so if you move  
27 it appropriately. Okay, folks. There it is, and it looks like we  
28 only have two negative connections there, or maybe three. Unless  
29 anybody has a comment on this view, I think we could go to the  
30 matrix.  
31

32 **GRACIELA GARCIA-MOLINER:** I don't know if you see them, but there  
33 are quite a number of blue ones on this one. There are quite a  
34 number of pending issues.  
35

36 **TARSILA SEARA:** A lot of the blue numbers indicate those  
37 complicated complex relationships that I'm not sure how we're going  
38 to deal with them, because it will be very difficult, for some of  
39 these, for us to attribute either positive or negative signs to,  
40 because a lot of these boxes are -- Like, in some of the other  
41 sub-models, they are very complex, and there's a lot that's going  
42 into these boxes that are kind of a catchall for important aspects,  
43 but, if we were to sort of open up these boxes, we would be able  
44 to make more of these sort of nuanced decisions, in terms of  
45 direction and in sign, but, I think that, because they're so  
46 complex, we're probably going to have to think of a different way  
47 to deal with these.  
48

1 I don't know if the building of the conceptual model will allow us  
2 to do something like that, that would sort of characterize these  
3 relationships as something other than positive or negative,  
4 because, for instance, just to give an example, if you're looking  
5 at cultural preferences and norms and how it affects market demand,  
6 it becomes really difficult to think in terms of negative or  
7 positive impacts, because, if we look at a specific example, or a  
8 specific case, we may be able to do it, but, as it is, this sort  
9 of broad concept, it would be very difficult to make a decision.

10  
11 **VANCE VICENTE:** I think the problem is that we have a lack of  
12 expertise in this field, and maybe that whole block should be  
13 revisited at some other time, and, for the time being, simply  
14 define it as much as possible, but we definitely -- I mean, all  
15 that blue means that we're don't know what we're talking about.

16  
17 **TARSILA SEARA:** That's not necessarily the case, that we don't  
18 know. I mean, there's a lot, and we can go on and on, and, I mean,  
19 we could talk all day about how cultural preferences and norms  
20 will impact market demand in all these different ways, and there  
21 is a lot of literature, and there's a lot of evidence, even from  
22 just people sitting here, but we won't be able to characterize  
23 them one way or another, because there's going to be all these  
24 specific cases where it's going to affect one way and other cases  
25 where it's going to affect it in a different, and potentially  
26 opposite, way, and so that's the issue here, is that they are  
27 extremely complex and difficult to characterize.

28  
29 Unless we start to look at these specific examples, my thinking is  
30 that we won't really be able to do it, and we would have to think  
31 of a different way to deal with these relationships that are not  
32 necessarily linear, and I don't know if that's the best term.

33  
34 **WALTER KEITHLY:** I think the linear component -- I agree with what  
35 has just been said, but I think the linear component itself is one  
36 of the limitations of this model. At certain levels, and I'm just  
37 throwing out something that -- Population size, and that's just  
38 one that I'm thinking of, you may have a positive relationship,  
39 and then, at another level of the population -- This is not the  
40 best example, I can see, but you may have a negative relationship,  
41 and so the assumption of linearity is probably very problematic,  
42 on many of these factors, and it's similar to what we had talked  
43 about in some of the other sub-models that we developed.

44  
45 **RICHARD APPELDOORN:** Well, I am going to ask two things, one to  
46 Liajay, that she had put the entire matrix on the screen. You can  
47 certainly collapse a lot of the row width, and so go ahead and do  
48 that, and so we can see the whole thing.

1  
2 The second thing is I'm going to ask J.J. to comment, and he's had  
3 a lot of modeling experience, and I know he runs into this  
4 situation, where you're dealing with linear models, but you have  
5 something that doesn't behave that way, and is there another way  
6 to look at that?

7  
8 **JUAN CRUZ-MOTTA:** Thank you, Rich. The issue, more than the  
9 linearity, because most of the things that we have looked at in  
10 any sub-model, and I would say more than 90 percent are not linear.  
11 The issue here is that each one of those items is multivariate,  
12 and you can describe each one of those lines, or columns, using  
13 multiple variables, and Reni said that, and Mandy said that, and  
14 I think almost everybody has mentioned that, and so, basically,  
15 what you have is one of those little boxes that has a multivariate  
16 characteristic, and we don't put much emphasis on the symbol,  
17 because, in a multivariate space, there is not a positive or  
18 negative direction.

19  
20 When you have only one variable, it's going up or it's going down,  
21 but, in a multivariate space, there is no direction, and so,  
22 especially when you're using a non-metric space, and like it would  
23 be, ideally, using these cases, and so my suggestion here is, even  
24 though we have put a lot of effort in other sub-models to go  
25 positive or negative, here we just focus on whether the  
26 relationship is strong or weak, regardless of whether it's a  
27 positive or negative relationship. This is just a suggestion, and  
28 I don't know what you, Rich, and the committee think about it.  
29 Thank you.

30  
31 **TARSILA SEARA:** Well, I absolutely agree with that, because that's  
32 what I was thinking, that we would have to think of a different  
33 way to deal with it, and is it possible to have a visual way to  
34 deal with it, for instance a dashed line or something like that,  
35 or a different color, in the model itself?

36  
37 **GRACIELA GARCIA-MOLINER:** Do you mean a Mental Modeler to have  
38 different dashed lines and things like that to represent like these  
39 blue colors, for example?

40  
41 **TARSILA SEARA:** Yes.

42  
43 **GRACIELA GARCIA-MOLINER:** I don't know if in Mental Modeler we can  
44 do that, but I'm sure that there is another visual software that  
45 could do that.

46  
47 **RICHARD APPELDOORN:** Well, you have red and blue lines in the  
48 images, which I assume came out of Mental Modeler, and you can't

1 add a third color, or you can't link that to the matrix to have it  
2 automatic? Is that the issue?  
3  
4 **GRACIELA GARCIA-MOLINER:** Okay. Let's see. Liajay, do you have  
5 Mental Modeler open, so that we can -- I don't think we have tried  
6 three colors. Maybe the third color available is black.  
7  
8 **SARAH STEPHENSON:** You pretty much are limited to -- If it's  
9 positive, it's going to be the blue color, and, if it's negative,  
10 it's going to be the red, and there really isn't another option.  
11  
12 **ORIAN TZADIK:** There is the black lines we've seen, which is when  
13 you don't have a value, and then the only other option would be  
14 there is a way to kind of mess with the code that creates all this  
15 stuff, and we could try that, and it's not something simple.  
16  
17 **GRACIELA GARCIA-MOLINER:** The other thing that we could do is to  
18 actually request help from the Science Center, for example, to see  
19 if there is any other visualization software that would take the  
20 matrix that's been created for this over to that software, and so  
21 that's -- Let me see if I have anyone online.  
22  
23 **SARAH STEPHENSON:** I don't know if you remember, but Adyan used a  
24 different software package to help develop the conceptual models  
25 that the DAPs did early on, and it's not as simple as this, but  
26 the matrix behind it -- It was just a hand-drawn, and so it would  
27 be like doing it in PowerPoint, but it did have more options, and  
28 it make a prettier model than what you can do in PowerPoint,  
29 because you can bend the lines and stuff.  
30  
31 **GRACIELA GARCIA-MOLINER:** It's iDraw, and so it's like making a  
32 PowerPoint presentation type of slide, but, if anyone has any other  
33 ideas, but there shouldn't be a problem in visualizing it any other  
34 way. I mean, we can do the iDraw, and we won't be able to do it  
35 right now, I don't think, but I will send that email to Adyan and  
36 see what she comes up with. Do you want an answer right now?  
37  
38 **RICHARD APPELDOORN:** Not necessarily, but I'm just thinking about  
39 what do we do next. That is one, in terms of trying to visualize  
40 it in the diagram, but, if we go back to the matrix, we still need  
41 to deal with that, but I don't know if the blue color is getting  
42 us there.  
43  
44 **JUAN CRUZ-MOTTA:** Would it be possible to use a third color, like  
45 yellow, like in addition to the ones we have been using?  
46  
47 **GRACIELA GARCIA-MOLINER:** In the matrix, yes. In the matrix, you  
48 can do whatever you want.

1  
2 **RICHARD APPELDOORN:** I was thinking of actually -- Instead of  
3 playing with the color of the number, play with the color of the  
4 box for those things that we're treating as absolute value. That  
5 would at least make it easier, for the person who is going to do  
6 hand alterations, to know to put a dashed line or something like  
7 that, if you see a blue box, for example. Tarsila, was it your  
8 understanding that basically all the blues are these multivariate,  
9 non-linear types of problems?

10  
11 **TARSILA SEARA:** Yes, that's right, and I'm just -- In looking at  
12 it, I think maybe one of the -- I think, for seafood imports and  
13 exports, I think the issue with those relationships is that we  
14 have imports and exports in the same box, and so they are sort of  
15 moving things in opposite directions in the same box, and so I  
16 don't know if that's something that it makes sense -- Maybe that's  
17 a question for Walter, if it would make more sense to have them  
18 separate, if that could maybe solve that, but I'm not sure, but I  
19 think, for all the other ones, it is just the characteristic, the  
20 multivariate characteristic, of the boxes.

21  
22 I mean, some of these could really unfold into many, many different  
23 variables, but that's just a question there for imports and  
24 exports, and I don't know if that would make sense, if it would  
25 simplify things or not, but that could maybe help with those blue  
26 numbers, and what do you think?

27  
28 **WALTER KEITHLY:** I am looking for the imports and exports. Is it  
29 farther down on the screen?

30  
31 **RICHARD APPELDOORN:** It's Row 5.

32  
33 **WALTER KEITHLY:** Okay. Can we scroll? I can't see the top line.  
34 It's something to market demand. An increase in imports, holding  
35 everything else constant, will lead to a decrease -- Again, how is  
36 market demand defined? Is it local? An increase in imports will  
37 lead to a decrease in demand for the locally-produced product, and  
38 an increase in exports would lead to the exact opposite, an  
39 increased market demand for locally-produced product, and so, if  
40 I had to take a guess, each of these would have similar magnitudes,  
41 but in the opposite direction, again, that being imports versus  
42 exports.

43  
44 It kind of goes back to, if you want to think about it from a pure  
45 economic perspective, and, again, this is where we were getting  
46 hung up a little bit yesterday, and it's the market demand that  
47 will establish -- If that's local market demand, that local market  
48 demand will establish the need for imports and not vice versa,

1 generally, and the same thing with exports. If you have a very  
2 strong local demand for the product, then you will be consuming it  
3 domestically, purchasing it domestically, rather than exporting  
4 it.

5  
6 **GRACIELA GARCIA-MOLINER:** Walter, we have a comment on the chat  
7 from Michelle that there is not much export of seafood, or any  
8 other products, really, here in Puerto Rico.

9  
10 **WALTER KEITHLY:** Yes, and we talked about that at one of the  
11 previous meetings. You do have exports from St. Croix, or you  
12 did, I recall, on queen conch, at one point in time and so forth,  
13 and, if there is no exports in Puerto Rico, you can just do away  
14 with the -- Or if they're very limited, you can probably take out  
15 exports altogether. Now, what that is saying is that your domestic  
16 demand is large enough that the product being harvested commands  
17 a high enough price that there would be no need to export the  
18 product.

19  
20 **RICHARD APPELDOORN:** So two comments. One is that export of  
21 lobsters has certainly been actively talked about, and so we have  
22 to think about the future, and, secondly, the question was really  
23 whether we should split the import/export line, and would that  
24 simplify things, so we could actually get numbers in black, rather  
25 than blue.

26  
27 **VANCE VICENTE:** That's a great suggestion.

28  
29 **WALTER KEITHLY:** I would say, if adding another row simplifies  
30 things, which I find hard to believe, then go ahead and add another  
31 row.

32  
33 **RICHARD APPELDOORN:** Well, it's a question for you and Tarsila  
34 whether, if we do that, it's going to allow us to not have to use  
35 absolute values, but we could actually get direction for some of  
36 these things, and so, if we split them and we still could go either  
37 way, depending on certain scenarios or factors, then there's no  
38 point in splitting it.

39  
40 **TARSILA SEARA:** Based on what Walter just said, and I think the  
41 relationship is between that and market demand and then local  
42 economy, and I think those are the only ones, and so, based on  
43 what Walter just said, I think it would definitely simplify, or we  
44 would be able to attribute a sign for the relationship with market  
45 demand, I think, if I understood correctly, and I believe the same  
46 would be true for the impact on local economy. I think we would  
47 be able to do it. What do you think, Walter?

48

1 **WALTER KEITHLY:** I missed a little bit. Are you suggesting that  
2 we do separate imports from exports?

3  
4 **TARSILA SEARA:** Yes, and don't you think, if we do, that we would  
5 be able to attribute signs for the relationships between imports  
6 and market demand and local economy and then exports and market  
7 demand and local economy?

8  
9 **WALTER KEITHLY:** Yes, and, I mean, it does -- Again, I would  
10 probably argue, without thinking about all three thoroughly, that  
11 imports -- If you break out imports and exports that have the same  
12 reciprocal numbers -- For example, with market demand, you have a  
13 three for imports, and it would be a negative-three for exports,  
14 or something of that nature, and it would be opposite signs on the  
15 probability magnitudes for imports versus exports. Again, my  
16 concern is this is pretty unwieldy as it is, and I hate additional  
17 rows, but it may simplify it, actually.

18  
19 In one way, it could complicate it, but, from a modeling  
20 perspective, again, we've already talked about taking per capita  
21 income, and, as per capita income initially increases, the  
22 household may demand more seafood, but, after a given level of  
23 income, they may move to filet mignon or something, and their  
24 demand for seafood actually goes down, and, again, that's not just  
25 on this sub-model, and I've seen it on several sub-models, and  
26 we're not accounting for that at all in any of this, and I think  
27 part of the problem is we're dealing with an Excel spreadsheet  
28 here rather than a mathematical formulation of a model, where you  
29 can build in non-linearities into the model.

30  
31 **RICHARD APPELDOORN:** It says to me that there would still be some  
32 issues, and all we would really be doing would be solving two  
33 boxes, out of the many that are in blue here, and so it really  
34 doesn't make a strong contribution to relieving the problem of  
35 direction over the whole sub-model as a whole. I have no strong  
36 feelings either way about leaving it or splitting it, but it sounds  
37 like splitting it makes it easier for almost all situations, but  
38 it's that almost that we are -- Are we still stuck with that, or  
39 are we willing to kind of just say, okay, for almost all, and  
40 that's good enough, it runs this way, and so let's put it in.  
41 Again, J.J., as a modeler --

42  
43 **JUAN CRUZ-MOTTA:** I have a question, Rich. What would be the issue  
44 on using the absolute numbers instead of having direction? Why  
45 would you rather like split than use an absolute number? What  
46 would be the advantage of that?

47  
48 **RICHARD APPELDOORN:** Well, that was my question to you. As a

1 modeler, would you like to see that kind of change in something  
2 where have a lot of ambiguity still left in there, and so there  
3 would be lots of absolute values?  
4

5 **JUAN CRUZ-MOTTA:** There are two levels here, Rich, the coarse level  
6 and the detailed level. The coarse level, which is directed at  
7 non-scientists to understand how the system is working, it makes  
8 sense to use a sign, whether this thing positively affects that,  
9 and vice versa. Then, when we go into the details and try to do  
10 some analysis on all of this, the signs don't matter, and the signs  
11 don't matter because each one of those little boxes can be  
12 estimated or measured or understood using multiple variables.  
13

14 Mandy used the name -- I forgot the name she used, but some people  
15 use "parameters" or "descriptors", but the thing is, when you do  
16 the detailed analysis, from a quantitative point of view, those  
17 signs don't exist. The signs are important for the level of where  
18 are we now, and what I mean by where are we now is what do all  
19 stakeholders think of where we are now, and so having signs in  
20 that conceptual model -- Again, the conceptual model is the  
21 understanding that each individual or group might have on the  
22 system.  
23

24 In that context, signs make sense, but, again, for the detailed  
25 sub-models, all those intricate relationships that we have been  
26 describing here, it doesn't make sense. They have no use. I will  
27 put an example.  
28

29 Walter and Tarsila were just talking about market demand, and the  
30 market demand is on a species-by-species case, and it's not the  
31 same demand for the lobster as the capitán, and so the  
32 relationships between market demand and any component in the  
33 ecosystem, any little box in the ecosystem component, will have  
34 different directions, depending on what species you are talking  
35 about. If you ask me, my suggestion for the committee would be  
36 let's use the absolute numbers instead of splitting. Thank you,  
37 Rich.  
38

39 **TARSILA SEARA:** I totally agree with J.J. I think the only reason  
40 why I was thinking in terms of the exports and imports is because  
41 I'm thinking in terms of we would be able to get data for imports,  
42 and we would be able to get data for exports, I would think, and  
43 so, for feeding in data into the model, those were actually points  
44 that we would be able to get. We would be able to split them and  
45 if they are influencing things in opposite directions, and I just  
46 thought that that would maybe make sense, but I totally agree with  
47 J.J. that, in most of the cases here, and perhaps in this case as  
48 well, the absolute numbers would make more sense.

1  
2 **RICHARD APPELDOORN:** But it is a conceptual model, and, if we  
3 wanted to get into that kind of detail later on, we can do that,  
4 of course, with everything, and so I am hearing that we should  
5 just use absolute value, but we just need a way to code that.  
6 Coding that might be, as we discussed, someone has to go hand-  
7 modify the drawing to put a dashed line or something like that.  
8  
9 **WALTER KEITHLY:** Let me see if I understand this correctly. You  
10 are now proposing that we simply use an absolute number and not  
11 consider whether the relationship is even positive or negative?  
12  
13 **RICHARD APPELDOORN:** No, and we are saying that, when there is a  
14 definite negative or positive relationship, we indicate that, but,  
15 when we have a situation where, depending on the situation or the  
16 specific aspect, say of imports or exports that you're looking at,  
17 it could go one way or the other and that it's not possible to  
18 ascribe a sign, and then we should just use absolute value.  
19  
20 **WALTER KEITHLY:** Okay.  
21  
22 **RICHARD APPELDOORN:** The trick is, of course, to know that  
23 something is an absolute value and not a positive. Right now,  
24 that's done by coding them in blue.  
25  
26 **WALTER KEITHLY:** Thank you.  
27  
28 **RICHARD APPELDOORN:** For Graciela and Liajay, whoever is working  
29 on this, blue initially was something where we had a question, and  
30 now, at least for this sub-model, blue means absolute value, but  
31 we haven't, as yet, extended that issue, or that nomenclature,  
32 across the rest of them, because there might be a question that's  
33 in blue coming up that would be resolved in some other way, and I  
34 don't know.  
35  
36 **GRACIELA GARCIA-MOLINER:** Okay, and so we'll make that  
37 modification, and I have already emailed Adyan, but she's on  
38 another call, but she will be looking at the model shortly, and  
39 definitely it's no problem changing to the blue means absolute  
40 values, and we will make sure that the arrows are not giving you  
41 any kind of specific direction, correct, and so it would be a  
42 double arrow, for example, to represent the absolute value, or  
43 just a line without any arrows pointing in any direction, and that  
44 you will have to tell me, because that would be part of the  
45 visualization exercise.  
46  
47 **RICHARD APPELDOORN:** It would have to be an arrow-less line, and  
48 so no arrowheads.

1  
2 **GRACIELA GARCIA-MOLINER:** Perfect.

3  
4 **RICHARD APPELDOORN:** Because a line with both things says that one  
5 affects the other, and the other affects the original one, and  
6 that's not exactly what we're saying here.

7  
8 **GRACIELA GARCIA-MOLINER:** Okay, and so we've made the notes. I  
9 think that the only ones that you had with issues was this one and  
10 the competing use of resources, and everything else has been  
11 handled, except for some questions here and there, but everything  
12 else did not show this many -- For competing uses, you had one.

13  
14 **WALTER KEITHLY:** Mr. Chairman, can I bring something up? Can we  
15 go back to ciguatera for a second?

16  
17 **GRACIELA GARCIA-MOLINER:** Socioeconomic, right?

18  
19 **WALTER KEITHLY:** Yes, and I'm still trying to figure some stuff  
20 out here. Are we looking -- Maybe I have been thinking about this  
21 wrong throughout, but we have negative-one, saying it negatively  
22 influences market demand, and are we -- There may be several  
23 examples of this, but are we thinking with respect to a specific  
24 product or for the total catch of say Puerto Rico?

25  
26 For example, ciguatera may reduce the demand for one species that  
27 is associated with ciguatera, but other species are substitutes,  
28 and so it increased the demand for all those other species, and  
29 how are we supposed to interpret these numbers and so forth?  
30 Again, is it a species-by-species analysis or the total catch for  
31 the island with demand for domestic product?

32  
33 **JUAN CRUZ-MOTTA:** Richard, if I may --

34  
35 **RICHARD APPELDOORN:** Go ahead.

36  
37 **JUAN CRUZ-MOTTA:** Walter, that's a very good point here. When you  
38 asked -- Again, there are two levels. One is that people,  
39 stakeholders, believe is the influence of ciguatera on market  
40 demand, and the answer that has come straight from the general  
41 public, or the stakeholders, is going to be negative, without  
42 taking into consideration precisely what you mentioned, and that  
43 is that it really depends, the negative or positive, on what  
44 species you are looking at.

45  
46 At this coarse level, yes, we want to know whether the perception  
47 of the people in general is negative or positive in terms of the  
48 relationship between ciguatera and market demand. For us, as

1 scientists, we know that that's not necessarily true, for one of  
2 the reasons that you just mentioned, that it could be positive or  
3 negative, depending on the species, and so a quantitative model  
4 will take that into consideration.

5  
6 Imagine that, when you're going to correlate the product, as you  
7 call it, or the species matrix, with the likelihood of that species  
8 having ciguatera is a multivariate correlation, because you are  
9 looking at all the species in a single multidimensional space. I  
10 am sorry if I'm repetitive, but the broad approach, most  
11 stakeholders will immediately say that, yes, ciguatera is negative  
12 for the market demand. However, when we do the detailed analysis,  
13 it might be so or not, depending on the problem. I totally agree  
14 with your point, Walter, and that will be taking into consideration  
15 the look of Lenfest.

16  
17 **WALTER KEITHLY:** Okay. Well, how do you take it into  
18 consideration? Again, our model here, and it's not a model, but  
19 what we've agreed on is a minus-one between ciguatera and market  
20 demand, and let's just to pull an example out of the air of  
21 barracuda, which we all know is often associated with ciguatera.

22  
23 We are saying that, in this case, certainly ciguatera will reduce  
24 the demand, market demand, assuming that's domestic, for  
25 barracuda, and so what happens is consumers merely substitute  
26 another species for barracuda, which, in actuality, then increases  
27 the price of these other species relative to barracuda, and you  
28 say that it's taken into account, and how do you take into account,  
29 based on these numbers that we're providing, that demand for other  
30 species will increase due to ciguatera in a limited -- How do you  
31 know that demand for species not associated with ciguatera will  
32 increase, given ciguatera in a limited number of species? Thank  
33 you.

34  
35 **JUAN CRUZ-MOTTA:** Very good question, Walter. With this data that  
36 we are providing with these three categories, no, we cannot. We  
37 have to do that detailed analysis -- It has to be done with real  
38 data, and so, no, with this level, you cannot go into that detail.  
39 What this is trying to do is capture our, as stakeholders, as  
40 scientists, what is our general impression of how ciguatera as a  
41 whole will influence market demand as a whole, and I don't know if  
42 that answers your question, Walter.

43  
44 **WALTER KEITHLY:** I understand what you're saying, but that bothers  
45 me even more, that, again, I think the natural tendency is to think  
46 narrowly and that ciguatera in a given species is going to reduce  
47 the demand for that species, without considering the more complete  
48 picture that, well, if demand for this species is declined due to

1 ciguatera, demand for other species that don't have ciguatera will  
2 likely increase.

3  
4 Again, it's a mind tends to focus on the economics, clearly  
5 suggesting that the mind tends to focus on the very narrow aspects,  
6 rather than on a broader picture, and so, yes, I was thinking that  
7 negative-one was fine for say ciguatera, but, if you think it  
8 through in more detail, that's likely not to be the case.

9  
10 **TARSILA SEARA:** Walter, I think you make a great case for us to  
11 remove that minus sign from the spreadsheet, and I think that makes  
12 perfect sense.

13  
14 **JUAN CRUZ-MOTTA:** Actually, Walter, I totally agree with you that  
15 these conceptual models are a boxed mechanistic view of the  
16 reality, and I totally agree with you, and, if you ask me  
17 individually, I would delete the signs from not only this sub-  
18 model, but from all the sub-models, and I can make you that case  
19 you made with ciguatera and market demand with turtles, that we  
20 all believe it's a good thing to have a lot of turtles, but it has  
21 been shown that turtles can have negative effects on foraging fish,  
22 and so, in my individual opinion, I totally agree with you that  
23 this a narrow view, and that's what a conceptual model is trying  
24 to do, is capture, in our three-dimensional view of the world, the  
25 reality, which is very reduced, narrow, as you said, and so I  
26 totally agree with your point. Then, if we take the minus from  
27 there and put an absolute one or two or whatever, I would agree  
28 with you. Thank you.

29  
30 **WALTER KEITHLY:** Again, ciguatera was just one example that I saw  
31 immediately, and I wonder how -- We tend to look at everything  
32 through a narrow lens, and, as we try to increase our view, I  
33 suspect that we would reconsider a number of these factors that we  
34 have included, and, with that, I'm not going to say anything else.  
35 Thank you.

36  
37 **RICHARD APPELDOORN:** I am going to view it from another way, which  
38 I think is also a narrow view, but it's just a narrow view in a  
39 slightly different perspective, and that is, unless you have a  
40 very informed consumer base, they're not going to make a  
41 distinction between -- They're not going to say, oh, that was  
42 barracuda and we all know that's bad, and maybe they -- I think a  
43 lot of people don't know that it's barracuda and that's bad, and  
44 it does say all fish are ciguatoxic and I better cut down on my  
45 fish, or be more careful.

46  
47 I am thinking of -- So consider the Virgin Islands, where the  
48 safety, in this regard, really rests on the fishermen, because

1 they are buying for clients, and it would kill them if they were  
2 to serve them ciguatoxic fish, because they will just go someplace  
3 else to get it, and so they are taking the burden.

4  
5 They know the fish, and they know the area, and so there's a  
6 spatial component to this as well, and they are doing their best  
7 to make sure that they are supplying healthy seafood to their  
8 clients. That means the client doesn't have to worry about this,  
9 and so, if there's a news report that X number of people got  
10 ciguatera from eating a fish someplace, I don't think they're going  
11 to know that it's that fish and they shouldn't have been eating  
12 that, and so I think, viewed narrowly, it depresses the thing.

13  
14 I think, when you start getting into those details, you are asking  
15 the consumer to think very broadly about where does that fish come  
16 from and what species was it and how big was it, and I think most  
17 consumers don't do that, and so I would argue for leaving the  
18 negative in. I understand J.J.'s point of view, that, further  
19 down the line, perhaps it isn't important, but --

20  
21 **WALTER KEITHLY:** Rich, if I understand your point of view, it ought  
22 to be a zero, and you're saying that consumers don't think about  
23 it and the fishermen have already developed a market and so there's  
24 no concern of ciguatera in the market, and so consumers don't think  
25 about it.

26  
27 **RICHARD APPELDOORN:** Until it happens.

28  
29 **WALTER KEITHLY:** If that's the case, it would be a zero.

30  
31 **RICHARD APPELDOORN:** No, because that doesn't mean that it gets  
32 eliminated, and it doesn't mean that there aren't people who poach.  
33 It doesn't mean they bought from say other fishermen, in Puerto  
34 Rico or wherever, that weren't so concerned about that, and so  
35 ciguatera still happens, or it's not even ciguatera. You get  
36 scombroid poisoning or something like that, and this all gets mixed  
37 up in the minds of the public.

38  
39 **WALTER KEITHLY:** I will give one example, and I don't know if you  
40 read anything about it down here, but a certain type of packaged  
41 salad was found to include salmonella, I believe it was, just  
42 yesterday or the day before, and that one salad -- I went to the  
43 store, and I still bought salad, packaged salad, but I made sure  
44 that that brand of salad was not -- The label of that type of salad  
45 was not on the store shelves, and so, again, in this case, I didn't  
46 decrease my purchases of salad, bagged salad, but just the type.  
47 It can go in any direction. Without an empirical study being done  
48 of the situation, we don't know what the relationship is.

1  
2 **RICHARD APPELDOORN:** I guess I would still mildly disagree, but I  
3 would agree to make it an absolute value.  
4  
5 **GRACIELA GARCIA-MOLINER:** Richard, do you want me to read the  
6 comments on the chat? You have Mandy, and I don't know if she  
7 wants to just connect and speak. If not, she says I think this is  
8 another example of where the scoring could be facilitated if the  
9 nodes were phrased in terms of their attributes or aspects. In  
10 this case, we're talking about the general presence of ciguatera  
11 or occurrence rates in one species. Likewise, with market demand,  
12 it's total market demand.  
13  
14 Then, on the discussion that you've just had, Vanessa Ramirez and  
15 Nelson Crespo spoke to the fact that sometimes it's not just the  
16 fishers, but also -- The people in the restaurants demand hogfish,  
17 for example, and some stakeholders are not clear where they get  
18 the fish or the ciguatera, and it's very localized.  
19  
20 The quality of our product is the key to maintain our market, and  
21 we always avoid bringing to shore products that affect people's  
22 health. We have cases every year at restaurants on the west coast,  
23 and they are not investigated, which is one of the issues that  
24 we're having with the statistics on ciguatera cases. Ciguatera is  
25 more common on the southeast part of the island.  
26  
27 **RICHARD APPELDOORN:** Can you give the person's -- So the previous  
28 comment was Vanessa, and then the last comment was Nelson Crespo.  
29 Then you have a new comment from Vanessa.  
30  
31 **GRACIELA GARCIA-MOLINER:** The last one was the stakeholders selling  
32 fish from the east, from Vieques, and saying that it was from  
33 Guanica, rather than from where it came from, without permits and  
34 without any way of contacting the fisher, and the health agencies  
35 only provide, quote, unquote, orientation regarding the issues of  
36 ciguatera and other poisonings. That was Vanessa, the last one.  
37  
38 **RICHARD APPELDOORN:** Well, I think I can answer Mandy's comment.  
39 We are talking about the general presence of ciguatera and total  
40 market demand.  
41  
42 **GRACIELA GARCIA-MOLINER:** I have a question, for clarification.  
43 So that would argue for absolute values, rather than --  
44  
45 **RICHARD APPELDOORN:** I think we are in agreement that this should  
46 be an absolute value, and I think the comments by Vanessa and  
47 Nelson point to how there are variable responses, depending on the  
48 consumers, where the fish is coming from, their knowledge base, et

1 cetera.  
2  
3 If I can read it, Marcos Hanke has a new comment that recent cases  
4 of ciguatera happened with fishes from south of St. Thomas that  
5 were sold in Puerto Rico.  
6  
7 **GRACIELA GARCIA-MOLINER:** So should we just put in ciguatera and  
8 market demand and just a one and take out the minus-one?  
9  
10 **RICHARD APPELDOORN:** Make it blue.  
11  
12 **GRACIELA GARCIA-MOLINER:** Okay.  
13  
14 **RICHARD APPELDOORN:** The other issue we had, which I think Walter  
15 had brought up, is we had split out fishery regulatory structure  
16 from regulatory structure, and I think there was a question about  
17 whether we needed regulatory structure, and, if so, where should  
18 it go.  
19  
20 I will make two observations with respect to the latter part. If  
21 you look across the rows, or on the columns, for regulatory  
22 structure, there is a lot of values there, and so it's obviously  
23 something that is important here, and then, within the context of  
24 what we talked about yesterday in competing resources, many, if  
25 not all, of those were going to be dependent on non-fishing  
26 regulatory structure, like permitting process for putting out  
27 artificial reefs or mariculture operations or waste disposal  
28 outfalls or whatever.  
29  
30 I would say we need to have regulatory structure, and I am open to  
31 any suggestions about where to put it, although it's going to be  
32 messy whatever we do, because there is so many connections within  
33 this sub-model, and there's going to be a lot of connections  
34 outside this sub-model, and so we might just want to leave it where  
35 it is, and so those are my comments.  
36  
37 **TARSILA SEARA:** I agree with you, Richard.  
38  
39 **RICHARD APPELDOORN:** Walter, you are being quiet.  
40  
41 **WALTER KEITHLY:** I am not sure. Does -- The fishery regulatory  
42 structure will also influence some of the other sub-models, I  
43 believe, and I really can't tell, until it's all together, whether  
44 it should be pulled out and used as a separate sub-model or left  
45 as it is, and I think it could be left as it is, because, again,  
46 what we're ultimately trying to tie everything into is the stock  
47 size, and, as long as this regulatory structure influences the  
48 factors in here, and any of the other factors then could be tied

1 into influencing the fishery model, and maybe some of the other  
2 models, then we should be okay, assuming that there's then a  
3 feedback loop that we'll come back to here and affect everything.

4  
5 Then, again, you have a loop that you have to build into a model  
6 at some point, it seems to me, and we talked about that with the  
7 catch per unit effort and how that -- As catch per unit of effort  
8 originally increases, harvest increases, but then harvest falls,  
9 which means a decline in income among fishermen, which then leads  
10 to fishermen leaving the industry and a rebuilding of the stock,  
11 eventually, at least in theory, and so I think it's okay here, but  
12 I really can't tell until we see how the different sub-models  
13 interconnect. That was kind of a long story with no good answer.  
14 Sorry.

15  
16 **RICHARD APPELDOORN:** Yes, but it was a good story with a good  
17 message, even if it doesn't have an answer, and so thank you for  
18 those comments.

19  
20 **JOE KIMMEL:** What's the difference between regulatory structure  
21 and fisheries regulatory structure?

22  
23 **RICHARD APPELDOORN:** Fisheries regulatory structure is those  
24 regulations that are directly affecting fisheries, the laws and  
25 regulations passed by NMFS and the council and the local agencies.  
26 The other regulatory structure would be say Corps of Engineer types  
27 of activities or other permitting issues for say mariculture, which  
28 I assume goes through NMFS or the local agency that is not  
29 necessarily tied to fishing, per se.

30  
31 **VANCE VICENTE:** Like other agencies. I think, under regulatory in  
32 general, you're referring to both regulatory themselves, which is  
33 the U.S. Army Corps of Engineers and U.S. EPA, and the other is  
34 such as the National Marine Fisheries Service and the U.S. Fish  
35 and Wildlife Service.

36  
37 **RICHARD APPELDOORN:** Yes, and the planning board in Puerto Rico  
38 and whatever is the comparable --

39  
40 **VANCE VICENTE:** The planning board is regulatory and not advisory.

41  
42 **JOE KIMMEL:** Thank you for the explanation.

43  
44 **RICHARD APPELDOORN:** I am thinking that, surprisingly, we're done  
45 here.

46  
47 **GRACIELA GARCIA-MOLINER:** Can I ask a question? I don't know if  
48 I missed it, but there is still one negative number in this matrix,

1 tourism to -- Right there. For completion's sake, unless that's  
2 really stated as that, do we change that to an absolute value?  
3

4 **RICHARD APPELDOORN:** Personally, I don't see why this is an issue.  
5 We have lots of ones that have signs, and they're all in black.  
6 That happens to be the only negative, but are you saying that,  
7 because it's the only negative, that there might be a question  
8 there?  
9

10 **GRACIELA GARCIA-MOLINER:** The only reason why I'm asking is that  
11 everything that's in black has a direction, and it's a positive  
12 number. Everything that you have in blue is the absolute value,  
13 the one that we're going to use, and this negative-one, which is  
14 the only one in the whole matrix, stays as a negative-one?  
15

16 **JORGE GARCIA-SAIS:** There is another, Graciela. It's public health  
17 with ciguatera.  
18

19 **GRACIELA GARCIA-MOLINER:** So keep those as they are, right?  
20

21 **RICHARD APPELDOORN:** What we're saying -- What we're left with,  
22 that we need to make sure this is understood, is that all those  
23 things in red, which indicate we made changes from the last  
24 meeting, that they're all black.  
25

26 **GRACIELA GARCIA-MOLINER:** Okay, and they represent --  
27

28 **RICHARD APPELDOORN:** I don't know if somebody wants to change that,  
29 but my understanding is that they were put in -- Because they are  
30 not blue, we still don't need to change them.  
31

32 **GRACIELA GARCIA-MOLINER:** Right, and so red will become part of  
33 the black numbers now, and we'll just keep the blues to represent  
34 the absolute values, and everything that has a minus sign will be  
35 minus, and the rest of them that are black will be positive  
36 numbers, correct? Only the blues are the ones that have no  
37 direction, right?  
38

39 **RICHARD APPELDOORN:** That is correct.  
40

41 **GRACIELA GARCIA-MOLINER:** Okay. Thank you very much.  
42

43 **RICHARD APPELDOORN:** If you were a glutton for work, as I have  
44 commented a number of times, differentiating blue from black is  
45 sometimes difficult, and so you might change the blue to some other  
46 color that really sticks out from black, but that's a minor thing,  
47 and you can deal with the comment as you will.  
48

1 **GRACIELA GARCIA-MOLINER:** Thank you.  
2  
3 **RICHARD APPELDOORN:** While there's a lull, there was one other  
4 comment by Marcos Hanke concerning ciguatera. Ciguatera is based  
5 on perception and not on facts or science, and so we need more  
6 research.  
7  
8 **MARCOS HANKE:** May I clarify?  
9  
10 **RICHARD APPELDOORN:** Sure. Go ahead.  
11  
12 **MARCOS HANKE:** I just want to say that this is among -- I recognize  
13 that ciguatera is something true and that is confirmed by science,  
14 but, between the fishermen and the community, this is where my  
15 comment comes from. There is a lot of unknowns, and that's all I  
16 am saying. That's the reason I made the comment.  
17  
18 **RICHARD APPELDOORN:** Thank you, Marcos. Graciela, I think you  
19 commented that there was just one blue box from the competing  
20 resources matrix from yesterday.  
21  
22 **GRACIELA GARCIA-MOLINER:** Yes, and that's the only one that we  
23 could see, and so that should be on your screen now, and that is  
24 waste to artificial reefs.  
25  
26 **RICHARD APPELDOORN:** All right. That negative value would say  
27 that, as waste goes up, you are reducing artificial reefs.  
28  
29 **VANCE VICENTE:** That's not what we talked about, Richard.  
30  
31 **RICHARD APPELDOORN:** So I assume that's in the context of how the  
32 environment is more conducive to how --  
33  
34 **VANCE VICENTE:** Of waste, but also like Joe Kimmel mentioned and  
35 also I mentioned that also waste items or products are used for  
36 the construction of artificial reefs, and so I don't know, and we  
37 never -- I mean, that's what we talked about.  
38  
39 **RICHARD APPELDOORN:** So, in the context of our current discussion,  
40 that should remain blue, and we get rid of the sign, yes?  
41  
42 **VANCE VICENTE:** I think so. I mean, based on our discussions,  
43 there were two things. You don't want to build artificial reefs  
44 on polluted water columns, but you can use waste to create  
45 artificial reefs, such as the case of the piers and the other --  
46 Like Joe mentioned in the Florida Keys and using the pilings of  
47 destroyed or renewed bridges and the like.  
48

1 **RICHARD APPELDOORN:** So absolute value for that.  
2

3 **GRACIELA GARCIA-MOLINER:** So take the negative out and just leave  
4 it in blue, and I misspoke, because we have two other ones under  
5 conservation/restoration, Column P.  
6

7 **RICHARD APPELDOORN:** Well, here, I would actually argue that it  
8 should be blank, and here is why. This is competing uses, and, if  
9 you've already put a marine development in an area that drives out  
10 fishing, and that's the competing use aspect, the fact that it is  
11 conservation and restoration is not further displacing fishing,  
12 because the fishing was removed because of the marine development,  
13 and therefore there is no change, in that regard, to the  
14 competitive scenario. Any comment?  
15

16 **VANCE VICENTE:** Well, I don't know, Richard. It depends on how  
17 you're going to define marine development, and there is marine  
18 development that does not interfere and does not compete at all  
19 with fishing practices, and so that's another example of where we  
20 have to improve on our definitions.  
21

22 **RICHARD APPELDOORN:** Well, by definition, the sub-model is  
23 competing uses. If it doesn't compete, then it's not an issue.  
24 Can you give us some examples?  
25

26 **VANCE VICENTE:** You can develop a marina, but you can fish within  
27 the marina, if you like, and, I mean, it does not impede any  
28 fishing practices at all, and it doesn't displace it. It might  
29 minimize the value of the fisheries, potentially, in the area, but  
30 what I'm saying is that one is not necessarily exclusive of the  
31 other. I don't know.  
32

33 **RICHARD APPELDOORN:** Well, again, I would argue that -- Personally,  
34 I would argue that a marina is displacing fishing, and maybe  
35 someone can go spearfishing around the pier, but anybody who is  
36 doing serious fishing in the area would not be fishing in a marina,  
37 because of losing their gear or getting run over by a boat or  
38 whatever, but, if it's really an activity that's not displacing  
39 fishing, then that specific activity would not be included under  
40 marine development, because this is marine development that  
41 displaces fishing, and it's a competing use.  
42

43 It could be marine development like you put in a marina, and you  
44 have taken away the access points for -- This goes for coastal  
45 development as well. If you take away the access points for  
46 fishermen, and they can't fish in a region anymore, because they  
47 can't get to the water, and that kind of gentrification happens a  
48 lot, but the whole issue here, I emphasize again, is competing

1 uses.

2  
3 If we're talking about something that really isn't displacing  
4 fishing activity, it's not included in the categories, the  
5 definitions of the categories.

6  
7 **JORGE GARCIA-SAIS:** Richard, if I may, the problem that I have is  
8 that marine development can include such a wide range of things  
9 that not necessarily -- I mean, they not necessarily are negative  
10 for conservation and restoration. I mean, I don't want to start  
11 going in a different direction here, but, for example, I believe  
12 that marine development can include many other things other than  
13 a marina that don't necessarily go in a different direction of  
14 conservation and restoration.

15  
16 For example, take the marine aquarium that I dream about, and  
17 that's something that would not go against conservation and  
18 restoration, but that would occupy a piece of the land, a piece of  
19 the shoreline, or a piece of the marine area, and I don't know if  
20 you consider that -- Because I do have, also, confusing coastal  
21 development with marine development, and you know that happened to  
22 me yesterday, and I still pretty much have an overlapped concept  
23 of those two things.

24  
25 That's why I don't like to comment on this, because I know it's  
26 kind of like a -- It's also pretty subjective of how different  
27 people assimilate these concepts, and I think, yesterday, and I  
28 think the previous two times, that I think the diversity of ways  
29 in which each individual perceives these concepts, these items,  
30 whatever you want to call them -- Not everybody has the same  
31 definitions of all these parameters, if you want.

32  
33 **VANCE VICENTE:** Reni, may I add something, looking at this more  
34 deeply? Richard, this may be serious, and, I mean, conservation  
35 and restoration are totally, totally two different things,  
36 totally. When an area is designated for conservation, it's  
37 designated for conservation, like an MPA and a marine reserve and  
38 the like, and you are not allowed to have any marine development  
39 in that area, period.

40  
41 Restoration may be related to marine development, which a marine  
42 development project entails some type of mitigation, whether it's  
43 compensatory or the like, and, there, normally the mitigation  
44 projects involve restoration of a seagrass bed or restoration of  
45 a mangrove area or restoration of a coral reef that has been  
46 impacted by a shipwreck or a ship grounding and the like, and so  
47 I really think, at this point, and I'm sorry for looking at this  
48 too late, but, really, conservation and restoration, legally, are

1 totally two different things.

2

3 **JOE KIMMEL:** I agree totally, Vance.

4

5 **JORGE GARCIA-SAIS:** I agree with you on that.

6

7 **RICHARD APPELDOORN:** That's fine, but we're not really talking  
8 about those things in that context, and, if you look at what the  
9 issue here is, this is competing use, and so this is did we close  
10 an area or somehow, for conservation and restoration areas,  
11 restrict complete access to the fishing resources in an area, and  
12 that's the competing use. We have taken an area away from  
13 fishermen that's going to be used for these activities.

14

15 Now, these activities may foster there being more fish, but that  
16 part of it is not included here, and we're really talking about  
17 displacing fishing activity or not, and, when we talk about marine  
18 development, we're not talking about we're putting in something  
19 that's going to increase knowledge and benefit the fishery, and  
20 therefore it really is a conservation issue.

21

22 Yes, it does, but the question is does it displace or reduce the  
23 amount of area available for fishing access, and this is what the  
24 competing use is, and so --

25

26 **VANCE VICENTE:** I see your point. I see the way that you're  
27 looking at it now, and I am re-thinking about what I just said.  
28 Would marine development really -- Would it be a competing source  
29 of conservation or restoration? Well, it depends on the magnitude  
30 of the marine development. I mean, once you develop an area, a  
31 marine area, which we have to define what marine development is,  
32 and all I can think of right now are marinas and piers and  
33 mariculture cages, which we have talked about, but nothing much  
34 more than that, really. What type of marine development, other  
35 than that, have we been talking about?

36

37 **RICHARD APPELDOORN:** Well, we talked about the possibility for  
38 offshore windfarms.

39

40 **VANCE VICENTE:** But I am talking about actual ones right now.

41

42 **RICHARD APPELDOORN:** Well, but we have to be open to what might  
43 come down. We had big plans for offshore developments to bring in  
44 natural gas, or I forget what the Mona thing was for back in the  
45 1970s.

46

47 **JORGE GARCIA-SAIS:** Offshore gas ports.

48

1 **VANCE VICENTE:** Okay. Well, looking at it that, there, if you  
2 look at the magnitude and the future and the potential -- Looking  
3 at it in the subjective case, and departing from actuality, then  
4 definitely it will have a negative impact on conservation and  
5 restoration efforts, because it will be reducing the amount of  
6 area that could be used for conservation and restoration, and so,  
7 there, marine development would be a negative-one, and so we're  
8 back to the same level, I guess.

9  
10 **RICHARD APPELDOORN:** Here is where I am going to argue perhaps not  
11 that, because, if you have marine development in an area that --  
12 The question is has that marine development already displaced  
13 fishing?

14  
15 If it did, then you're not going to put a conservation zone there,  
16 and so it doesn't really impact whether you're going to have a  
17 conservation action in that zone. You have already decided, since  
18 you had the development, you're not going to do that.

19  
20 **VANCE VICENTE:** There is a problem there, Richard.

21  
22 **RICHARD APPELDOORN:** Okay.

23  
24 **VANCE VICENTE:** There's a problem, because, actually, the U.S. EPA  
25 Clean Water Act 404B1 guidelines -- They favor -- The number-one  
26 type that they prefer of mitigation on the on-siting kind, and so  
27 you really want to restore or conserve an area on-site and in-  
28 kind, and on-site means the area of development and in-kind is the  
29 same type of taxa, if it's seagrasses or mangroves or corals, and  
30 that's the preferred. If it's not possible, then you go off-site.  
31 If you cannot do that, you go off-site and off-kind, and, from  
32 there on, other types of mitigation measures.

33  
34 **RICHARD APPELDOORN:** Okay, but, there, we're not talking about  
35 something that ultimately is reducing access to fishermen, and  
36 it's actually -- It's leading to something, but that restoration  
37 activity is not something that displaces fishermen from the area.

38  
39 Now, if you said, in mitigation for something, we're going to  
40 create a marine reserve, that would displace fishermen, and then  
41 that would actually be a positive number going into that, if that  
42 situation were actually to exist.

43  
44 **VANCE VICENTE:** The way I am interconnecting things is different  
45 from what you are thinking of, and so I'm just -- I guess I am  
46 just confused.

47  
48 **RICHARD APPELDOORN:** Well, if you're not confused, you're not

1 understanding any of this.

2

3 **VANCE VICENTE:** Okay. Got it.

4

5 **RICHARD APPELDOORN:** I think actually Reni made the comment  
6 yesterday that we are going rather fast through this process, and  
7 it's very complex, and our potential is 64,000 connections here,  
8 and so it's very, very easy to get lost in what we're trying to do  
9 and how we're viewing the sub-models and the components in them,  
10 and so that's why those definitions are really important, as has  
11 been emphasized a number of times already today. Graciela, you  
12 said there was another place?

13

14 **GRACIELA GARCIA-MOLINER:** Yes, and it's military uses and  
15 conservation, but you have to tell me if the blue here will be a  
16 minus-one, with that direction. If that the case, then we're  
17 changing it to black. Did you hear me?

18

19 **RICHARD APPELDOORN:** I heard you. Your problem is you're waiting  
20 for a response.

21

22 **VANCE VICENTE:** I have a response, which maybe you won't like.

23

24 **RICHARD APPELDOORN:** Go ahead.

25

26 **VANCE VICENTE:** Okay. If we're thinking about military uses and  
27 conservation restoration, it is interesting to say that military  
28 properties, under the U.S. Army and U.S. Navy and everything, once  
29 they cease to operate, they are passed to the U.S. Department of  
30 the Interior as refuges, as protected areas, and that's a major  
31 thing. I mean, that's why Culebra is largely preserved, and, right  
32 now, much of the Vieques area, which was owned by the military, by  
33 the Navy, now is under the U.S. Department of the Interior as a  
34 U.S. Fish and Wildlife refuge, and so I just thought of that now,  
35 and I'm sorry, but maybe we should discuss that or not, and I don't  
36 know.

37

38 **RICHARD APPELDOORN:** Well, it's sort of along the lines of what we  
39 were doing with marine development, and it gets very complicated.  
40 You have the shorelines going into protected areas, which would  
41 kind of say that, as we did -- Well, we have a negative relationship  
42 with coastal development, and what we're saying is, if you have  
43 military uses, you don't have coastal development, which means  
44 exactly what you said, Vance.

45

46 If you cut down military uses, that's going to affect coastal  
47 development, and, here, we said it would increase it, but maybe  
48 that should be in blue, without a sign, because, depending on what

1 happens, if it goes to Interior, and Interior does not develop it,  
2 then what you say is true. It actually protects the shoreline,  
3 which is going to protect habitat, and that would have some  
4 beneficial use.

5  
6 Of course, the military didn't do anything with the marine  
7 environment, and so that's all of a sudden opened up, ordnance  
8 notwithstanding, and you have cases like Roosevelt Roads, which is  
9 activity being developed, and this kind of changes per  
10 administration, and so that's a situation where military use goes  
11 down and coastal development would go up, and so that's the  
12 situation with the scoring that we have in there. Remember that  
13 these three rows we did not discuss yesterday, because we had  
14 already talked about them before.

15  
16 **VANCE VICENTE:** But, also, areas within the military are protected  
17 areas, because you cannot have any other type of development other  
18 than military, and that's a classical case of California. I mean,  
19 the few of the wetlands that are left in California are within  
20 military bases, because they were not allowed to be filled for any  
21 construction other than what they already have done for their  
22 military buildings and the like, and so my suggestion would be to  
23 leave it a one, blue, without a negative value, with no value, and  
24 just a blue one, because that really needs further discussion, I  
25 think.

26  
27 **CHURCHILL GRIMES:** I tried to stay out of this, but, really, many  
28 of the military bases that have been closed by the military --  
29 Part of them would go to development, like Rich was just saying,  
30 but a lot of the land that has gone into what you might call  
31 conservation is because it's got unexploded ordnance and that sort  
32 of thing all over it that makes it dangerous for people to use.

33  
34 You said California, and I was thinking of Florida, which is a  
35 classic example of that, and a huge part of Monterrey Bay that was  
36 closed, and part of it has been given over to be developed, or it  
37 has been, and, the rest of it, people can't go on it, although I  
38 think is a stretch to call it conservation land, but I guess you  
39 get blown up if you get out there and walking around too much.

40  
41 **VANCE VICENTE:** But, once the land is cleared of military ordnance,  
42 it's still kept as a refuge. Like, in Culebra, a lot of the  
43 ordnance has already been removed, but already it's been declared  
44 a U.S. Fish and Wildlife Refuge, the Culebra U.S. Fish and Wildlife  
45 Refuge. That means no development, period. I mean, there is one  
46 very small building that we built after Hurricane Hugo, but that  
47 means still no urban development, and it's not a waste disposal  
48 area, and so, in that respect, that enhances the conservation

1 aspect of the resource.  
2  
3 **RICHARD APPELDOORN:** What box are we talking about, coastal  
4 development or conservation?  
5  
6 **VANCE VICENTE:** I think we're talking about military versus  
7 conservation and restoration. We're talking about that negative-  
8 one, the negative-blue-one. It's military uses, the last column,  
9 the third row.  
10  
11 **GRACIELA GARCIA-MOLINER:** While you think about it, I have to read  
12 two comments from the chat. One is from Vanessa Ramirez regarding  
13 what you had talked about earlier. There is only catch-and-release  
14 at the marinas, and there is no commercial fishing around, and  
15 there is no good quality of water, because of contamination, and  
16 so you should think twice before eating what you catch at the  
17 marinas. From Michelle Scharer, the USO at Desecheo, Mona, and  
18 Monito now are designated national reserves.  
19  
20 **RICHARD APPELDOORN:** I would say, in light of the discussion here,  
21 for our two blue boxes in that column, go ahead and make them  
22 absolute value.  
23  
24 **GRACIELA GARCIA-MOLINER:** Okay, and so you have land-based uses  
25 and water quality left.  
26  
27 **RICHARD APPELDOORN:** Really? Okay. Land-based uses.  
28  
29 **GRACIELA GARCIA-MOLINER:** This is the matrix as you had it worked  
30 out at the last meeting, but then you have, if we go down to the  
31 figure, the connection to water quality and all these other  
32 parameters that are not included, but could be part of the  
33 definition of each of the ones that you already have in the matrix.  
34  
35 **RICHARD APPELDOORN:** My comment to this, in the last meeting, was  
36 that this was, I thought, exceedingly valuable as a guide to how  
37 we should be -- How the sub-models should connect, because this is  
38 really looking at stuff, to some degree, across sub-models.  
39  
40 There is a lot more detail here than what is encompassed in the  
41 sub-models, but that's true of everything, and so my -- I don't  
42 know how we do this with one screen, but to keep this very much in  
43 mind, as we're going through the land-based uses to sub-model, to  
44 keep in mind, okay, what here would actually be linkages within  
45 that and what is going to come out of linkages across sub-models  
46 and to what degree can we capture the detail that we need.  
47  
48 If I recall, Reni was presenting this, and rightly so, from the

1 point of view of data sources, and we actually have data sources  
2 on a number of things here, and that allows us to link nodes in  
3 the model, or arrows in the model, to actual data at some point,  
4 and that's not what we're trying to do now, because this is  
5 conceptual, but, if we want to look toward the future, we have to  
6 very much keep in mind how we're going to evaluate things, and  
7 that requires data.

8  
9 As I said, I don't know how you keep that image in mind, where  
10 we're working on the matrix, and that's a little difficult, but  
11 that is --

12  
13 **GRACIELA GARCIA-MOLINER:** Well, everyone should have a copy of the  
14 Excel file that was sent to them, but Liajay is going to try and  
15 do that, but that's going to be kind of hard to read, but you do  
16 have the power to zoom in individually, and so that should be fine.

17  
18 **VANCE VICENTE:** You can do that with a touchscreen.

19  
20 **RICHARD APPELDOORN:** I just went out of my way to buy a new computer  
21 that doesn't have a touchscreen.

22  
23 **VANCE VICENTE:** I just found that out, and I've had this one for  
24 three years, but that's okay.

25  
26 **GRACIELA GARCIA-MOLINER:** Is that better?

27  
28 **VANCE VICENTE:** In my opinion, I think that -- Well, I know that  
29 we had plenty of discussion during the last meeting on this, and  
30 I don't have any major comments or plan to make any complications  
31 of this, but just any specific questions that Reni or I could  
32 answer, but we did a lot of discussion on this model, of this  
33 section.

34  
35 **RICHARD APPELDOORN:** Given that, there might not be anything that  
36 we really need to deal with with the model internally like that,  
37 and it's really going to be how this connects to the outside world  
38 that Reni's diagram is going to be really valuable in informing  
39 us.

40  
41 **VANCE VICENTE:** Well, I think that we have really over-digested  
42 this one in our last meeting, unless you want to resuscitate  
43 everything back again and discuss it, but does anybody see a  
44 problem with this? I mean, do you want to go --

45  
46 **RICHARD APPELDOORN:** Nobody wants to go where we don't need to.

47  
48 **VANCE VICENTE:** Okay. I mean, Reni, do you feel satisfied with

1 this, to look at it?

2

3 **JORGE GARCIA-SAIS:** Well, I don't know. I thought of -- I did  
4 what I thought be useful, and whether you want to believe this on  
5 the short or on the long run, and I pretty much have worked on  
6 many of these activities, parameters, after working with quite a  
7 lot of experience in ecology, knowing pretty much the rivers and  
8 the data that is available for many of them, and, also, with the  
9 work with the regional treatment plants and knowing that all of  
10 that information is available.

11

12 I know that this kind of application may be useful in the future  
13 to decide, for example -- This is just an example of the Guanica  
14 project, where, at some point, it was decided to -- It was  
15 considered, and I don't know what was the end result of this, but  
16 they wanted to drain the watersheds.

17

18 If you drain the watersheds, that has a diverting influence on  
19 altering the nutrient inputs into the bay, and whereas the nutrient  
20 inputs may make the bay more autotrophic, and supposedly enhancing  
21 the growth of corals, and it may very well diminish the  
22 productivity of the bay in terms of mackerel landings, and so these  
23 things have a direct impact.

24

25 The good thing about it is that they -- At least for land-based  
26 activities, we have a handle on the quantification of the inputs  
27 into the environment. We know how much is the nutrient loading,  
28 is the sediment loading, is the loading of pesticides and all of  
29 that, and we have data for all of that.

30

31 There is also data for the regional treatment plants, which are  
32 the other important input of materials into the marine environment,  
33 and you may be able to make a quantitative estimate of how much  
34 less nutrients would be discharged into the environment if you  
35 make these plans tertiary treatment plants.

36

37 I mean, I am not advocating one or another direction, but I am  
38 just saying that the analysis can be made if you use quantitative  
39 sources, at least for the main drivers of what is going into the  
40 marine environment, and that was the point of -- Essentially, this  
41 is how I see the chain, or the direction, of the processes that  
42 are occurring to affect, or to regulate, water quality and sediment  
43 quality, in the marine environment, and so, I mean, we have seen  
44 that -- That's why you see so many blanks, basically, because there  
45 are no direct effects, in many of these cases, but there is  
46 certainly a line of processes that are interconnected and  
47 interrelated. More importantly, they affect productivity, and  
48 they affect water quality, and they may have a direct impact upon

1 fisheries.

2  
3 **VANCE VICENTE:** Reni, that's good. The only thing I see lacking  
4 here are the atmospheric sources of nutrients, of phosphates and  
5 nitrates. Like, for example, in Tampa Bay, it was found that about  
6 80 percent of the phosphates are coming in from the air, and it's  
7 a land-based operation, but, because of the emissions and through  
8 the atmospheric environment, by rainfall, it causes eutrophication  
9 of Tampa Bay, and the same thing is happening in the Chesapeake  
10 Bay. I think it's like 20 percent or 30 percent of the nitrogen  
11 comes in from atmospheric sources, and so that's something that we  
12 may need to take into account at some level in this modeling.

13  
14 **JORGE GARCIA-SAIS:** Yes, but this is land-based, and I know that,  
15 and I realize that it is important, and particularly there is a  
16 lot of nitrogen during storms and things like that, but, to the  
17 point where they are landed, they would actually enter the marine  
18 environment through any of these pathways that I portrayed here.

19  
20 **VANCE VICENTE:** I've got you.

21  
22 **JORGE GARCIA-SAIS:** Okay, but, I mean, certainly you're right that  
23 there is quite a bit of atmospheric influence upon the ocean  
24 productivity dynamics, particularly on areas like the seabed  
25 around us.

26  
27 **RICHARD APPELDOORN:** So, as I mentioned right from the beginning,  
28 I think that this perspective is very valuable, and it's going to  
29 help us going forward, as we connect across sub-models, and perhaps  
30 even more so when, hopefully, someone wants to get beyond  
31 conception and actually deal with something mechanistic.

32  
33 **JORGE GARCIA-SAIS:** Richard, one more comment. That is that what  
34 I would have liked to see in this model, that I consider that is  
35 very important, for example, there is no -- The rivers are not  
36 listed as an input here in the list of parameters, if you like,  
37 and that -- If you would have put rivers, the connection would be  
38 more -- You would have more connections to all of the other aspects  
39 that are portrayed here, and so, I mean, the runoff, urban runoff  
40 and coastal runoff, the mechanism of how they get to the marine  
41 environment is mostly by rivers.

42  
43 It's mostly through rivers, and, at the rivers, that's where you  
44 have the data, and then it's absent here, and I look into the  
45 future and say, okay, well, if we need to regulate the amount of  
46 -- If we need to make a model, to see how much we're facing a  
47 problem of eutrophication, for example, at some localized area,  
48 and we need to know how much the river inputs are, how are we going

1 to use this model to predict that, or to calculate that? We don't  
2 have it.

3  
4 **VANCE VICENTE:** Reni, you're right, and the USGS has a lot of data  
5 monitoring on nutrients, et cetera, and how much comes into the  
6 ocean from different river basins and the like, but that is true  
7 of all the -- That is strictly to Puerto Rico, and neither Vieques  
8 nor Culebra or St. Thomas or St. John or St. Croix, and not even  
9 the British Virgin Islands. Not only not rivers, but there is no  
10 permanent streams, and so they are just temporary runoffs during  
11 major rainstorms and the like, which come through the gullies, but  
12 that's really more for Puerto Rico than anywhere else.

13  
14 **JORGE GARCIA-SAIS:** But this is an island-based consideration.  
15 It's an island-based exercise, and so, for Puerto Rico, it may be  
16 very important. For St. Croix, it may not be that much, and so,  
17 these models, they are island-based. I mean, they are completely  
18 flexible to variations in the sub-model components and the model  
19 sub-components, and that's the way it should be. It's island-  
20 based, and it's not generic.

21  
22 **RICHARD APPELDOORN:** Okay, and so I will make the following  
23 observation. It doesn't bother me that rivers is not in the  
24 matrix. The flow chart that Reni has clearly shows that rivers  
25 are the bottleneck, or not only the bottleneck, but the source of  
26 data collection for those, and so, when we're talking about  
27 developing whatever word you want, indicators or whatever, that  
28 might talk about urban runoff or agriculture runoff, where are you  
29 going to go get the data?

30  
31 You're going to go to rivers in Puerto Rico, as one of the major  
32 sources for that information, and so it being a data source does  
33 not necessarily require it to a box in the matrix, and maybe J.J.  
34 can talk more about how indicators, or whatever data inputs for a  
35 model, are related relative to the boxes that are there, but I  
36 don't think we need to have something in there just because it's  
37 the data source, if we have the flows in and out that would be in  
38 that indicated in the matrix, and that just indicates, well, where  
39 do you want to get the data for that, and you go to the rivers for  
40 that, but it doesn't necessarily change the way we're conceptually  
41 looking at this.

42  
43 As I said, if we go to a mechanistic model, yes, then we have to  
44 have, I would think, something more in line of how Reni has drawn  
45 his flow charts, and the same thing for Vance's, when we get to  
46 the next sub-model as well. J.J., do you have any comments about  
47 data sources relative to whether the box is in the matrix or not?

48

1 **JUAN CRUZ-MOTTA:** At this stage, they are two independent  
2 processes, Rich. One activity that the council would do, or at  
3 least it would be recommended to them to do, is to compare what  
4 the people believe is important and the actual data we've got, and  
5 then that will produce subsequent analysis or subsequent products.  
6  
7 One is identifying priorities for research, and like let's suppose  
8 there is a box or a link that is extremely important for all the  
9 stakeholders, but there is no data for that, and that means some  
10 research has to go in that way, and the second is to actually, for  
11 the boxes that you've got data, then to do the quantitative  
12 analysis to test whether that relationship was truly important or  
13 not.  
14  
15 At this stage, we can propose a model, or, I mean, what we were  
16 asked to do from the council is develop a model of things that we  
17 consider are important in the fisheries system for the U.S.  
18 Caribbean, regardless of whether we have data or not. Thank you,  
19 and I don't know if that answers your question, Rich.  
20  
21 **RICHARD APPELDOORN:** I think so. With that, I am suggesting that  
22 we move into water quality, and that's the last one.  
23  
24 **GRACIELA GARCIA-MOLINER:** Yes.  
25  
26 **RICHARD APPELDOORN:** Do you have Vance's diagrams?  
27  
28 **GRACIELA GARCIA-MOLINER:** We do have it in the presentation. There  
29 we go.  
30  
31 **RICHARD APPELDOORN:** All right, and so there was a more complicated  
32 model and a simplified model that Vance had put together  
33 emphasizing the sources and how these  
34  
35 **GRACIELA GARCIA-MOLINER:** Do you want the complex one before  
36 anything else?  
37  
38 **RICHARD APPELDOORN:** Let's just bring up the simplified one, since  
39 you have it there.  
40  
41 **GRACIELA GARCIA-MOLINER:** Okay.  
42  
43 **RICHARD APPELDOORN:** Again, this is a simplified version, but it's  
44 very process oriented, but it's making distinctions about the  
45 sources of components that are targeting turbidity, which was  
46 really the emphasis of Vance's presentation, that it has a major  
47 disturbance in water quality in a tropical system. What did you  
48 have below turbidity? Can you scroll down to that?

1  
2 **GRACIELA GARCIA-MOLINER:** Benthic essential fish habitats, all the  
3 way at the end.

4  
5 **RICHARD APPELDOORN:** Again, turbidity, the core area of that model  
6 as it filters down, is one of the boxes, key boxes, in the model,  
7 and, of course, essential benthic fish habitat is getting into the  
8 habitat model, and so we'll be expecting linkages across there,  
9 and then we have the inputs, and I think this is where I would say  
10 it's certainly more complex than what is in any of our models now,  
11 and being conceptual, but his point was that these do have  
12 different functions, whether they're scattered or absorption or et  
13 cetera, and, therefore, how they work is not exactly the same,  
14 even though they all contribute to turbidity.

15  
16 Again, I am seeing some of that complexity we could deal with in  
17 how we connect with things, but some of it is just going to be  
18 more complex than we're going to be able to deal with at this  
19 stage, but, if the committee wants to do that, there are two  
20 sediment boxes here, allochthonous and autochthonous, and we just  
21 have sediment, and so, if we split those, and then they actually  
22 would change how we would relate those to turbidity and nutrients,  
23 et cetera, then it would be worth putting them in. If not, then  
24 it's something that would rest for the time when a more complete  
25 and mechanistic model was being developed. Again, I would want to  
26 hear from J.J.'s perspective on degree of complexity relative to  
27 what we're looking for here.

28  
29 **JUAN CRUZ-MOTTA:** As a rule-of-thumb, if we keep it simple, the  
30 better, for the conceptual model, unless there is a strong urge to  
31 start adding more lines or boxes.

32  
33 **RICHARD APPELDOORN:** I am feeling rather urge-less at the moment,  
34 but I don't know about the rest of the committee. Again, this is  
35 something that we discussed last time to some degree as well, and  
36 we added the box for dissolved organic matter. Is there any desire  
37 on the committee to change or not? Let me hear it. I'm assuming  
38 that silence means not, and so, Graciela, this was the last sub-  
39 model?

40  
41 **GRACIELA GARCIA-MOLINER:** Yes. Then you have to go through the  
42 homework of what's coming next.

43  
44 **RICHARD APPELDOORN:** Right, and that will take a while, I'm sure,  
45 but I don't feel compelled to have to go to 5:00, just because  
46 that's what we could do. I am thinking about the issue of box  
47 definitions, but I think we have sort of already said we want to  
48 sum up all of the commentary coming out of this and the previous

1 meetings and then address questions there, and so that would be  
2 for a future --

3  
4 **GRACIELA GARCIA-MOLINER:** Right. For that, we can send out -- I  
5 mean, I have been receiving, over the course of these two days,  
6 the verbatim minutes from the last meeting, and so I am already  
7 sending the ones for this meeting, to see if we can have them back  
8 in less than a month, and then we'll pull all of your definitions  
9 from there and update the glossary, and then we can distribute  
10 that to you all.

11  
12 Meanwhile, you can be working on the homework for the next meeting,  
13 and then you can combine making sure that the definitions and the  
14 boxes and the parameters are defined as you see fit and link the  
15 sub-models.

16  
17 **RICHARD APPELDOORN:** All right. Can you put the latter half, or  
18 latter third, from my presentation from yesterday up?

19  
20 **GRACIELA GARCIA-MOLINER:** Yes.

21  
22 **RICHARD APPELDOORN:** More or less, this is what we had a year ago,  
23 but the major headings haven't changed, and that's what I want on  
24 the screen, and this is a question to the committee, but it's  
25 following on a recommendation that J.J. made, and we have to do  
26 two things. We have to start looking at the connections between  
27 the components of the sub-models, across sub-models, and that can  
28 be done in a number of ways.

29  
30 One of those is looking at component-to-component, and that's the  
31 focus of the homework assignment, and then the other one was  
32 something that J.J. had mentioned, where we just take the major  
33 headings, and there's eight of them, and is that right, and we are  
34 drawing lines between those, and so that's actually something we  
35 could probably do now, and is it possible to generate a matrix of  
36 the eight headings?

37  
38 **GRACIELA GARCIA-MOLINER:** Do you mean in Excel or in the Mental  
39 Modeler, because you already have it, remember, from one of your  
40 presentations, and there is a slide that has the eight components.  
41 Let me see if I can find it here in a second, and so let me share  
42 the screen with you. You have that. Is that what you were thinking  
43 about?

44  
45 **RICHARD APPELDOORN:** Yes, and so, J.J., in your thoughts about how  
46 to proceed, I think you were saying it would be valuable to have  
47 both this kind of map and one that is more in line with the homework  
48 assignment, where we're looking at sub-component to sub-component,

1 and is that correct?

2  
3 **JUAN CRUZ-MOTTA:** Yes, that's correct. The only difference is,  
4 like for these that you're showing, I would suggest using the logic  
5 that Vance and Reni used for their sub-models, more like a  
6 cascading effect, and then having fishing as the central node, and  
7 then decide, out of the other seven boxes, what are the boxes that  
8 directly affect fishing.

9  
10 For example, I would say, in this slide that you are showing, that  
11 the abiotic factors definitely have an effect on fishing, but  
12 that's not a direct effect, and that's an effect through the marine  
13 ecosystem component, right?

14  
15 **RICHARD APPELDOORN:** Well, this is where you're going to get some  
16 variability, probably, among the committee, and I would have said  
17 that temperature -- Temperature would go through -- As we have  
18 defined it now, yes, it would go through there, and so, yes, I  
19 would agree with that. This is an old diagram, and so don't take  
20 this as something that reflects the thinking at the moment.

21  
22 **JUAN CRUZ-MOTTA:** It was just an example, Rich, and, of course,  
23 somebody can argue that, yes, there is a direct effect, because of  
24 this and that, but I am not -- Why is that? Because then, you can  
25 have -- Just as an example, let's say we've got fishing, and then,  
26 for the sake of the argument, I say that the two main boxes that  
27 directly affect fishing are marine ecosystem components and  
28 socioeconomic and cultural drivers, right?

29  
30 When we do the work, for that specific relationship, we only need  
31 to look at those three boxes, and we don't need to look at all the  
32 possible permutations, right, and so we've got Box Number 1 is  
33 fishing, and Box Number 2 is socioeconomic, and Box Number 3 is  
34 marine ecosystem components.

35  
36 Then, I can think, okay, would be another box, and I have  
37 identified number one and number two, and then I say, okay, what  
38 other box will directly affect fishing, and I could say, look,  
39 competing use of resources. That definitely will affect that  
40 fishing box.

41  
42 However, land-based uses will affect fishing, but it will do so  
43 through water quality and through marine ecosystem components and  
44 not through another box, and so I won't look at the relationship  
45 between land-based and fishing in that homework. I don't know if  
46 you -- That's why I am suggesting to go through this general  
47 exercise, so it might simplify the homework, but, again, it's just  
48 a suggestion, and let me know what you think. Thank you.

1  
2 **RICHARD APPELDOORN:** Personally, I think that's a great idea,  
3 because it will save us a lot of time in thinking about this at  
4 the homework level, and so --  
5  
6 **GRACIELA GARCIA-MOLINER:** Richard, we can try and put up Mental  
7 Modeler and have the eight components right there and see if that  
8 would work.  
9  
10 **RICHARD APPELDOORN:** Yes, and I was going to suggest a matrix, but  
11 either way.  
12  
13 **JUAN CRUZ-MOTTA:** The only little twist that I would suggest to  
14 differentiate the exercise that we have been looking at before is  
15 to start on the fishing component as the main node, as the main  
16 box that we are interested in. Then we can develop the tree out  
17 of that fishing box, and it's basically using the logic that Vance  
18 and Reni used for the sub-models, to have some logic sequence.  
19 Thank you.  
20  
21 **GRACIELA GARCIA-MOLINER:** Do you want us to put just the Excel --  
22 The one that will lead you to the homework?  
23  
24 **RICHARD APPELDOORN:** I think, in this case, it might be easier to  
25 work through the diagram, again, if Mental Modeler can do that,  
26 because then we can see the pathways easier than within the matrix.  
27 We're not talking about a lot of lines here.  
28  
29 **GRACIELA GARCIA-MOLINER:** Okay, and so I will pass it along to  
30 Liajay. Do you want to begin with the fishing in the center?  
31 That's the fishing right there. You might have to zoom in on your  
32 end.  
33  
34 **RICHARD APPELDOORN:** As far as fishing being the center, the real  
35 issue, in this case, is the clarity of what we're doing, and so  
36 whatever makes the line structure most easy to comprehend, as  
37 opposed to, conceptually, yes, fishing might be the focus, but, in  
38 terms of just looking at lines across the page, it might not be  
39 the best place to put it, but the most important thing would just  
40 be to spread the boxes out, so we can see the lines as much as  
41 possible.  
42  
43 **GRACIELA GARCIA-MOLINER:** Okay. So where do you want to go?  
44  
45 **JUAN CRUZ-MOTTA:** Just as an example, I would like to suggest --  
46 Just to say how we go about with this exercise, for fishing, I  
47 would say, just to start the discussion, that the main box that  
48 influences fishing is the socioeconomic and cultural drivers,

1 directly, I mean. Does anybody agree, or what do you guys think?  
2 Is that correct?  
3  
4 **RICHARD APPELDOORN:** Well, it's certainly more -- Yes, and the  
5 other one is going to be the marine ecosystem components, and  
6 that's your biomass.  
7  
8 **JUAN CRUZ-MOTTA:** Correct.  
9  
10 **WALTER KEITHLY:** Is there any chance we can scroll up a little bit  
11 on this? I really would like to see everything in more detail, or  
12 maybe I can just minimize mine.  
13  
14 **GRACIELA GARCIA-MOLINER:** We lost Richard, and so Richard will be  
15 calling in in a second.  
16  
17 **JORGE GARCIA-SAIS:** Graciela, we had a power failure here, and I  
18 just lost everything except the phone for the time being, and I  
19 have a weak connection right now, a very weak cellular connection.  
20 There is a very large power failure on the west coast.  
21  
22 **WALTER KEITHLY:** While we're waiting for everything, everybody,  
23 Graciela, can you refresh us, or can somebody refresh us, on what  
24 we consider the marine ecosystem components?  
25  
26 **JUAN CRUZ-MOTTA:** It's reef fishes, coastal pelagics, inshore  
27 forage species, offshore birds.  
28  
29 **WALTER KEITHLY:** Okay, and so it's basically vertebrates and  
30 invertebrates or whatever.  
31  
32 **JUAN CRUZ-MOTTA:** In this node of the sub-model, we have the  
33 products, what you are calling the products, the snappers and  
34 groupers and lobster and conch, et cetera, et cetera.  
35  
36 **WALTER KEITHLY:** Okay. So, in other words, the way it would work  
37 in this system is water quality, habitat, land-based uses, and at  
38 least water quality and habitat will influence the marine ecosystem  
39 components that then translate to influencing fishing activities,  
40 and is that how we plan to set this up?  
41  
42 **GRACIELA GARCIA-MOLINER:** You would have a line between land-based  
43 uses and marine ecosystems.  
44  
45 **WALTER KEITHLY:** I am not sure. I'm just trying to figure this  
46 out.  
47  
48 **JUAN CRUZ-MOTTA:** I would agree with that, Walter. The land-based

1 uses will have an effect of fishing through the marine ecosystem  
2 components, the same as habitat, as you have suggested.

3  
4 **WALTER KEITHLY:** Okay. Well, that goes both ways, actually. The  
5 land-based, let's say it's destroying habitat. At first, it  
6 impacts marine ecosystem components and affects the stock, which  
7 then affects fishing. The same thing with saying habitat affects  
8 the population of fish, which then affects either fishing or  
9 socioeconomics, and then we get a feedback, a continual feedback,  
10 on those, and through the marine ecosystem, but the initial effect  
11 would be through the -- Let's focus on habitat.

12  
13 The initial focus would be let's say a degradation of habitat. It  
14 will first lead to a reduction in population of relevant species,  
15 which then, actually, affects your catch per unit effort, and I  
16 don't know if that one would be in fishing or socioeconomics, the  
17 fact that it influences fishing. Am I thinking about this  
18 correctly, or am I incorrect?

19  
20 **JUAN CRUZ-MOTTA:** I agree with your analysis. Also, I would add,  
21 for example, lines then going back from fishing to socioeconomics  
22 and to marine ecosystem components, and then the loop back.

23  
24 **GRACIELA GARCIA-MOLINER:** Okay. Can you direct Liajay? You want  
25 from there, from marine ecosystem components to socioeconomics,  
26 right? She will separate them a little bit, so that you can see.

27  
28 **JUAN CRUZ-MOTTA:** In my opinion, that relationship is through  
29 fishing, Graciela. The marine ecosystem components affect  
30 fishing, and then the fishing affects -- It's not a direct link  
31 between marine ecosystem components and socioeconomics.

32  
33 **GRACIELA GARCIA-MOLINER:** Okay, and so marine ecosystems to  
34 fishing, and so we'll bring that line into fishing and from fishing  
35 to socioeconomics. Correct?

36  
37 **JUAN CRUZ-MOTTA:** That's correct.

38  
39 **WALTER KEITHLY:** I do not agree with that. I can't remember what's  
40 in fishing, and I would have to go back to my notes to see, but  
41 does fishing include -- Can we look for a minute at what's included  
42 in fishing again?

43  
44 **GRACIELA GARCIA-MOLINER:** Do you want me to tell you, or do you  
45 want to see the Excel file?

46  
47 **WALTER KEITHLY:** You can just tell me, to save some time.

48

1 **GRACIELA GARCIA-MOLINER:** Okay. Fishing gear is derelict fishing  
2 gear, fishing mortality, dead discards and bycatch, fishing  
3 grounds, fishing seasonality, illegal unreported fishing, fishery  
4 infrastructure, recreational fishing catch, and commercial fishing  
5 catch.

6  
7 **WALTER KEITHLY:** Okay. Based on that, other than maybe the two  
8 catches, the recreational and commercial, it seems to me the marine  
9 ecosystem components likely first influence socioeconomic and  
10 cultural drivers that then influence catch. We have say income of  
11 the fishermen. An increase in population of the stock will first  
12 attract increased fishing effort, which I would assume is in  
13 socioeconomic and cultural drivers, somehow tied in there, which  
14 then affects fishing and commercial and recreational catch.

15  
16 **TARSILA SEARA:** I think any variables that capture the idea of  
17 effort are going to be in the fishing model.

18  
19 **WALTER KEITHLY:** I was thinking that's on effort and seasonality  
20 and so forth, but it seems that the main direction, to me, from  
21 marine ecosystem components would be directly to the socioeconomic  
22 and cultural drivers. Catches are increased due to fishermen  
23 realizing that they can catch a higher amount per trip, at least  
24 in the short run, and so the stock is depleted, and I assume those  
25 drivers are contained in the socioeconomic and cultural drivers.

26  
27 **TARSILA SEARA:** Right, but, if it's going through catch, then it's  
28 going through the fishing docks.

29  
30 **WALTER KEITHLY:** The fish stocks, we started with the fish stocks  
31 in ecosystem components. The stock increases due to say an  
32 improvement in habitat, and what does that encourage? It  
33 encourages, or it leads to, an increase in profits to the  
34 commercial industry, income, more enjoyment by the recreational  
35 fishermen, which I would assume things of that nature are included  
36 in the socioeconomic and cultural drivers.

37  
38 Those factors lead to an increased catch, or increased fishing, in  
39 the short run, until the stocks are depleted, again, or I shouldn't  
40 say depleted, but until, under an open-access situation, a  
41 population falls, due to the increased effort.

42  
43 **JASON COPE:** One thing that is hard for me to kind of wrap my head  
44 around here is there are strong conditionals on these  
45 relationships. For instance, if you have effective management,  
46 then fishing, by definition, should feed back into the marine  
47 ecosystem components fairly strongly, and we don't really have  
48 that relationship here, but, if you don't have strong management,

1 then you're not -- Some of these relationships aren't going to be  
2 as strong as maybe we can talk through the theoretical, and so  
3 there are some pretty strong conditionals on these if this is going  
4 on or if you can assume this about the system, and then these  
5 relationships are the way you put them, but, if it's a different  
6 assumption about the system, particularly the human connection and  
7 the human-induced side of things, then you're going to get probably  
8 different arrows.

9  
10 **WALTER KEITHLY:** Graciela, while we're waiting, can you put back  
11 up the Excel sheet on socioeconomic and cultural drivers? I would  
12 argue that what we have is an improvement in habitat, resulting in  
13 an increase in population, looking just at the commercial sector,  
14 which then translates to an increase in fisher income, and I guess  
15 we have to increase catch before -- Now you could have a reduction  
16 in catch per unit effort, which then leads to fishermen fishing  
17 more, and so that increases the catch, and I would still argue  
18 that everything first goes through the socioeconomic and cultural  
19 sub-model before flowing back into the fishing sub-model, at least  
20 from a commercial basis, and I think we don't have much on the  
21 recreational, which would be akin to recreational fishermen  
22 enjoyment, satisfaction.

23  
24 **TARSILA SEARA:** That would be under -- Right now, we have a broad  
25 category for that, which is wellbeing, and so that would be under  
26 that, which we can't really see it right now, and so that makes  
27 sense, to me.

28  
29 **WALTER KEITHLY:** In that case, again, I still would argue or  
30 propose that it go from the ecosystem, or whatever it was called,  
31 up through the socioeconomic and cultural sub-model and then going  
32 down to the fishing model. Again, let me go through it one more  
33 time, and then I'm going to stop talking.

34  
35 An improvement in habitat, and I'm just thinking in the commercial  
36 industry, what happens? Initially, your cost per unit of catch to  
37 a fisherman, to an individual fisherman, will fall, and then he  
38 says, okay, I'm going to fish more, because I am making higher  
39 profits, and other fishermen will also get into the industry, and  
40 that increased effort by individual fishermen, in addition to the  
41 number of fishermen increasing, then leads to an increase in catch.  
42 I said I was going to stop talking, but I'm not sold on that, if  
43 somebody can convince me otherwise, but catch is not --

44  
45 **GRACIELA GARCIA-MOLINER:** I was just going to say that there has  
46 been a major power outage on the island, and so I think that  
47 Richard might be back via phone.

48

1 **RICHARD APPELDOORN:** I can listen, but I just can't see anything,  
2 and so that makes it difficult to make any comments at all as to  
3 what you all are doing, but please go forward.

4  
5 **GRACIELA GARCIA-MOLINER:** Right now, we're just looking at the  
6 matrix from the socioeconomic, and Walter is going through the  
7 different parameters within that matrix that are connecting to  
8 fishing, and so we are not in the Mental Modeler right now, and  
9 we're just going through the matrix again.

10  
11 **RICHARD APPELDOORN:** I understand that, but I just can't -- I don't  
12 think the situation is going to change. If you feel you can get  
13 through this exercise, I would say continue to do it, because that  
14 would be valuable guidance for the homework assignment. I can  
15 talk about the homework assignment, because I have the matrix for  
16 that in the PowerPoint that I gave yesterday, and so I can see  
17 that while we're talking about it, but, for the exercise you're  
18 doing now, I would say carry on, if you think you can come up with  
19 something.

20  
21 **WALTER KEITHLY:** I have to say that, once we solve one of these,  
22 all of them are going to be the same directions, and I think it's  
23 -- Would everybody agree with me that all of these factors  
24 immediately, or the most direct causality, would be onto the marine  
25 ecosystem component, be it water quality, abiotic factors,  
26 habitat, at least, and I guess, in land-based, you do have possibly  
27 marinas or something, but certainly the water quality and the  
28 abiotic factors and habitat would most directly initially  
29 influence the marine ecosystem components.

30  
31 **JOE KIMMEL:** Yes, Walter, I would agree with that.

32  
33 **WALTER KEITHLY:** Then I would argue that they, in turn, initially  
34 -- Any change in the populations of the stocks will initially  
35 influence socioeconomic and cultural drivers that then influence  
36 fishing activities.

37  
38 **RICHARD APPELDOORN:** I might disagree with you, Walter. As  
39 populations are going down, that's immediately going to affect  
40 catch, which is in the fishing, and then the socioeconomic system  
41 responds to the decline in the catch, or increase in catch, if  
42 things are getting better.

43  
44 **TARSILA SEARA:** I would agree with Richard. I think the way we  
45 have -- I was just looking back at the variables that we have in  
46 each one of these sub-models, and I think, based off of that, this,  
47 the way we have it now, makes the most sense to me, where marine  
48 ecosystem components would affect fishing, in this case catch, and

1 that would impact socioeconomic drivers, and then you have this  
2 feedback onto fishing again.

3  
4 **WALTER KEITHLY:** I kind of agree too, but it's almost a  
5 simultaneous factor, because your catch by the individual  
6 fishermen may initially change, which immediately results in,  
7 again, a declining -- In this case, it's an increasing cost per  
8 unit of catch.

9  
10 It happens at the same time, but then, because of that, you have  
11 fishermen leaving the industry, and so I guess the question is  
12 whether you're talking about it at an individual level or at an  
13 aggregate level, because then a number of fishermen start leaving  
14 the industry, which then more significantly influences catch.

15  
16 **RICHARD APPELDOORN:** So you have a feedback there, obviously, and,  
17 to me, the catch is the signal that the fisherman is responding  
18 to, and, if fishermen start leaving the fishery because catch is  
19 going down, does that have -- There is a feedback there, because  
20 that reduces fishing pressure, and catch per unit effort should  
21 stabilize at some point, right?

22  
23 **WALTER KEITHLY:** Catch per unit effort should stabilize at some  
24 point, but an increase in population, or a decrease in population,  
25 will immediately affect at least the CPUE and the income of the  
26 individual fishermen, and that triggers entry or exit, entry into  
27 the fishery or exit from the fishery, and I guess, when I think of  
28 catch, and maybe this is where we're thinking a little bit  
29 differently, but I'm thinking of aggregate catch by the industry,  
30 rather than by the individual, or at least more so by the industry.

31  
32 **RICHARD APPELDOORN:** I think you have that right, Walter. I would  
33 agree with that thinking, that we're talking aggregate catch, and  
34 so catch per unit effort runs through the socioeconomic box, as  
35 you had originally said.

36  
37 **WALTER KEITHLY:** That's the way I would look at it.

38  
39 **KEVIN MCCARTHY:** That sounds a lot like the commercial side, but  
40 do we think that same thing is happening on the recreational side  
41 and for-hire side?

42  
43 **WALTER KEITHLY:** Based on the fact that this wellbeing of the  
44 community represents, at least in part, increased satisfaction, or  
45 utility, by recreational fishermen, that those out there fishing  
46 all of a sudden see their catch per day increase, that leads to  
47 increased satisfaction, which leads to them eventually making more  
48 trips and additional recreational fishermen coming in. If you buy

1 into that argument, then, yes, the recreational side and the for-  
2 hire would operate in the same way as the commercial.  
3

4 **KEVIN MCCARTHY:** I could see the timing of things and tipping  
5 points would be different for the recreational side than the  
6 commercial side, and maybe different still from say the for-hire  
7 side, but, if you think it's all sort of generally the same  
8 pathway, then I'm okay with that.  
9

10 **WALTER KEITHLY:** I agree with you that the timeframe is likely to  
11 be different, and we haven't attempted to model any timeframe into  
12 it, and I suspect that the for-hire sector could be a significant  
13 lag, vis-à-vis the commercial and recreational. First of all, I  
14 would assume that much of the for-hire is tourism-based, and so,  
15 first of all, they would have to pass on that catch per unit of  
16 effort is increasing, and you can go out and get more fish, and it  
17 takes a lot more capital investment to increase a fleet of for-  
18 hire vessels than a lot of people, citizens, of Puerto Rico who  
19 already have boats and can easily adjust their effort accordingly.  
20

21 **TARSILA SEARA:** Walter, just for clarification, what you were  
22 saying is what's being captured right now in this model that we're  
23 looking at, right?  
24

25 **WALTER KEITHLY:** Yes.  
26

27 **TARSILA SEARA:** Okay. I agree with that.  
28

29 **WALTER KEITHLY:** Again, what we did with respect to habitat, both  
30 water quality and the abiotic factors would have the exact same  
31 influence. Their first impact would be on the population of the  
32 stock, and so on the marine ecosystem components.  
33

34 **GRACIELA GARCIA-MOLINER:** For water quality and abiotic, there are  
35 also lines into the marine ecosystem components.  
36

37 **WALTER KEITHLY:** That would be my recommendation. The only thing  
38 that I -- Again, I can't remember what's in land-based uses, but  
39 that dealt more with land-based pollution and so forth, didn't it,  
40 and not marinas and all?  
41

42 **GRACIELA GARCIA-MOLINER:** Then you have the competing uses of  
43 resources, which is the one that is left on the right-hand side by  
44 itself. Would that also be influencing marine ecosystem components  
45 before anything else?  
46

47 **KEVIN MCCARTHY:** I think it would be influencing habitat. I mean,  
48 there's a lot of stuff in competing uses of resources.

1  
2 **TARSILA SEARA:** I would say that would influence fishing directly  
3 too, if we're talking about space and conflicts.  
4  
5 **GRACIELA GARCIA-MOLINER:** Okay, and so you want a line between  
6 competing uses and fishing and competing uses and habitat?  
7  
8 **WALTER KEITHLY:** Well, help me out. How do we define competing  
9 uses of resources?  
10  
11 **KEVIN MCCARTHY:** I think that was the sub-model that we worked on  
12 all day yesterday, right?  
13  
14 **RICHARD APPELDOORN:** Yes, and so competing uses are other  
15 activities in the marine environment that would displace fishing  
16 activity.  
17  
18 **JOE KIMMEL:** I think we've got it. It looks good.  
19  
20 **WALTER KEITHLY:** It looks good to me, too.  
21  
22 **GRACIELA GARCIA-MOLINER:** Even with the power outage, you do have  
23 Nelson Crespo online listening, and I just need to read his  
24 comment, for the record. Many fishers on the west coast of Puerto  
25 Rico are diversifying their fishing and opening new markets, and  
26 they are moving away from those fisheries that are under a lot of  
27 pressure. For example, the deepwater snapper fishers are fishing  
28 also for tunas and other pelagics. I'm sorry that it's a little  
29 bit out of whack with what you were discussing, but now it's in  
30 the record.  
31  
32 **WALTER KEITHLY:** It still follows at least with what I suggested,  
33 my recommendation that basically that taking from the stock -- It  
34 goes up to the fishermen themselves developing a market demand  
35 somehow for the product, which then influences fishing, or the  
36 catch component in fishing.  
37  
38 The only question I still have, and I just can't remember, even  
39 though I say through it for eight hours yesterday, is what factors  
40 are in the competing uses of the resources and whether some of  
41 those competing uses may influence the marine ecosystem components  
42 directly.  
43  
44 **GRACIELA GARCIA-MOLINER:** So competing uses of resources -- I just  
45 Richard a picture of what you have done with the Mental Modeler.  
46 Liajay put in the chat the information on the competing uses of  
47 resources, and so recreational diving, marina activities, boating,  
48 research, mariculture, light contamination, energy sector,

1 artificial reefs, waste, and conservation and restoration  
2 activities.  
3  
4 **WALTER KEITHLY:** Certainly conservation and restoration activities  
5 may directly influence the marine ecosystem component, and waste,  
6 for that matter.  
7  
8 **JOE KIMMEL:** So you're recommending a line between competing uses  
9 and the ecosystem components?  
10  
11 **WALTER KEITHLY:** I am recommending it, but it does complicate  
12 things, because I think, if you want to be more accurate, you may  
13 have a line between competing uses and marine ecosystem components,  
14 and I suspect it would be a weaker line than either to habitat or  
15 to fishing.  
16  
17 **JOE KIMMEL:** I can see that. It does complicate the model a little  
18 bit, and I can also see how, as you brought up in the beginning of  
19 this whole discussion, how there might be a direct connection  
20 between marine ecosystem components and socioeconomic drivers as  
21 well, but I don't know enough about that to make an intelligent  
22 comment.  
23  
24 **GRACIELA GARCIA-MOLINER:** You do have, under competing uses of  
25 resources, also marine development, coastal development, military  
26 uses, noise generation, large vessel and shipping activity. Does  
27 that help in making that connection?  
28  
29 **JOE KIMMEL:** Yes, I think so. What do you think, Walter, or  
30 anybody else, for that matter?  
31  
32 **WALTER KEITHLY:** Based on that, I would say that probably would be  
33 worthwhile to put an arrow between the competing uses of resources  
34 and the marine ecosystem components, because it sounds like some  
35 of those may directly influence the populations, and I would hate  
36 to say this, because it blows the whole model out of the water,  
37 with no pun intended, but some of those may also influence water  
38 quality and other factors, and now I'm getting out of my area, but  
39 the --  
40  
41 **GRACIELA GARCIA-MOLINER:** Well, I think that's where one of the  
42 things that Richard presented yesterday morning is heading, into  
43 the out parameters within each of these sub-models influence the  
44 other parameters into the other sub-models, and did I make myself  
45 clear with that?  
46  
47 You remember that he put a matrix up showing what the connections  
48 that you have made already look like and what other connections

1 you can make among the different sub-models? I don't know if  
2 Richard is still online and if he wants to go over that part of  
3 the presentation.

4  
5 **RICHARD APPELDOORN:** I am still online, and I'm not sure where you  
6 are, because I have to flip back and forth between my muting screen  
7 and the figure you sent me. The power just came back on, and so  
8 maybe shortly I will have internet again.

9  
10 **GRACIELA GARCIA-MOLINER:** So there is one more connection maybe  
11 between competing uses and resources and marine ecosystem  
12 components.

13  
14 **RICHARD APPELDOORN:** There was something that I wanted to add, and  
15 I'm not sure where you are, but fishing affects habitat, which  
16 will affect things, but this is all going to go through marine  
17 ecosystem components, and so fishing also affects marine ecosystem  
18 components, which affects habitat, and so there's a feedback loop  
19 there.

20  
21 **GRACIELA GARCIA-MOLINER:** So do you want those lines drawn from  
22 fishing to marine ecosystem components and from there to habitat  
23 and from habitat to fishing?

24  
25 **DOUGLAS GREGORY:** How does marine ecosystem components affect  
26 habitat? I was looking at this, and I do think water quality,  
27 particularly since corals are in habitat, water quality affects  
28 habitat, but I don't understand how other animals affect habitat.

29  
30 **RICHARD APPELDOORN:** All right. One of the principal things that  
31 people have been talking about, just as an example, is the role of  
32 herbivory and the health of coral reefs, and much of that  
33 herbivory, in a fisheries context, is fishing herbivores, the  
34 parrotfish in particular, and so the changes in the populations in  
35 the marine ecosystem components, which are affected by fishing,  
36 can then also alter the health of the habitats and the degree of  
37 connectivity between them, and a lot of that connectivity is also  
38 mediated by fishes that are exploited, otherwise exploited.

39  
40 **DOUGLAS GREGORY:** I understand the logic. Thank you. Shouldn't  
41 we have water quality impacting habitat as well?

42  
43 **RICHARD APPELDOORN:** I'm sorry, but what was affecting water  
44 quality?

45  
46 **GRACIELA GARCIA-MOLINER:** Habitat. Water quality to habitat.

47  
48 **RICHARD APPELDOORN:** Yes, directly, turbidity being the major issue

1 there. Apparently I have to leave and re-enter, and so I'm going  
2 to work on that while you guys talk about something else.  
3  
4 **GRACIELA GARCIA-MOLINER:** So you have internet. Good. Can anyone  
5 else think of any other connections that we're missing? If I may,  
6 and I'm not an SSC member, but the one thing that has always caught  
7 my attention is the land-based uses connected to water quality,  
8 and, therefore, water quality and habitat, but we'll wait until  
9 the --  
10  
11 **JOE KIMMEL:** Graciela, I was thinking the same thing, and, also,  
12 the abiotic factors probably have an impact on habitat as well,  
13 and so there's still another one.  
14  
15 **GRACIELA GARCIA-MOLINER:** So, from Reni's model, land-based should  
16 be connected to water quality, and what was the other thing, Joe?  
17  
18 **JOE KIMMEL:** I was looking at abiotic factors maybe have an impact  
19 on habitat.  
20  
21 **GRACIELA GARCIA-MOLINER:** So, in that case, like hurricanes and  
22 storms and things like that?  
23  
24 **JOE KIMMEL:** Exactly. Just like what's getting ready to happen  
25 now.  
26  
27 **GRACIELA GARCIA-MOLINER:** Okay, and so I don't see any comments in  
28 the chat.  
29  
30 **RICHARD APPELDOORN:** I have power back, but I don't have internet  
31 back, and so there's an internet problem, like yesterday,  
32 someplace.  
33  
34 **GRACIELA GARCIA-MOLINER:** Richard, did you hear the last two  
35 things, water quality to habitat and land-based uses to water  
36 quality and abiotic factors to habitat?  
37  
38 **RICHARD APPELDOORN:** If we're talking things like hurricanes, there  
39 would be a direct impact on habitat.  
40  
41 **TARSILA SEARA:** If we have hurricanes under abiotic factors, then  
42 I think it also makes sense to talk about how that would influence  
43 fishing directly, through gear and socioeconomic and cultural  
44 drivers, because we do have variables in there that talk  
45 specifically about resilience to disturbances, and so I guess we  
46 would have to make that -- It's not necessarily through fishing,  
47 and so I guess we would have to also make that connection, and I  
48 forgot that hurricanes were under abiotic factors.

1  
2 **GRACIELA GARCIA-MOLINER:** So that would be abiotic factors to  
3 fishing or to --  
4  
5 **TARSILA SEARA:** I mean, I can see both. The way I'm thinking about  
6 it, since I'm thinking of impacts on gear, and gear is under  
7 fishing, and then impacts on infrastructure, on coastal community  
8 resilience, through direct impacts of hurricanes on communities  
9 and affecting their ability to fish.  
10  
11 **GRACIELA GARCIA-MOLINER:** Okay, and so abiotic to -- There we go.  
12  
13 **TARSILA SEARA:** I think, if we spend another forty minutes here,  
14 we're going to end up connecting every single one of these boxes,  
15 because I'm also -- I think that was Jason's point, and it makes  
16 sense, that the competing uses would have direct impacts on  
17 socioeconomic drivers, not necessarily only through fishing.  
18  
19 **JOE KIMMEL:** I agree.  
20  
21 **GRACIELA GARCIA-MOLINER:** But do you want to draw a line now, or  
22 do you want to stop and go on to the homework?  
23  
24 **TARSILA SEARA:** To me, it makes sense that there would be a line  
25 going from competing uses of resources to socioeconomic and  
26 cultural drivers.  
27  
28 **JOE KIMMEL:** You might as well draw the line, and then we'll go to  
29 the homework, and how about that?  
30  
31 **LIAJAY RIVERA:** I apologize, but which direction should the line  
32 be drawn?  
33  
34 **TARSILA SEARA:** From competing uses to socioeconomic.  
35  
36 **RICHARD APPELDOORN:** Okay. I'm back online.  
37  
38 **GRACIELA GARCIA-MOLINER:** Richard, are you able to see the Mental  
39 Modeler diagram?  
40  
41 **RICHARD APPELDOORN:** Yes, I can, and so I immediately say that we  
42 need a line going from socioeconomic to competing resources,  
43 because that is what defines what the competing uses are going to  
44 be. Socioeconomic drivers also drives land-based uses, but I'm  
45 interrupting, and so where were you in this process?  
46  
47 **GRACIELA GARCIA-MOLINER:** They were saying that, if they spent  
48 another forty minutes doing this, everything and anything will be

1 interconnected, and so maybe it would be a good time to move on to  
2 the homework.

3  
4 **JOE KIMMEL:** We were going to move to the homework, just to avoid  
5 the connecting everything to everything.

6  
7 **RICHARD APPELDOORN:** Okay, and I think we can then take this as a  
8 guide, but, as we get into the homework, if you feel like there  
9 ought to be some connection which is not here, don't feel shy about  
10 putting it in. At this point, I would go to my PowerPoint, the  
11 second-to-last slide, that has the matrix on it for the homework  
12 assignment.

13  
14 Up on the screen is the matrix that we are asking each of us to  
15 fill, to the extent that we can, and, to give you an example --  
16 Well, the goal is to try to focus our thinking on the connections  
17 across the sub-models, component to component, and the idea here  
18 was, okay, let's just focus on the top three.

19  
20 Now, there may not be a top three, and you may in fact only think  
21 there's one connection, and that's fine, but we don't want you to  
22 go beyond the top three. It's split into cells of plots of three-  
23 by-four, and you can see the diagonal cells are blocked out,  
24 because those are the internal connections to the sub-models, and  
25 we're looking at the connections across sub-models, and so, if we  
26 go to Column 1 in Row 2, that's socioeconomic factors, and so we  
27 deal with this the same way we dealt with all the other ones.

28  
29 How does the row affect the column? This is socioeconomic factors,  
30 and what are the three most important components -- Let me rephrase  
31 that. What are the three most important linkages between  
32 socioeconomic and cultural drivers as they affect the components  
33 in fishing?

34  
35 We would have, in the first little sub-column there, where the red  
36 dot is, you would say, okay, what's the component in socioeconomic  
37 driver, and the next one would be what is it connecting to, what's  
38 the component in the fishing model, and the third one is the sign,  
39 plus or minus, and, if you think it's non-linear, or  
40 multifactorial, and so it could go either way, then -- Well, we  
41 need a coding for that, and so maybe just put an "A" for absolute,  
42 and I don't know how that -- That would be one solution.

43  
44 Then the strength, again, of one, two, or three of that connection,  
45 and so it's the same kind of thing that we've been talking about  
46 within models, and now we're just going it across the sub-models,  
47 and so, if you go to the next slide, and so this was the  
48 socioeconomic one, as we had it before, and I just circled three

1 things here that someone might say, okay, these are the three most  
2 important factors in socioeconomics that affect fishing, the  
3 market demand, the regulatory structure, and, just for argument,  
4 compliance.

5  
6 You might say market demand feeds into -- I don't remember the  
7 fishing categories, but whatever component might drive the extent  
8 of fishing activity, and maybe that's directly to fishing  
9 mortality, or maybe it's through one of the other boxes, and,  
10 again, I can't remember, and then fishery regulations might -- It  
11 would certainly affect fishing, and how might that -- What is the  
12 most important link there? Then the same thing with compliance.

13  
14 What you could say is, hey, the most important thing actually is  
15 fishery regulation structure, and that affects three different  
16 boxes in the fishery box, and those three connections are actually  
17 more important than say market demand or compliance or anything  
18 else.

19  
20 When you're filling in the three items in socioeconomics that  
21 affect fishing, you can repeat any component, or you can repeat it  
22 twice, or you can repeat it three times, if you think connections  
23 coming out of that box are the most important drivers affecting  
24 fisheries.

25  
26 In the same way, you can do that on the receiving end, and you  
27 might say market demand, fishery regulatory structure, and  
28 compliance are the most important things, but they're all hitting  
29 one box in fisheries, and that's also legitimate. Now we'll go  
30 back to the matrix.

31  
32 That's what we want filled out across the board, and the exercise  
33 that was just finished should guide you, in the sense that, if  
34 there really isn't a good connection between one box and the next,  
35 then you just might not put anything there, and that's fine. That  
36 just says there is really no connections between any of the boxes  
37 in one model to any of the boxes in the other model. Do people  
38 kind of understand what we're asking?

39  
40 **GRACIELA GARCIA-MOLINER:** Silence is golden.

41  
42 **JOE KIMMEL:** Well, it seems subjective to me, very subjective, and  
43 I don't know how you choose what the drivers are going to be.

44  
45 **RICHARD APPELDOORN:** It is subjective, and that's actually one of  
46 the things we would like to capture, because we will come back to  
47 this, and then we'll discuss why people had what they had. Clearly  
48 all of us have different areas of expertise, and so we're going to

1 view this slightly differently.

2  
3 Hopefully some of the discussion that we just had can be brought  
4 to that, because we talked about does something link directly to  
5 fishing, or does it go to socioeconomic and then to fishing and  
6 whatnot, and so that same kind of thinking has to be kind of worked  
7 out, but, at this time, you don't have to worry about doing  
8 multiple checks, other than the fact that, if you think one box  
9 model is affecting the other model, you have to think, okay, what  
10 is the direct connection, rather than a connection that goes  
11 through another sub-model, and, again, the exercise we just did  
12 should drive, or inform, your thinking on that.

13  
14 You can disagree with what we just did, because we really haven't  
15 had time to flesh that out, and the consensus was kind of like  
16 let's get out of here before we get too involved. Does that answer  
17 your question, Joe, and is everybody just hoping that Joe just  
18 asks the questions, or have you all got it?

19  
20 **JOE KIMMEL:** That helps a little bit, but I'm still very confused  
21 about the subjectivity, and I'm just looking at all the different  
22 sub-models up there and trying to imagine making these subjective  
23 connections and putting them down on paper, and I don't feel  
24 comfortable with it right now, but maybe, after I've worked through  
25 it a couple of times, I might feel better about it.

26  
27 **DOUGLAS GREGORY:** It's 172 boxes that you've got to fill out, but  
28 I've got a question. Can you give us some written instructions  
29 with this, because sometimes I tend to go from column to row with  
30 my thinking, instead of row to column, and, if I don't look at  
31 this for another week, I might forget some details of that.

32  
33 **RICHARD APPELDOORN:** Okay. We can do that.

34  
35 **DOUGLAS GREGORY:** Are we going to get a copy of all the other  
36 stuff, the background material, or do we have to dig it out of our  
37 previous meeting background material?

38  
39 **GRACIELA GARCIA-MOLINER:** You will receive a clean Excel file, and  
40 what you are seeing on the screen now will be the last of the tabs,  
41 and there will be instructions on how to follow, with an example,  
42 so that it would be -- Sarah and Orian and Liajay and myself have  
43 been working on doing that, so that you can go in and have  
44 everything in the same Excel file and be able to fill it out  
45 directly, rather than to go looking for anything around.

46  
47 **DOUGLAS GREGORY:** You want each of us to do the entire table, and  
48 you don't want to sub-divide the table up, because there's like,

1 what, ten of us, with ten different versions.  
2  
3 **GRACIELA GARCIA-MOLINER:** Yes, everyone separately.  
4  
5 **DOUGLAS GREGORY:** So we'll need a week for our next meeting.  
6  
7 **RICHARD APPELDOORN:** Well, we can't have a meeting -- What's the  
8 lead time on the Federal Register, a month? So we're not going to  
9 have a meeting next week, if that's what you're thinking.  
10  
11 **DOUGLAS GREGORY:** What I was saying is I probably won't get to it  
12 until after next week.  
13  
14 **RICHARD APPELDOORN:** That's not a problem. Any other questions?  
15 Certainly, once we deliver everything, the instructions in the  
16 updated matrices, and this would include the figures, correct,  
17 Graciela?  
18  
19 **GRACIELA GARCIA-MOLINER:** It will have the same thing, the Excel  
20 file with the matrix and the changes that you have made in the  
21 Mental Modeler and then what you worked on in this last Mental  
22 Modeler exercise. There will be instructions for filling out the  
23 table, with an example, and this last tab with the complete matrix.  
24  
25 **WALTER KEITHLY:** Actually, I do have one question. What is the  
26 purpose of all ten of us filling this out?  
27  
28 **GRACIELA GARCIA-MOLINER:** Do you want me to answer that?  
29  
30 **WALTER KEITHLY:** Somebody.  
31  
32 **RICHARD APPELDOORN:** I see two reasons that came up when we were  
33 having this discussion, and it was myself and Graciela and J.J.  
34 and Sarah, I believe, and is that correct, Graciela?  
35  
36 **GRACIELA GARCIA-MOLINER:** Yes.  
37  
38 **RICHARD APPELDOORN:** So two things. One is we have to deal with  
39 the connections, and this is really to force everybody to focus on  
40 these things and kind of what is the top three and how would it  
41 work, and, like I said, if you can only think of one connection,  
42 then it's just one connection. It's only those ones that are very  
43 complicated that you're going to have to pick the top three. That  
44 is one thing.  
45  
46 The second thing is that it will actually give us a record of what  
47 the subjective variability is, because that's part of the stuff  
48 we're going to have to work through when we get together and start

1 working on the connections, but this is sort of -- Maybe a third  
2 point is this sort of a shortcut into having a product that can be  
3 used by others, in the sense of, okay, here is the model, and, at  
4 this point, we would also have the connections within the models,  
5 and here is the major linkages between them, and so that's  
6 something -- That presents a product right there that the council,  
7 or whomever, could start utilizing, and then that gives us a more  
8 flexible time schedule to complete the more detailed connections  
9 among the groups.

10  
11 **WALTER KEITHLY:** As far as I can tell, we have already developed  
12 the linkages, and so that's the first point, is it seems like we've  
13 already done that. The second point is you want to see the  
14 variation, and it's already going to be biased, because you have  
15 already quantified either a minus or a plus and then one, two, or  
16 three, and so our subjective opinions are likely to be  
17 substantially biased by what people have already written down, and  
18 I can't remember the third point, but I guess I just don't see the  
19 value in this exercise, but I never liked homework either, and so  
20 --

21  
22 **RICHARD APPELDOORN:** I'm not sure what you're talking about. Were  
23 you talking in the previous discussion, where I could not see what  
24 was going on with the screen, and were you assigning actual ones,  
25 twos, and threes to the connections you were actually talking  
26 about?

27  
28 **GRACIELA GARCIA-MOLINER:** No.

29  
30 **RICHARD APPELDOORN:** For myself, who was just listening to this,  
31 yes, I got an idea of how we should think this all works, but that  
32 was not for everything. That was sub-model to sub-model, and,  
33 when we get down into the individual components, yes, you were  
34 working that for socioeconomic drivers, and I am not sure how that  
35 works necessarily with the other ones.

36  
37 Now, this may be my bias, because I didn't have access to the  
38 screen during that discussion, and so I wasn't taking away -- I  
39 wasn't getting a lot of the discussion, because I was trying to  
40 get back online or dealing with multiple windows on my phone, and  
41 so, to me, it's not something that we've already done. I don't  
42 know how others feel about it.

43  
44 **WALTER KEITHLY:** You have a point there, and so it's the  
45 quantification between the different sub-models then is where  
46 we're headed on this.

47  
48 **RICHARD APPELDOORN:** Correct. We don't want to -- We don't touch

1 anything with the sub-models. It's between sub-models. That's  
2 why we have the shaded areas on that matrix, because those are the  
3 connections that would be within, and we're not interested in that.  
4 We've done that, as you said.

5  
6 **WALTER KEITHLY:** Okay. So, in other words, we're supposed to be  
7 giving our subjective opinion as to whether abiotic factors have  
8 a larger influence on socioeconomic drivers of fishing than does  
9 land-based activities or something, is what you're saying, or what  
10 you're asking for.

11  
12 **RICHARD APPELDOORN:** That would be something that comes out of  
13 that, yes.

14  
15 **JORGE GARCIA-SAIS:** For example, Richard, if something doesn't  
16 have any impact upon land-based sources, you just leave it blank?

17  
18 **RICHARD APPELDOORN:** Correct.

19  
20 **WALTER KEITHLY:** The more I hear about it, the more concerned I'm  
21 getting, and I'm more and more in agreement with Joe that I don't  
22 feel that I have the expertise to discuss, in any serious manner,  
23 the impacts of say especially abiotic factors and some of the  
24 others on fishing and so forth. Joe thought it was subjective,  
25 and I would go beyond subjective. It's like a probability, and I  
26 have no idea what the distribution would even be.

27  
28 **RICHARD APPELDOORN:** All right. Does the rest of the committee  
29 feel that way?

30  
31 **JOE KIMMEL:** Yes, I kind of do. It's like a haphazard subjectivity.

32  
33 **DOUGLAS GREGORY:** My only concern is that, at the end, our next  
34 meeting, given all the discussion that's been going on with  
35 connections over these broad areas, and even with habitat, the one  
36 I did, which was extremely simple, an argument that was made two  
37 meetings ago, or three meetings ago, came up again, and we're going  
38 to have ten different values and different drivers for each of  
39 these that we're going to have to discuss and come to an agreement  
40 on.

41  
42 If we did it individually, then some of us may not have thought  
43 about that, but I was thinking, if we each did a row, there would  
44 be sufficient discussions about it at the next meeting, and it  
45 might be simpler than if we had to try to, I guess, converge ten  
46 different views on one box.

47  
48 **VANCE VICENTE:** I am thinking that, if I have doubts in one of the

1 connections in my evaluation, I will call the person in charge of  
2 preparing the sub-model. I will just call them up and say, hey,  
3 what do you think about this, and so there can be communications  
4 between us, and it doesn't have to be totally independent, one  
5 from another, and, in fact, we're working on this as a team.

6  
7 If I have a serious difficulty on any of the issues, I would call  
8 Reni or Richard or whoever, Graciela, whoever I feel is more  
9 competitive on the issue that I am evaluating, and I don't see any  
10 problems with that.

11  
12 **RICHARD APPELDOORN:** J.J., do you have any opinion on this?

13  
14 **JUAN CRUZ-MOTTA:** They are all very valid points, and these --  
15 What Richard presented was an alternative to the discussion in a  
16 meeting of all the potential connections, and, without that, it  
17 might take too long. One of the original ideas to come up with  
18 this was to reduce the number of areas that we will have to discuss  
19 about, and I will give you an example.

20  
21 If each one of us fills out these individually, and let's suppose  
22 the relationship between socioeconomic and fishing, if 70 percent  
23 of the seven of us agree that the main driver is market demand,  
24 just to put an example, that area won't need too much discussion.  
25 If, for example, for another relationship we have ten different  
26 replies, we could focus on those areas that there is a lot of  
27 variability among answers.

28  
29 Then, for those that we have a strong consensus, or a consensus  
30 would be 100 percent, but like most of us have the same opinion,  
31 and, in other words, the variability among answers would be low,  
32 those areas won't need much time, and so this is like, if you want  
33 to see it that way, it's homework that will allow us to focus the  
34 next discussion. That's one thing.

35  
36 The other thing is like, for example, when Walter was explaining  
37 the relationships among different boxes, he was describing a very  
38 good mechanism of relationships, and so, basically, perhaps this  
39 is not the best way to do it, but what we wanted, at the end, was  
40 an instrument, a form, that will capture the thinking that Walter  
41 was doing, and I am mentioning Walter because he was the last one  
42 mentioning it and trying to join the dots among different models,  
43 but I am pretty sure that each one of us can draw a picture of  
44 important aspects in each one of those boxes that are related.

45  
46 Basically, the idea of this instrument was trying to save time for  
47 the next discussion, but perhaps it's not so, and it would be nice  
48 to hear an alternative. I mean, the default is to do as we did

1 for the individual sub-models, like go through each one of the  
2 lines and then connect with, or try to connect with, each one of  
3 the columns collectively, and I believe that would take many, many,  
4 many days, and so, basically, what we were trying to do with this  
5 is to find a mechanism to reduce time. If you believe this is not  
6 a good -- I don't know what other way you recommend.

7  
8 **VANCE VICENTE:** J.J., can we do something? We don't have much  
9 time left, and let's do an example. Let's do, for example, fishing  
10 across the board, taking SEC drivers, marine ecosystem components,  
11 habitat, land-based sources, and let's do an example, and that  
12 will really help us do the rest.

13  
14 **JUAN CRUZ-MOTTA:** That's a good idea.

15  
16 **JORGE GARCIA-SAIS:** It's going to take us more than an hour to do  
17 that, easily.

18  
19 **VANCE VICENTE:** Just one quick run.

20  
21 **GRACIELA GARCIA-MOLINER:** Liajay can put up the Excel file, if you  
22 want, where all these matrices are found, and you can just select  
23 an example and do it.

24  
25 **DOUGLAS GREGORY:** I have a question about the overall process. In  
26 the beginning, we were going to do this conceptual model, and the  
27 DAPs have done conceptual models, and then somebody is going to  
28 take ours and theirs and combine them, and I thought that was it,  
29 and so how far does this go? I mean, somebody has got a game plan,  
30 and what do we do after we do this spreadsheet, and when do we get  
31 to the end, and what does it look like? Is there a set of steps  
32 that somebody has got figured out, but we just don't know it?

33  
34 **VANCE VICENTE:** There is no end.

35  
36 **GRACIELA GARCIA-MOLINER:** For the SSC, this should be -- Once you  
37 connect all the sub-models, that will be your ecosystem conceptual  
38 model presented to the council. With all of these values, and the  
39 DAPs already have their values. They are not as detailed as what  
40 you have here, but the main issues of how one thing connects to  
41 the other -- That, they have already done, and they have quantified  
42 that relationship.

43  
44 The idea would be to do some kind of stacking, in terms of the  
45 different stakeholder models and how they come up, in terms of  
46 what are the most important issues, what are the most important  
47 drivers, and so how do you recognize -- How do you look at your  
48 ecosystem and come up with what things are very important to the

1 different stakeholders, because you are going to have a different  
2 perspective than what the DAPs have presented to the council  
3 already.

4  
5 In that stacking, we are hoping that there will be that connection  
6 of what are the things that are common among all these models, and  
7 so that's where this is heading, and then we'll provide these  
8 models from the DAPs and from the SSC to the Lenfest group, who  
9 will also hopefully use them in their endeavor. Does that answer  
10 your question?

11  
12 **DOUGLAS GREGORY:** Thank you, and so this is basically the last  
13 step, and, while we're making stew, I think the DAPs made cakes  
14 and pies. Thank you.

15  
16 **RICHARD APPELDOORN:** I like to think of it as spaghetti, but  
17 Graciela failed to mention that these models all go to the -- I  
18 forget the exact name, but the new habitat --

19  
20 **GRACIELA GARCIA-MOLINER:** The EBFM TAP.

21  
22 **RICHARD APPELDOORN:** Yes, and so they will be using these models  
23 to -- Because they are the ones that are looking at that full  
24 diagram of where are we and where do we want to go and how do we  
25 get there, that circular diagram that was up earlier this morning,  
26 I guess, and so our job is to come up with a model, as the DAPs  
27 did, and those are going to be feeding into that group for their  
28 purposes.

29  
30 J.J., you're a member of that group, and I don't know if anybody  
31 else is that's online, and maybe you could talk a little bit about  
32 what that group's responsibilities are.

33  
34 **JUAN CRUZ-MOTTA:** Well, the responsibilities are to do whatever  
35 the council tells us to do, I mean in the strict sense, the same  
36 as the SSC. Then the council hasn't yet instructed us to do these  
37 -- I believe that it will happen, but it hasn't instructed us yet  
38 to do these stacked models, but that will be the next step.

39  
40 Just to give a little bit of context on this EBFM approach, and  
41 this is not my area of expertise, right, the big theory of EBFM,  
42 and I tend to work more on the quantitative part of developing  
43 mechanistic models, from a quantitative point of view, but I'm  
44 going to give you my perception of the whole theory of this EBFM.  
45 It all started with what the people think about the --

46  
47 **VANCE VICENTE:** J.J., I'm sorry to interrupt you, but I have to  
48 step out again. Before I leave, really quickly, can you fill out

1 a hypothetical example, so that we can work based on that example,  
2 even if it's hypothetical, just filling in one of the columns, so  
3 that we know where we're heading?

4  
5 **RICHARD APPELDOORN:** We can certainly do that in the instructions.

6  
7 **JUAN CRUZ-MOTTA:** Should I answer your question, or should I go on  
8 and do what Vance is asking me? Well, to answer your question,  
9 Rich, for an EBFM approach, the opinion of the stakeholders is  
10 very important, and then this instrument, about conceptual models,  
11 what it's trying to capture is the opinion of a lot of  
12 stakeholders, and then somehow combine all of these opinions to  
13 then define the objectives for the EBFM EFP, which the ecosystem  
14 fishery plan.

15  
16 That's very, very quick, and, I mean, it's important, the opinion  
17 of everybody, and then the council is trying to come up with a  
18 common idea, including everybody's opinion, on how the system  
19 works. I hope that answers your question. Vance, you want to go  
20 through an example?

21  
22 **WALTER KEITHLY:** It was my understanding that Graciela was going  
23 to give us an example when she sends us the final spreadsheets and  
24 all.

25  
26 **RICHARD APPELDOORN:** Correct.

27  
28 **JUAN CRUZ-MOTTA:** That sounds good.

29  
30 **WALTER KEITHLY:** What this sounds like, to some extent, and I  
31 haven't seen it used for a long time, at least what you're asking  
32 the SSC to do, is what used to be -- Well, I guess it's still  
33 called the Delphi technique, where everybody gives a quantitative  
34 value and then they come together as a group or whatever, and  
35 everybody can see each other's differences, and then we can  
36 rearrange the numbers accordingly, and you get a second round  
37 where, based on everybody else's responses and discussion, then  
38 you go back and change the numbers.

39  
40 My only concern there is, generally, you're asking experts to do  
41 that, and I don't consider myself an expert on abiotic factors and  
42 some of these others, and to be asked to rank them is -- It goes  
43 beyond subjective, and I have minimal -- Subjectivity implies that  
44 you have some knowledge, and I guess I have some, but I don't feel  
45 that I have enough knowledge to provide any objectivity to some of  
46 the categories.

47  
48 **RICHARD APPELDOORN:** So two comments to that, Walter. One is that

1 we're not strictly doing a Delphi technique. This is the basis  
2 for discussion, and, following your other comment, if I -- Our  
3 scores are not all equal, and let's put it that way, and so, when  
4 we have discussion, and it involves aspects of the socioeconomics  
5 and cultural aspects and how those might interrelate, I would rely  
6 heavily on you and Tarsila to inform how I would think of that.

7  
8 I mean, I can give my opinions now, based on all the conversations  
9 we've had and what we think these various boxes mean, and then how  
10 do they link up, but, when we get together, I would be -- In an  
11 area that I feel that I am very knowledgeable on, say habitat, I  
12 probably wouldn't listen to anybody else, and, in socioeconomic  
13 terms though, I would listen heavily to somebody I thought was an  
14 authority in those areas, and so expertise is going to drive this  
15 conversation, when we get together.

16  
17 I think your point is well taken about doing stuff that is beyond  
18 our knowledge base, even rudimentary knowledge base, and maybe  
19 it's perhaps a good idea that we would allow a coding system that  
20 basically says I didn't do this because I feel really uncomfortable  
21 in this particular box, and so to separate it from something where  
22 you say there is no connection, and so we'll think about putting  
23 that in the instructions.

24  
25 **DOUGLAS GREGORY:** Well, alternatively, couldn't we just leave the  
26 area blank? Like, if Walter isn't comfortable with habitat  
27 influences on say fishing, he could just leave that series of boxes  
28 blank.

29  
30 **RICHARD APPELDOORN:** No, because that would be saying he says that  
31 there's no connection, and so we have to differentiate between I  
32 know there is no connection to I don't feel comfortable doing this,  
33 and so blank would mean no connection, and so that's the only  
34 thing, and so it's not a hard thing to do.

35  
36 **DOUGLAS GREGORY:** What does zero mean? We don't use zeroes?  
37 That's what I would use zero for, is no connection.

38  
39 **RICHARD APPELDOORN:** As opposed to a blank?

40  
41 **DOUGLAS GREGORY:** A blank is lacking value.

42  
43 **JOE KIMMEL:** How about a question-mark?

44  
45 **WALTER KEITHLY:** Or an X.

46  
47 **GRACIELA GARCIA-MOLINER:** We will figure out the code for that.

48

1 **RICHARD APPELDOORN:** Yes, and we'll figure out the code and have  
2 it in the instructions.  
3  
4 **WALTER KEITHLY:** Okay. If you're good, I recommend we adjourn. I  
5 will make a motion to adjourn.  
6  
7 **RICHARD APPELDOORN:** I need a second.  
8  
9 **JOE KIMMEL:** I will second that, Walter. Good idea.  
10  
11 **RICHARD APPELDOORN:** Any opposition?  
12  
13 **GRACIELA GARCIA-MOLINER:** Let me read this for the record, so that  
14 it can be accounted for. Sorry about that. Julian Magras said  
15 that I thought that the models for each island was going to be  
16 discussed one-by-one at the SSC meeting with our involvement, and  
17 then the St. Thomas models are not done, due to the fact that they  
18 haven't had the meetings with officials yet, because they planned  
19 a regulatory agency meeting before finalizing their model.  
20  
21 Michelle said that perception is part of the subjectiveness of  
22 these models, and so sorry about the interruption, but now they  
23 are on the record, and so the SSC still had to discuss, like you  
24 did today, with the varying inputs, the differences between the  
25 islands and how you're going to guide the council towards that  
26 end.  
27  
28 **VANCE VICENTE:** I have a major question before doing my homework,  
29 and I was out for the last half-hour, but I need a very short and  
30 solid definition of driver component and response component, or a  
31 very good example of it, so that I can run through this experiment.  
32  
33 **RICHARD APPELDOORN:** Okay, and so that will be included in the  
34 instructions, both of those.  
35  
36 **VANCE VICENTE:** Thanks.  
37  
38 **RICHARD APPELDOORN:** To address the comment on island-based plans,  
39 that is another step after we get this together, and so tune in at  
40 a later date. All right.  
41  
42 We're going to close, and I want to thank, again, Liajay for her  
43 work, and Graciela for her work, in supporting the activities here,  
44 and all of you for your contributions. Thank you very much.  
45 Unless there is other comments, we are closed.  
46  
47 **GRACIELA GARCIA-MOLINER:** We have Sarah and Orian in the  
48 background.

1  
2  
3  
4  
5

(Whereupon, the meeting adjourned on July 28, 2020.)

- - -