# SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL

## HABITAT ADVISORY PANEL MEETING

**Crowne Plaza Hotel**
**North Charleston, South Carolina**
**April 7-8, 2015**

## Summary of Minutes

**Habitat AP**:

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|---|---|
| Pat Geer, Chair | Anne Deaton |
| Dr. Christopher Elkins | John Ellis |
| Steve Trowell | Priscilla Wendt |
| Mark Caldwell | James Geiger |
| Bill Parker | Pace Wilber |
| Dr. Dustin Kemp | Alice Lawrence |
| Mark Carter | Bill Kelly |
| Dr. Amber Whittle | Dr. Patrick Halpin |
| Dr. Steve Ross | Carter Watterson |
| Dr. George Sedberry | |

**Council Members:**

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| Dr. Wilson Laney | Mel Bell |
| Mark Brown | |

**Council Staff:**

| | |
|---|---|
| Gregg Waugh | Roger Pugliese |
| Julie O'Dell | Chip Collier |

**Observers/Participants:**

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| Dr. Clark Alexander | Brian Krevor |
| Brian Hooker | Mark Belter |
| John Johnson | Arie Kaller |
| Jaclyn Daly | Stan Labak |
| Jill Lewandowski | |

Additional Attendees Attached

The Habitat Protection and Ecosystem-Based Management Advisory Panel of the South Atlantic Fishery Management Council convened in the Crowne Plaza, North Charleston, South Carolina, April 7, 2015, and was called to order at 9:00 o'clock a.m. by Chairman Patrick Geer.

MR. GEER: I guess we'll get started. My name is Pat Geer. I'm with Georgia DNR, and I'm chairman of the Habitat AP. We have a lot of new members so I want to go around the room and have everyone just briefly introduce yourself.

DR. ELKINS: Chris Elkins; North Carolina recreational seat.

MR. KELLY: Bill Kelly. I'm the executive director for the Key West Commercial Fishermen's Association.

DR. KEMP: Dustin Kemp; I'm with the University of Georgia.

DR. ALEXANDER: I'm Clark Alexander and I am with Skidaway Institute of Oceanography, part of the University of Georgia.

MR. WATTERSON: Carter Watterson; U.S. Department of the Navy.

MR. PARKER: Captain Bill Parker; Runaway Fishing Charters, Hilton Head, South Carolina.

MR. GEIGER: Dr. Jaime Geiger; U.S. Fish and Wildlife Service, retired after 35 years.

MR. CARTER: Mark Carter; Florida recreational seat.

DR. HALPIN: Pat Halpin; Duke University.

MS. WENDT: Priscilla Wendt; South Carolina Department of Natural Resources.

MR. PUGLIESE: Roger Pugliese; South Atlantic Council staff.

MR. WILBER: Pace Wilber; NOAA Fisheries.

MS. LAWRENCE: Alice Lawrence; U.S. Fish and Wildlife Service, Athens, Georgia.

MS. DEATON: Anne Deaton; North Carolina Division of Marine Fisheries.

MR. ELLIS: John Ellis; U.S. Fish and Wildlife Service; Raleigh, North Carolina.

DR. WHITTLE: Amber Whittle with the Florida Fish and Wildlife Commission.

MR. CALDWELL: Mark Caldwell; Fish and Wildlife Service here in Charleston.

MR TROWELL: Steve Trowell; North Carolina Division of Coastal Management.

DR. ROSS: Steve Ross, research professor at the University of North Carolina in Wilmington.

MR. GEER: I want to thank the council members for coming today. I'm sure we'll have some lively discussions. Approval of the agenda is next. We have one change that I know about. We're supposed to have a session on artificial reefs at the end of tomorrow. We're going to push that back to November if nobody has any objection to that.

The Florida Wildlife Commission is going to do a presentation so we will have the artificial reef discussion at the November meeting. Are there any other additions or changes in the agenda? Seeing none; we'll consider the agenda is approved. We don't have the minutes from our April meeting with us.

MR. PUGLIESE: The minutes have been e-mailed to you along with the revised agenda. If there are any editorial modifications, please e-mail them to me directly and we will make those adjustments.

MR. GEER: It says I'm supposed to give an opening statement here. We've got a lot of discussion today. We're going to break out in small state groups later on this morning. Then tomorrow BOEM is going to be here for almost the whole morning to discuss a lot of topics with us of concern and interest, so I'm looking forward to a very productive meeting.

MR. PUGLIESE: Just a couple of quick comments. I appreciate all the standing members and new members for making the time to be able to participate and provide input. I think we are at a very key point to have very preliminary information on the movement and the refinement of our fisheries ecosystem plan, the second version that is in the process. There is a lot of connectivity already and getting the groups together and coordinating and getting the first set of revisions on board.

This is an opportunity to have general guidance on where some of these newer sections are being developed; in addition to some very key ones as you will see in this morning's discussions on both fishing and non-fishing activities. Really kind of look at and then meet the mandates of what this group really is.

Then the name of the group at the council session; the council merged Habitat and Environmental Protection Advisory Committee with the Ecosystem-Based Management Committee. I think that is just great that they acknowledge the fact that this group is the group that has provided guidance, for example, on both habitat and the move towards ecosystem-based management and has been for a long time.

That is kind of acknowledged and that really also acknowledged the fact that the South Atlantic has had to go back to the original habitat plan and fishery systems plan and has identified that habitat conservation is the foundation to move towards ecosystem-based management. That can at least set the stage for a lot of open discussion, and I guess that is one of the biggest things. Today there is going to be a lot of open discussions on some of these topics. We'll just begin to flesh them out.

MR. GEER: The first topic item today is talking about threats to the habitat, and we're going to talk about non-fishing impacts. Later on this morning we're going to talk about fishing impacts. We'll open it up with in your books, Attachment 1 through 3.

MR. PUGLIESE: I had to take this as support mainly for the other documentation that I've provided to the group. What I've highlighted is the section from the Ecosystem Plan that identifies it here; but I also provided some additional documents that have been created with an opportunity to draw on some of the input and some of the recommendations that were developed in a broader sense.

I think that is why I thought it was somewhat appropriate and at least allow Pace to touch on those. We will have a breakout session later on and be open to discussion on where we are looking at non-fishing threats in our region and to build on what we have in the existing fishery ecosystem plan.

Going back into it again has refreshed what is in the draft in there; I think it did a fairly excellent job of showing us the core of what the real threats are. We could go back in session breakouts and really identify how these are addressed as a special mandate from Magnuson. Many of you are very familiar with these; but for those who are not, right in the front end of the section it is talking about how essential fish habitat mandates really cover this really complex combination of everything that is necessary from fish spawning and breeding, growth and maturity.

When you do that, you really are covering a very large graph of this and linked to that. I think our region addresses this a bit more significantly in many cases both through our NOAA Fishery partners and other activities, but how important addressing non-fishing impacts is and so much connectivity systems that this is an area to really provide guidance for the future.

The direction and focus on really identifying impacts on the components of the system, you're looking at the freshwater estuarine inshore processes that are connected and how those different areas are connected. Then you really do get into the major sections that cover agriculture – and the way this is structured in the document; it talks about potential and that may be where the discussions in the breakout session, the potential threats and expansion of the way it talks about potential threats because it gets into very much detail and really getting into the core of what the different threats are from agriculture, aquaculture now that everybody is involved in.

At the last AP meeting we did revise a policy statement addressing aquaculture. I think that has got something that can be drawn on and is really a demand to try and refer back to that. We've got the silviculture in our region; again the same thing with identifying the general threats and it gets into the detail of the urban and suburban development component.

I think what is really interesting with this discussion and opportunity is that our partners in some of the different areas are looking at some of these issues on regional scales. For example, our work with the Landscape Conservation Cooperative; we may be able to get some really refined information of what the real threats are on development, and not just coastal development but through all the way inland.

I think as we look at some of these other types of products, you can see the erosion in that north type of region is just as great as the coastal areas, so you're getting a double attack in terms of urbanization and what is happening in water flows and all the things that the estuarine systems rely on or have issues on.

But there are some new tools that really highlights those fairly effectively. Other ones address transportation components, and again focusing on the potential threats with some of these other partner efforts, industrial and commercial efforts in our region. Navigation components within our region, shoreline and fish passage; some of these again drawing on recent policy discussions, and our partner discussions, the analysis that were done through the Southeast Resource Partnership on the assessment of all the areas in the entire southeast region, and species that are vulnerable to some of those types of activities.

I think again that type of information could be really useful in giving it a broader, especially regional scope of what some of these impacts are; and with more recent NOAA Fisheries responses to dam, river flows, and what some of the implications are for prey through the council- managed species.

Other sources of non-point source pollution is one of the other areas and again some of these types of information have been compiled on a more regional basis and in the individual states to support a broader understanding of what some of the water issues are and the quality. The non-native and nuisance species, we also had the updated, refined policy statement on invasives in those marine, estuarine, and non-marine.

We have the information that has compiled the ability to store those types of information and recommendation. And then it gets into the marine offshore processes; so again navigation, and that has some relevance very specifically to our recent adopted policy statement on dredge and fill, coastal engineering that is applicable in this area.

Marine debris, offshore mining; that one really tied directly to our beach policy discussions.
We want to get into one of the larger areas and the most recent concern, which we're essentially going to spend tomorrow on, is oil and gas exploration, development and transportation. The discussions in the document has to do with energy development of oil and gas, commercial and industrial activities.

It highlights artificial reefs; some of the implications on artificial reefs. Now we're going to focus that in our next meeting. This addresses some of the potential impacts on it, but we're going to get into a broader policy document on the entire artificial reef mandate. In gets into the other side of the policy discussion on alternative energy that we did get into the 2009 document, discussions of the offshore wind turbines, the LNG systems, and some of the offshore wind, solar technology, hydro-technology.

The potential evolution in the region is fairly preliminary at that stage. A lot more has been compiled and additional guidance is going to go directly into the upcoming revised council policy statement on energy. Again, time-wise, fairly extensive discussions on lionfish were included, and again those are connected to our policy. The last area has to do with natural events and climate change; and we'll get into a discussion later today on another subsection of the council document that will address fisheries oceanography and climate variability.

The idea of that, I will get into a little further, is to really understand the context of what we have in the ocean and then how that relates to managed species and then what types of episodic events and variability to change did potentially affect the habitat, so that is going to be a significant undertaking to refine.

But we had a fairly good beginning in this first session and a very brief discussion on a very extensive section that we'll update and refine and draw on a lot of what we have been doing on other policy changes and other information with partners. Any questions?

MR. GEER: I know that's a lot to digest. Some of those issues are going to have agency positions on something like climate change and some of them probably not as much. It is a very thorough document with a lot of information. We going to break out into groups later; but if there is any information that you have or any literature that you know of and can share such as documents; just provide those to Roger or myself.

MR. PUGLIESE: I think what is really key is we do have – in some circumstances we do have core groups, such as there will be a core group – there is a core group for the last section that is capturing especially the non-fishing component. The fish component I think we're going to be doing partially in-house and then probably work with partners and states and really refine those.

But definitely as those groups, anything that individuals may know that can update the more recent information that can be provided in any of those deliberations, it will be well worth the effort. I guess the last note I had was to maybe just at least let Pace know what I had provided but also got into many of the other follow-up documents some of the things that have been done in the northeast region and an overview of some very specific recommendations for some of the permit review processes that we're going to work with his staff and may be able to refine and add that. We're going to have a core component to work on that revision to that section.

MR. GEER: Does anybody have anything they want to add or discuss about this right now? The document has been out there for a while, but if there is something that you feel – Carter.

MR. WATTERSON: I just wanted to bring up one brief point under the marine debris section. On Page 58, like the fourth paragraph – the subparagraph begins with the U.S. Navy operates approximately 600 vessels worldwide, carrying about 285,000 personnel, and discharging nearly four tons of plastic refuse into the ocean daily; that reference is something like 25 years old. The Navy has a standard operating policy that we don't discharge any plastics and haven't for years.

MR. GEER: Can you provide a newer reference? Yes; that is why we're here to provide that kind of reference. Chris.

DR. ELKINS: What is the plan on the updated decision document, what is the schedule?

MR. GEER: As far as the date?

DR. ELKINS: Yes.

MR. PUGLIESE: Well, we're in the process right now of we've contacted many of the writers for individual sections. We looking at a somewhat similar process as we did before where we created writers for individual sections of species, habitats and then some of the newer areas. Those names are being identified and then they're going to provide the foundation for updates, revisions and generate the products and will ultimately be compiled together as the Fishery Ecosystem Plan II.

The back end of this entire process originally it was thought we were going to be moving a little quicker, but I think given the complexity of this and making sure that we bring as many partners together – as I said, most have been identified. We're going to be working now through the end of this year to get a lot of the writing done through those individuals, review groups and writing groups, and moving into having a draft into probably March of 2016 with the final approved in June of next year.

There had to be a bit of reality check in trying to get all of this accomplished and given everything else going on, we have other things moving like we're trying to have this moving forward also with modeling development as part of a component of this so that we have the tools capable to advance what we can actually translate some of this to management.

DR. ELKINS: Like Carter, I was struck by the dating of some of the issues. Just for the record, we do have a recent aquaculture thing that needs to be incorporated and some of the discussion on pig farming for North Carolina.

MR. PUGLIESE: I guess I'll say that certain parts of that will probably be a lot further advanced and here is the opportunity to refine that statement and really I think also provide guidance down to the road, so I think that's where we really can take it a step further. There are some sections that are fairly dated that we need to definitely get caught up with the most recent information.

MR. GEER: Is there anything else? Mark.

DR. ALEXANDER: There is just some more recent work that has been done associated with recreational boating and boating activity along intercoastal waterways that needs to be added into this as well. Then there has been a lot of work on docks and piers coming out of Georgia since the docks and piers section was written in here, so there are a lot of updating that we can do there as well.

MR. GEER: Anything else from anybody?

DR. HALPIN: On the climate change issue, I am on the MAFAC Climate Advisory Committee of NOAA and have more recent information on what is going on.

MR. GEER: I would think that would be great. Anyone else coming forward? Like I said, look through the document and if you see – yes, some of these are outdated and I had some comments as well. If anybody has any references, you can provide them to us. Pace.

MR. WILBER: I find two things to note. First this section of the FEP originated as a bit part of the Habitat Plan done in the 1990's. When the first iteration of the Fishery Ecosystem Plan was developed, they took the Word Star or Word Perfect version, or whatever, they had back then on the Habitat Plan, and just basically parsed it out to various teams. Some of those teams did an outstanding job of updating and other teams did not do such an outstanding job updating.

That led it to be fairly uneven in terms of quality and currentness of this section. I would hope in the next iteration of the FEP a lot of this unevenness is no longer in existence. I think to achieve that goal we kind of have to set some serious standards for what the next version of the FEP for the non-fishing impact section needs to look like.

We have to not be afraid to delete the sections that don't meet those goals. There has got to be a serious amount of effort needed not only just in the triage and see what sections really need some serious updating as opposed to this little spotty thing versus actually rewriting some parts of it. The other related point is I think some discussion that would help a lot is really what do we want this section to do for us.

I think right now it is kind of like a Wikipedia kind of a thing that some parts of it are pretty interesting and parts that are not all that interesting; but when it comes right down to what are the take-home messages and what is the guidance that this provides to those of us working in day-to-day permitting, what is the guidance that is emerging from this.

We can pick the part about hog farms, but what do I really need to know about hog farms if I'm doing a permit to be used in North Carolina? What is the bottom-line message is something that really needs to be kind of emphasized. Let's provide some of that specific guidance, and it would be good to make sure that it gets incorporated into the FEP. There is also an opportunity I think to do a lot of synthetic work and step back and really think about what some of these threats to the habitat really mean; and be a little bit bold and put out some suggested indications of what those threats mean.

MR. PUGLIESE: I think that's a natural evolution. We've spent so much time just trying to get to the next step the last time; this is exactly what we're hoping. I think again this is the opportunity where the panel can really weigh in as the main structure to build some of those refined recommendations and get some additional deliberations.

Let me just state at the November meeting we will probably have a very directed almost workshop discussions on threats, on research and some things we could maybe get into these types of refinement of those types of recommendations; the synergy of a lot of the information. I think this group can really provide some of those very specific recommendations.

MR. GEIGER: Updating threats, identifying any new threats, looking at threats that may no longer be that high a priority; is there any expectation that we are going to look at some kind of a priority system in terms of these or make recommendations based upon either biological, ecological, social economic harm or impact? Is there any implications that would be our role or an opportunity to do so?

MR. PUGLIESE: Yes, I think that is where he kind of crystallizes the policy statement where you really do get to what the present threats are within those, and I think that is an avenue. I think also that again maybe within those subsections you reiterate that or expand on that further and refine those recommendations. The council is looking at some guidance to really get not only the fishing threats but non-fishing.

MS. DEATON: I like that idea of like you referred to the whole point is to show the link between the threat and the habitat and what species rely on that habitat, right? I'm thinking maybe a paper in some point of the document that lists the major threats, even the high, medium, low, and like a major list where you have your threats, you have the habitats that are affected by those threats and then the species that utilize those habitats. If there was funding for temporary council staff to do that editorial type hat, I think that would greatly help the document and then you can cut and smooth it out.

MR. GEER: That's a good point. It is difficult for all of us to get these collated, and I agree with that.

MR. PUGLIESE: Again, this is evolving so one of the things that we've done last time is we did have an editorial group created with the partners from either states or other aspects, and the intent is to provide that. That is one layer to accomplish something, but I think that is somewhat different than having kind of the opportunity to create focused sections that we're talking about. There may be ways to work with some of our other partners. I think about the Landscape Conservation Cooperative just did with the state of the South Atlantic.

We actually talked about that the last time, because I was looking at that as a springboard to do kind of the state of our essential fish habitat also, something to connect in that; and if you're in it or connected to it. I think there are partners to get this accomplished. I think we can figure out a way to do the overall editorial but then have very specific focused review and product creation. We'll figure out ways to do it, because there are some resources in those organizations that can provide that, and I think there is a real desire to look at those resources.

MR. GEER: Anne, I like the idea of the matrix. I think that is something that we can probably as a group sit down and hash it out in a couple of hours. I think we can sit down and come up with some kind of matrix that everybody would be happy with.

MR. PUGLIESE: And that may be a product of the first discussion today as we go through the general discussion now before lunch and set the stage to have the core of what that is and that can be one of those subgroups. We really want to do some this and really take it apart, and that is going to be a critical time to get this done. That would be a really good task or those efforts to take it down to this next step. I think it is realistic to think that as a broader scope, it is perfect to begin to look at some of this.

DR. LANEY: In discussing the species habitat matrix that Anne brought up, the Atlantic Coast Fish Habitat Partnership has already put together a species habitat matrix for the whole east coast, so that may be a good starting point if you wanted to – you'd have to create some threats' linkages, too, but I think that piece is sitting there and has already been done.

I understand it is being submitted to Science, I think, for publication. It is surely going to submit it somewhere else if Science turns it down. I just wanted to remind you that is there and it has been done. It has been very seriously vetted along the whole east coast. How useful it might be, I don't know, but we can certainly take a look at that.

MR. PUGLIESE: I think that we would most definitely want to look at. There are some issues potentially connected the habitat. I've had some issues in reviewing that before. I think it still is a valuable product. It has a part of the discussions. There are other connected ones we're going to touch on is looking at vulnerability, some of the kind of work we're doing on building species information systems by all individual species. There are other things I think they can begin to discuss and have a matrix discussion.

MR. WILBER: I just want to emphasize the point Anne brought up about temporary staff; that at least full-time staff – there are lots of partners who have little bits and pieces of what the

Fishery Ecosystem Plan eventually could become. A lot of these bits and pieces that are out there are turnkey and are going to plug directly into the FEP.

They are all going to require substantial evaluation, reformatting, and adjustment in order to make it fit well into the FEP. There are plenty of companies that sell bricks, but if you don't have a plan as to how the bricks become a building, you don't really get anywhere. Really someone who is dedicated full time to this – I don't know whether it is a six-month job or a twelve-month job, but it is something on that order.

I really think it is necessary – I mean, my staff in the initial FEP were kind of locked in the burden of developing the fishing impact section. When the editorial process kind of broke down a little bit towards the end for the FEP, my staff took on doing some of the things such as copying stuff. Staffs run out of time and other things didn't get done because of time.

I really think the idea of having some funding, either hire a contractor or some other way to get somebody whose job is nothing but making this entity work for a six to twelve month period is really important if this is really going to get to the next level. Now a couple of folks have referred to this sort of being, well, it is a start for the first time. Well, it is not; this is really the third time. The first time was the Habitat Plan in the 1990's. The second time was ten years later in 2000. Now we're ten years later into 2018. This excuse of it being sort of a start, that's 20 years.

DR. ALEXANDER: Pace, could you tell me how you got to every decade the science is out of date, there are new things that need to be included and it needs to be revised again. It seems like you're saying that there is an effort that could take place now that would make it a final document, and I just wondered how you reconcile the science always being behind with saying it is not done. Could you remind me again?

MR. WILBER: It is never really the final document. It needs to be updated and it needs to be current. In order for it to be really useful – and to use the report that Roger mentioned, that document strove to produce basically cut-and-paste ready copy for environmental use; and it largely achieved that goal and it needs to be updated if it is going to continue to maintain that goal. That comes to back my point that some sort of standard – I mean, what is the minimum standard that really meets the need in order for a component to stay in the FEP. I think currentness at the time of the writing is one of those standards.

MR. GEER: All right, like I said, look it over and if you know of any references and you know some new materials, please provide those references. It is easy to look at something and say, well, it is outdated, but it is a little bit harder to get that information into the right hands of the people. There are 30 people; so if everybody takes a look in at least one section that they feel comfortable with providing information, we'll get a lot of updated information.

MR. PUGLIESE: I definitely take it to heart with Pace's comments about where we need to go back. I am charged with making sure that this moves forward. The bottom line is that I've got make sure this is done. I've already talked in-house about working with other partners to go further with this.

There may be other avenues to get an additional commitment to make sure that this happens and there may be facilitated efforts for subsections. We're going to keep that in mind as this moves forward to get whatever help to make sure it happens. The resources may either may be coming from partners, maybe done in-house or work with other groups to help facilitate subsections.

At the November meeting we may have a whole section that is a coordinated effort to get some of these specific inputs into and refinements of this. The review of the subsections and the review of the document is something that we want to make sure that it goes forward. I think the biggest thing is to ensure that the recommendations – that opportunity to refine whatever is in there already and then refine of how that translates to recommendations that we can advance to the council or to the partners.

There are some other partners in our region. Pew Charitable Trust is directly involved with the whole assessment process of providing guidance to the councils and others on where some of these should go, so we can draw at least from some of these other activities that we're working with other partners on. That's a lot and a lot still to go.

MR. GEER: Anything else on this topic? All right, let's move on the next item, which is updating information on impacts of fisheries on habitat. Again, it is kind of the same thing as some of the fishing gear that are in here in great detail, wonderful information on what is going on. It has got a lot of good information in there.

I guess given the importance of fishing trawls and otter trawls in the South Atlantic, I can see why that one was so large. There are a lot of different gears. There are mobile gears and there is static gears as well. I really don't see the need to go through the information that is in here; but if you know of new technologies that are coming up, that is what we're going to talk about next. I think it does a pretty thorough job of listing the different gears that may be impacting habitats.

MR. PUGLIESE: This is going to draw on definitely what other actions the council has taken since this done in terms of regulations on these gears. Maybe it could be a subsection of really identifying allowable gears, kind of looking around, et cetera. What are the ways that we have addressed this for fishing activities?

The key on this is that the council has addressed under the existing fisheries management plans many of the gears and how they impact this; and has Pat has already said, shoring up the importance of individual states or fishing operations. One thing I think that is going to be really useful to this; that this applies to the entire is spatial information relative to this; so understanding where operations of various gears are; because right now a lot is just understood in words, and it would be good to have spatial footprints of where some of various fisheries are operating.

We can get into other activities and those types of kind of the flipside activities that are affecting those fisheries. That opportunity I think is with the Atlas that we have been building, the fishery information that really doesn't shore it up further in terms of how those – I think the partners have been saying that they have some of that information so specifically it will be useful to be able to show those activities and to get the directed impacts and the importance of that and the implication may have no relevance that those gears are essentially limited in their activities.

MR. GEER: Is there anything that somebody knows of a new gear that is being used or any comments you might want to add to this section at this point that anybody knows of? If seems like a lot of things you could try, but very few things hold. In our state a lot of guys commercially are trying a lot of different fishing gears that just doesn't pan out.

(Mr. Kelly made some remarks about the spiny lobster fishery, but the recording is too low to transcribe.)

MR. GEER: I can't speak too much for the spiny lobster pot fishery, but there is like an entire bibliography for trawling. There are hundreds of references in there. When you start looking at them, some of them are saying it is a scale of destruction over here, and the other ones are saying no. It's a small percentage of the same – I mean, trawling can actually be beneficial. There is a lot of these things, depending on what the scope of the work was and what the research was intended to do. I mean, that's part of our job when we're looking at these things is looking at those references and making sure they're making sense and folks will agree with them. Is that referenced in this document now?

MR. KELLY: They are in the report.

MR. GEER: Does anyone else have anything? Like I mentioned, if there were any new fisheries that have been popping up, please let us know about it. There are fisheries that we are going to talk about now. Chip Collier is going to talk about the calico scallop fishery; and after that I have the honor of talking about jellyball fishery.

MR. PUGLIESE: The existing Fishery Ecosystem Plan had the benefit of essentially an entire FMP that was being developed; and at that point we were looking at developing that and the section that has been included in this not only included the information but all the research that had been done to date at that point where they were even doing sampling within the northern extent of the HAPC on the calico population, et cetera.

This actually was one of the more updated at that point. There were virtually no landings of calico, so what has happened is there has been some rumblings about a new fishery and Chip is here to kind of touch on exactly what is the condition and what we know about what has happened.

MR. COLLIER: Giving a little bit of history of the calico scallop fishery, it basically started in the sixties and then peaked back in the eighties with a high of about 42 million pounds. Since then, it has been extremely sporadic and actually in the 2000's pretty minimal. Over the years about 500,000 pounds landed; and since 2000 there have only been five years of landings. Two of those occurred in 2012 and 2013.

In 2014 I contacted Florida and South Carolina, two states have had landings in the past for calico scallops, and they reported no landings for 2014 of calico scallops. It seemed like it peaked in 2012 again at 500,000 pounds and then it dropped right off in keeping with the, sporadic nature of the calico scallop fishery. That is pretty much all I have.

MR. GEER: What is the life history; can you describe that a little bit?

MR. COLLIER: It is very similar to bay scallops. They're a short-lived scallop. Based on two years, they could be getting spawning in about six months. One of the biggest concerns with this species is there was a protozoan that was described. In 2008 they looked at it and reported on it and a significant portion of the scallops were actually having that protozoan in them. It is not known if that was actually killing the scallops, but the presence probably reduces their overall ability to reproduce and their overall reproductive potential.

MR. GEER: Are there any questions for Chip?

DR. ROSS: What is the financial contribution of this fishery; do you guys know, or have any boats that support it when it does operate like in 2012 or fishermen.

MR. COLLIER: In 2012 there were six fishermen in the fishery. Other years are confidential so that means there is less than three.

DR. ROSS: That's all in Florida, right? Are they still landing in North Carolina?

MR. COLLIER: There haven't been any landings in North Carolina reported I think since the nineties.

DR. ROSS: One thing to consider is I noticed that fishery I sampled many years ago, it creates quite a lot of benthic habitat in areas that are normally sand so it accumulates a lot of species that are almost reef-like with low profile. It has an ecological impact, but it is ephemeral to some extent. We have no idea what the removal of that habitat – what the impact of that has on anything, but that is another aspect to consider besides just the fishery.

Although the occurrence of this species is variable; it seems to show up at about the same places over and over again for some reason. It is something to think about whether or not we can somehow preserve those. I think there is an aspect of overfishing, but that is difficult to tell with this kind of species that is short-lived. Anyway, a couple of things to consider there.

MR. COLLIER: Yes, there are definitely certain areas where they are likely to be, and it is actually certain shapes that the beds are likely to take. It is going to be perpendicular to the shore. It is pretty interesting how it actually dispersed along the coast, and it is very consistent on the Gulf and Atlantic sides.

MR. GEER: Are there any other questions for Chip?

DR. ALEXANDER: I was wondering if you could tell us a little bit why the beds are elliptically shaped. Is that around inlets or what?

MR. COLLIER: There has been speculation, but nobody has come up with a real good answer on why it is shaped like that. It could be dispersal patterns where they think it is the larval retention. It is pretty short planktonic larval duration; two weeks, maybe a little bit longer. The currents in those systems might actually keep it localized into an elliptical shape, but that has been one of the hypotheses, but it has not been proven.

MR. PUGLIESE: Just quick thoughts about one of the concerns was just the – well, not necessarily concerns but just the fact that there may be a rebuilding of that population. I remember when we originally did our work with the rock shrimp; there were discussions or at least comments made during some of the sessions about potential bycatch of calicos was their controlling factors on that fishery.

Other aspects are the gear issues, because at the time the original calico – and most of the calico fishery is basically all shell stock – there was an opportunity or a desire to shift to a dredge and at-sea effort, because one of the big speculations is the fact that when those 40 million pounds were landed, those were essentially all brought to shore or dumped if they couldn't get into the process or something.

All that material, which would have been settlement material, was brought out of the ocean. Another aspect is that when we did the original effort here, they had done research in the northern section of the Oculina Bank and had seen significant bed rebuilding in that area. With rumblings of potentially a new fishery starting again, I was real curious if – and a number of people real curious is if that may have been the result of an untouched fish area in that northern section, those beds actually providing the spat to the northern area.

That would be something interesting to also look at. Now, the fact that it has not been sustained, I'm not sure exactly what that may mean, but it did reach a half a million pounds versus any other year up to that point was a pretty big jump for it. The idea is that it potentially could have kept on and maybe something else was something that connected.

Now, one of the other things that may be worthwhile looking into is understanding the oceanographic variability relative to where these beds are. That may be the defining character of why you are getting the settlement in those zones and everything. As we move down some of these roads, not only looking at the benthic, looking at truly what the oceanographic characteristic is defining is another aspect that may get a better understanding of the biology or the distribution of those patterns of those.

MS. DEATON: I had heard that the concentration off of Cape Canaveral has always been attributed to upwelling; nutrient-rich upwelling events off of there that are episodic, not every year, so that could be why. I just had a question. Are there any other bottom-disturbing fisheries in that same area that would be disturbing any shell matter or disturbing the bottom that would affect it?

MR. PUGLIESE: The only other fishery operating in those types of areas, the primary one would be the rock shrimp fishery that is operating in there. I'm not sure if maybe even some of the penaeid in the winter. The roe shrimp fishery may be operating in some of those same zones that calicos may be found.

But this is where all these things start really synergizing as you started talking about it. The upwelling issue is a pretty significant one in our region, because what was in that area of Florida, which was like once a month occurrence apparently in some years more recently, you are starting to see them two and three times a week and different things. You are seeing some of the stocks like mackerel may not even pass certain areas, because you are getting continuous upwelling in some of those areas.

That may have significant implications for a lot of our – it gets to that point of use of variability, because I think in our region those increased episodic events may have a lot more driver to what is going on. The distribution of black sea bass may be affected by that. This with the calicos may be affected by that and then migration patterns of king mackerel. There is a lot that we get all the way down to the roots of some of these; it may be some other types of events that are more driving it. I just had to build on that because that is something that is very timely, and that may be very much, because it is happening more frequently right now.

MR. GEER: Anything else, any other questions for Chip? I guess I am up on the agenda now. I don't know if anyone else has had the honor of having to deal with the cannonball jellyfish as I have, and Mel Bell has started to have to deal with it as well. It is an emerging fishery. I walked in the door at DNR in 2002, and this was one of the first things I did was visit the jellyball processing plant in Darien, Georgia.

I have been dealing with it ever since, but it is a fairly large jellyfish. You have seen them on the beach. Its name is the perfect name for it because it is solid. If you put it on the deck of a boat, it is not gelatinous ooze, it is solid. It is a round, heavy duty animal. The name cannonball fits it well, because they can weigh up to about three pounds. The maximum size is about 10 inches bell width. We have very limited information on it as far as from fisheries-independent surveys.

The SEAMAP Program and Coastal Trawl Survey has some and so does our survey at our Georgia DNR, our trawl surveys. Interestingly enough, the TEDs were originally designed by somebody in Georgia named Sinkie Boone, and he designed them to exclude the jellyfish, these jellyballs. That was the precursor to a TED.

With those kinds of things, the jellyballs were clogging the nets certain times of the year; so by putting this device in, it allowed it to exclude the jellyballs. There was a fishery in the mid-nineties that was first documented. We gave our first experimental permit in Georgia in 1998, and we kept it under that guise of an experimental fishery for all that time.

Now in 2013 in the state of Georgia we had a major overhaul of our fishing regulations where we removed mostly for finfish regulations from the legislation to our DNR board. In the process we said we're taking that experimental label off of it and we're considering it a bona fide fishery. There are a small number of participants in the fishery.

It is limited by the processer and the buyers; so if there is not a processor to purchase the catch, we won't issue that experimental permit. The way we've controlled it in our state and managed it in our state prior to 2012, it was by an experimental permit. We only had one person in the state doing it in Darien, Georgia.

That processor had the permit. He would come to us and give us a list of fishermen and vessels that wanted to participate in the fishery. We would go ahead and run any background checks on them. If they had fishing violations, we would say, no, they can't participate. Then we would issue each of the fishermen and the processor a letter of authorization to fish. We required from the start of this fishery a TED in state waters. You can see by that map most of the fishery; they don't like doing the TED, because it excludes the jellyball, so most of the fishery is being conducted outside of state waters where they are not required to have a TED.

NOAA does not really recognize this fishery yet, and it has been kind of frustrating trying to go after grant money when it is not – you know, why are you putting a TED in there if it is not required? Well, because we are trying to be proactive on this. That has been a little bit of an issue. It is not required in federal waters, so they are fishing primarily in federal waters.

Since 2013, when it became a bona fide fishery, we kind of kept the same guys with this, because we didn't want guys going out there – they can catch 100,000 pounds a day. We didn't want them going out, showing up at the processor and the processor says I don't have any capabilities today, I can't buy it from you, and then they dump it.

It is still being controlled by the processor and the number of processors; so if a fisherman wants to get into the fishery, we require him to have a letter from the processor saying that processor will buy all of his catch. We issue the letter of authorization. We have an approved season in state waters, but like I said most of the time they are not in state waters.

We still require the TEDs in state waters as well. The fishing gear is a four-inch stretch mesh, similar to what they use in the whelk fishery. They put lots of floats on the doors, because they are fishing primarily on the surface. The nets sometimes do reach down in the bottom if they are fishing shallow enough waters.

This is in here again and again. We are no BRDs in state, but TEDs are required in state waters. It is pretty much fishing on the surface. They have a time restriction mostly of about 30 minutes. The average tow time, when they tow, is 17 for most of the work that we've done with them. They are relatively short tow times. It is primarily, like I said, on the surface.

Pretty much what they do is they bring these on and just dump them in the hold. Then when they come back into the dock, they basically pump them out and the crew is sitting there, and they separate the bell from the mantel itself, from the tentacles, and they separate those out and put them into two different bins. They use a combination of salt and alum to dry them out.

Japan likes I think it is only 10 percent water weight in the products. China will take as much as 20 percent. It is also shipped to other countries. The processor in Darien; it is kind of reverse of what we have in our shrimp fishery where we are getting all these imports into our country. The countries that are getting charged a tariff are shipping it to countries like Malaysia where we don't have those tariffs against them, so there is no – what he is doing is he is shipping it to Viet Nam so he doesn't have to pay a tax and then they are shipping it to China.

He is kind of reverse in a much smaller scale. I can't show you the numbers on the reported landings, because we only have one processor, it is confidential, but I can show you the trends. I can tell you that landings are on the same scale as blue crab and shrimp in our state now. Then the CPUE is relatively stable, because they can pretty much fill their hold in a given – when they fill up and they come back in, it is about the same. The bottom one is the number of effort – is the effort and how many fishermen have been in the fishery.

The table on the left is how many letters of authorization, how many boats, and how many captains were issued letters of authorization. That doesn't mean they fished; it just means we issued them. You can see that before 2012 it was only one dealer. Since we've made it a bona

fide fishery, the number of boats and captains has increased each of the last two years, and now we have two dealers in the state.

We don't know what – we're thinking we're throwing out a number of probably 25 vessels maximum right now. We are just seeing where it goes. The number of trips that we're seeing is on a scale of hundreds of trips a year. It is not anything near the same level as our shrimping industry.

Again, I can't show you the values on here, because it is confidential, but the top is total pounds by month and then the CPUE, and then the total trips. Most of this is occurring – you know, it starts in November goes into December and then over the wintertime, which is kind of good, because it complements the shrimp fishery in the state.

It allows them to go out and make a little bit of money. The price per pound is nothing at the dock; it is five to eight cents per pound at the dock. They are making it up in the volume. Depending on the size of the boat, they can get as much as 5,000 pounds in a haul; 100,000 pounds in a day. The processing costs about 80 to 90 cents to process it. Then he ships it overseas and gets as much as twelve dollars a pound in China.

One of the things that I wanted to point out is what we're seeing is somewhat with an expansion of this fishery is that it is kind of small, but Darien is right in the middle on the coast there. That is where this fishery originated, but now we're having a second person want to come in and process and also unload and process.

Up in South Carolina, Mel can tell you about the issues they have had up there where somebody wanted to come in and unload in one place and process someplace else, and he had issues with water discharge. The site they picked had PCBs on the site, and there was shellfish nearby, and the issue is right now it is tied up in a lawsuit, correct?

What is happening in our state where this Crescent – where they want to create another jellyball plant in our state right now; they are looking at South Carolina and saying, look, they are having all these problems. We don't want to see it here either, but we've had one in downtown Darien for about 13 years now.

The gentleman who runs it is very successful. He donates a lot of money to the community, and he has been involved for a number of years. One of the problems is with this discharge, because of the alum sulfate, it is highly corrosive. He had permits, the one at Darien, to discharge it into this sewer system, but his sewer system started to rust away, so now he has to pretreat it before it goes into this system.

One of the issues is the discharge of the processing materials and that has to be treated somehow. The company that wants to start up in Crescent, they are saying that, well, we're going to just put it in the holds of the boat and take it offshore and dump it. You can't do that either. Then the Board of Health had issues like, well, then are you going to put the jellyfish in there right after you dump it? Then you can't do that.

We are also seeing people unloading in Fernandina Beach, and they unload in the Fernandina Beach and they are trucking these things all the way to St. Joes to Raffield's, is that it, Raffield's

in St. Joes? Now part of the problem with these things is they don't hold well, so to speak. Most of their trips are one day, and that is why they need to get them back and process them and get them on that salt, because the banging around in the trucks does not do good for the flesh of these.

The guy in Darien right now is not too concerned about the processor down here, because the quality of his, I guess meat is what you would call it is not up to the same scale as what he's doing. But you can see that they are tracking it 380 miles to Fernandina, but for the most part most of the landings are coming into Darien in our state.

Some of the issues that we've had in the state, some of the complaints about bycatch and what the bycatch issues are. It is a fairly clean fishery. We have been going out doing observer work with them since 2001. The numbers on here are harvest fish – I mean, 95 percent of the fish, I think it is less than 1,900 fish was 95 percent of all the fish they caught; so they don't see a lot.

They see harvest fish, they see a few blue crabs, butterfish, lots of cownose rays, because they are on the surface. There are times that the net is on the bottom, depending on the depth of where they're fishing, so they do see some blue crabs. They have had some protected species interactions as well, but the tow times are relatively short. We've been doing this -- the bycatch is fairly clean compared to some of the other fisheries.

DR. SEDBERRY: The harvest fish and the butterfish, are they the really tiny juveniles associated with the discards or are they bigger fish?

MR. GEER: I knew somebody was going to ask that. I don't know; I honestly don't. I haven't looked at the length frequencies on it. I am guessing they probably are because of the four-inch mesh.

DR. SEDBERRY: It seems like those things could go through unless they are really closely associated with jellyfish or shellfish or harvest fish.

MR. GEER: Interestingly enough, we don't get a lot of spadefish. We have some, but not as many as you would think. I think spadefish is number seven on that. The four species up there make up about 80 percent of what is caught in the bycatch. It is a fairly clean fishery. One of the things we've gotten is we've gotten a Sea Grant proposal to look at different TED designs,

They have come to us again and again about saying the four-inch TED that we have to fish in state waters, it excludes the larger jellyballs, we're losing money, so can we use a six-inch bar? We go to our turtle biologist who would present it to NMFS, and NMFS would come back and say a TED is four, and four, period. Two or three times that has come up, and it hasn't really gone anywhere.

We've got a grant through Sea Grant look at different TED designs. Right now we're looking at the approved NMFS TED versus no TED at all; and then when we complete that, the fishermen is designing a TED to use, which may not be six inches apart, it is probably going to be some kind of a gridded system, which might be 10 inches diagonally across. You were hoping to use that information to provide it to NMFS and get maybe an approved TED that they can use in state and federal waters.

George, you mentioned the symbiotic relationship between butterfish. We are looking at spider crabs. We've got a student at one of the colleges that is looking at a symbiotic relationship with spider crabs and jellyballs. I didn't even think about maybe having him do butterfish and harvest fish as well, but that is very good. It is a small grant; we just started it.

We are hoping to get some information on that. Those are the partners on it as well. The last thing I had is I had a video. It is just basically of them doing the trawling. They kind of put this together for our DNR Board, so they can kind of see some pretty pictures. There are the floats on the net going out.

He has kind of modified his gear, so basically he just dumps it right there and it goes right in to his hold. Like I said, the nets can have as much as 5,000 pounds in a single trawl. The main issues we're facing is with the processing, just getting rid of the discharge water that they have from the processing right now.

There have been some concerns brought up about, well, we don't know the sustainability of this; but between the SEAMAP data and our trawl data, we're not seeing any declines in the 12 years we've been collecting these. We are seeing a lot of juveniles, like maybe quarter size ones on our trawl survey. We're hoping that maybe we can link that to what is going on in the commercial fishery.

They just pump them out. That hold might be 100,000 pounds of jellyballs, and there they are processing. The processor in Darien, he had as many as 100 people working for him; but I think he said he had too many worker's comp claims and too many people complaining, so he cut it down to like 28 full-time people or something like that. He pays them whether or not they have work or not, I think is what he does. It is a growing fishery.

It easily has the potential to outcompete blue crabs and shrimp by total weight in the state; probably in South Carolina as well I guess if they ever start fishing there. But we are kind of hoping maybe one more dealer gets into the fishery so that we can actually start showing some of the numbers we're seeing. I've had discussions with the original dealer, who was pretty good about – initially he was very hush hush, but now I think he feels more confident. We've asked him can we use his data in presentations and he said, sure.

MS. LAWRENCE: Just out of curiosity, you talked about the processing; they separate the animal. Are both parts edible?

MR. GEER: Yes.

MS. LAWRENCE: Okay, they just treat them differently or something?

MR. GEER: No, they treat them the same. It is just one has higher quality than the other. Basically, when they ship it overseas – I think I gave Roger the wrong version, because I had a couple pictures of what it looked like. It looks like a dried-out plastic bag pretty much. They ship it out in five gallon buckets.

They chop it up very finely in the final processing in Japan and China, and they sell it in like 100 gram bags that have a 700 percent sodium allowance for the day. They use them in salads and

garnishing and things like that. It is fairly popular. You can go to any Asian market in D.C. or Atlanta and find these on the shelves. They separate them. I think the bell is worth more than the tentacles.

DR. ALEXANDER: I assume that given that you've said there really doesn't seem to be any dent in the population because of the fishery, there aren't any concerns about taking jellyballs out of the system, which are important sea turtle food?

MR. GEER: That is one of the concerns we've heard about this and in South Carolina Mel had those issues to the point where it was being suggested that a full and thorough stock assessment must be done on the population before we open the fishery. I'm like, okay, we don't have that on some of our super-important species, so I don't see that happening right away.

It doesn't appear to be. Like I said, our trawl survey in the summertime sees a lot of small juveniles. What we're hoping to do is start looking at that and correlating that to the commercial catch over the wintertime. The first attempts look pretty promising that we would be able to do that. It is somewhat hit or miss.

There are some years that they don't catch a lot. This year they stayed south of Florida a lot longer than normal. Then when they start moving up the coast, it can be a slow, gradual process or they could go right through the state in a matter of days. They are just being transported on the current, so to speak. They can swim vertically up and down, but it is depending on the wind and the current factors. It seems to be getting more and more consistent.

MS. WENDT: Are both of the processors in Georgia discharging to municipal wastewater treatment plants and what is the pretreatment they have to do?

MR. GEER: Right now we just have the one processor; the other one is potential. Initially he was discharging it directly into the sewer system. I guess after 10 or 12 years the municipality started seeing a lot of rust, and so he has to pretreat it and remove most of the solids. I am not sure exactly what else he is doing. The discharge is not going into the creek, I know that.

MS. WENDT: Right; that is one of the big concerns in South Carolina is the one processor who has applied for an NPDES permit wants to discharge directly into a tidal creek, and there are cultured shellfish permit areas right nearby. One of the big concerns is the low PH and high BOD.

MR. GEER: The second one, he came to us and we had a meeting with our Environmental Protection Division, us, and the Ag Department. We told him what he had to do and he was like, well, we want to start now. You are not going to get these permits in time. He was coming up with suggestions; well, I will just put it in a truck and I will ship it off that way. Well, you still have to discharge it somewhere.

There has been a lot of talk, a few GORA requests, a potential lawsuit; and they are calling it a jellyball plant, but we have not seen the first request for a permit from them yet for the discharge. We told them that you have to get all your discharge permits and then you have to be the Ag requirements before we will give you a letter of authorization to fish. We still have a fairly good control over it. It is in that regard. I think that is going to probably be the limiting factor is them

having an ability to have the proper discharge permits or treatment of that material that is coming off. You guys did some of the work on that in your place about what was in the discharge.

DR. SEDBERRY: Where is the statement for the jellyfish and is this affected by bottom trawls?

MR. GEER: We don't know. We are speculating it is an annual crop, but we don't really know for sure. We are seeing the juveniles in the Sounds; we see them in the Sounds. We just don't know at this point. Somebody else?

MR. PARKER: Fishing through the years, Calibogue Sound, Port Royal Sound; there sure is a big variation in the numbers every year. Of course, I am usually anchored and fishing for cobia, shark, so forth on four-hour and five-hour trips. I remember about 15 years ago there must have been an explosion of it or something for that one year.

I remember Calibogue Sound, there had to be an adult jellyball every two feet in that entire Sound. I don't know why. I'm sure we haven't studied them that closely until this point when it becomes a commercial fishery. They also have the spider crabs; kind of a symbiotic relationship, I guess.

We'll net a jellyball, take the crab out and use it for catching cobias. They just don't pass them up, they love them. But we also use them occasionally for bait for spadefish, cut them in small pieces, and spadefish is what we call an underutilized species, also. More people are beginning to realize that it is a good eating fish, just a little bit temperamental about catching them.

It is so hard some days to get them to go, because they also eat the ghost jellyfish, and it is impossible to put a ghost jellyfish on a hook. This is a pretty amazing fishery. Two years ago when I first heard of it, or three years, four; no more, who's eating these things? I would like to try it.

MR. GEER: No, you don't.

MR. PARKER: No?

MR. GEER: You don't want to try the finished product in here. I did and it took about four big gulps to get the taste out. From what I've heard talking to the processor, if you've eaten in a Japanese restaurant, you've probably had it in one of your meals and you didn't even know it. A lot of times it is just the garnishing.

It is just something they put in there. They are processing it. There is one more step. They say if you blanch it, then it will be – the product that we have right now in the states, it would be edible but there is one more step that they put it through when they get it overseas. But you could find it in the market. The packaging, it is in a saline solution and it is very little nutritional value; look at the sodium content, and it is 700 percent of your daily recommended allowance.

MR. PARKER: I guess I will stick with triggerfish.

MR. GEER: Yes, I would be a little worried about it. Some of the questions you asked, the SEAMAP survey and our trawl survey in our state, we can look at when we see the abundance.

One of the things we need to start doing is looking at what temperatures we're seeing, what depths we're seeing, salinity and things like that. It is usually high saline waters.

We probably have enough information from those two surveys at this point that we could probably put together a good picture of its distribution and preferences as far as salinity and temperature. We don't have enough information in the life history. I don't know; do you have anything on the life history?

MR. BELL: I was just going to say our SEAMAP data shows cycles in abundance. As George mentioned, what about the earlier forms; we don't really know and nobody is looking at that. I was just going to also add that from South Carolina's perspective; we were looking at this in an experimental fashion, simply as a potential additional thing that our shrimpers could do before the shrimp season kicked in.

It works nicely down in Georgia, because they seem to be abundant or more available down there a little earlier and in our waters it is a little bit later. They are really more abundant in our waters as we start approaching the opening of when we open on white shrimp. The shrimpers have to make a decision do they want to go after roe shrimp at a much higher value or do they want to mess around with jellyballs?

One thing to keep in mind is not every shrimp boat can participate in this fishery just by design. The nature of the product in the hold places a lot of stress on wooden boats. Years ago when they did some work with this, they even had a case where a bulkhead ruptured and the engine room was full of jellyballs. It is not for everybody.

We just looked at it as sort of a little niche fishery that would allow some of our shrimpers an opportunity to utilize their boats if they wanted to outfit them for it prior to the start of shrimp season. Part of our interest in this, too, was to see if our shrimpers were even interested in participating in the fishery; and a few of them were.

But again as has been mentioned, the issues right now that we are facing are dealing more with water quality and discharge and things like that in the processing plant. That is the key, as Pat mentioned. If you can get a successful operation going with the processing plant, then the whole thing will work; and if you don't, then it doesn't.

The locations that the folks down in South Carolina had chosen didn't work out for various reasons. I won't get into the lawsuit; we're not involved in that. Also, your first experience with DNR was with jellyballs. When I came on board with South Carolina DNR, I was involved in the development of the spadefish fishery. That is when we kind of worked through the whole process of using jellyballs as bait for spadefish, so I have a connection going back a while as well.

DR. ALEXANDER: You can correct me if I'm wrong, but I assume that since they are fishing relatively close to shore that you've got this many thousands of pounds caught and dragging along the bottom. Has anyone looked at any bottom habitat impacts from this?

MR. GEER: It is more of a surface trawl.

DR. ALEXANDER: Yes, I just didn't figure how those little floats were going to keep it all up near the surface when you fill it full of jellyballs.

MR. GEER: The bag might be dragging on the bottom is what you're saying. Well, you are towing at two and a half knots and the specific gravity is the same with water, so I'm not sure if it is making much of a dent.

MR. BELL: I think they tend to probably – if they get to the bottom, it is more like in a turn or something or as they slow. I don't know if that has really been an issue. That is an interesting thought.

MR. GEER: The bycatch study we're doing, initially they tried to – the fisherman said, "Well, I could tell you what the weight is." I said, "No that is not going to work. We need to have something better." We wanted to buy some scales that he just refused to let us use at first. Then we were going to work out some kind of a volume metric system on his net and that failed miserably.

Finally we put crane scales on the vessel so when he brings that up and when it is swinging, we can get a fairly decent weight. Like I said; that one drag right there was probably between 3 and 5,000 pounds. We never expected it to be a lot of participants in the fishery. For years it was the one dealer with four or five boats mostly. We don't know – we're not going to let it go up to 100 boats, so to speak. If we see an explosion and people wanting to do this, we're going to quickly put a cap on it. Right now we are just throwing an arbitrary number of like 25.

DR. ALEXANDER: Right, I was just interested because the activity is all around where the processing plant is and so it is concentrated in one area. If it was distributed all over the shelf or up and down the coast, then I would be less concerned about it.

MR. GEER: Well, those observer trips are when we go on the boat. That is a little bit different. A lot of times the crew, when they fish, they do fish over Fernandina. They will fish up and down the coast, but when the crew gets on the boat that is like a three-day trip. A lot of times they want to go just – they want to get on and get off. They want to go for the day, so those observer trips are probably just in and outs. Every time we bring this up, there are lots and lots of questions.

DR. LANEY: I appreciate all the ecosystem-related comments. I will just remind you all again that your name has changed, so you are now Ecosystem-Based Management in addition to Habitat Protection. I think Clark already touched on the question I was going to ask, as did Mel. These things are important not only for sea turtles, but also for spadefish. Have you looked at all about the implications in changing the density of spadefish prey base for this?

MR. GEER: With the Sea Grant study we're doing, we were looking specifically just at spider crabs, the symbiotic relationship with that. We probably should have looked at some of these other species as well. We had a slew of students that were interested. We are only in the first year, so we probably could still ask people to look at those. We haven't seen as many spadefish as you would think in the observer work.

I think if there were 1,800 fish, about 700 of those were harvest fish. I think we only caught 16 spadefish. I would have thought there would have been more spadefish than that. When I worked in Chesapeake Bay, you always saw spadefish with jellyfish. The observer work, it could be a function of the mesh size, too. A lot of the species, if they are not in the bell, they may be going right through the mesh.

MR. PARKER: I know that in fishing for spadefish, on days when there are a lot of ghost jellyfish around, you can't get spadefish to bite on the jellyball bait, where spadefish are very structure-oriented. They stay in site fidelity, bang, they are right there. I would say mostly just from a layman's standpoint, they eat mostly ghost jellies. You could chum with the jellyball. That is what you've got to do. You've got to kind of get them off of one and on the other. A lot of days that doesn't work, so go fish for something else.

MR. BELL: Yes, with the spadefish, they are structure-oriented. I think the reason you are not seeing them in the trawls is because the spadefish, particularly larger ones, are around structure where you are not going to trawl. But they will bite on and they do like jellyballs when they float by, but they are not necessarily following them around in the open waters, which may be why you don't see them.

AP MEMBER: I see mostly juveniles.

MR. BELL: Yes, which would make sense, and they might associate with it just as a structure. Another thing to keep in mind with this, too, is that regardless of what we do as states, it is still a perfectly wide open fishery in federal waters; unregulated, no TEDs. That is why we did as Georgia did and required TEDs in state waters. Again, because of the proximity of timing with the presence of sea turtles and all; we wanted to make sure we were careful with that.

But in federal waters it is wide open; and if they can work through the processing discharge issues and all of that and get that going, they could prosecute this fishery in federal waters and not even worry about state waters. Although I am told particularly off South Carolina, we apparently have higher densities in our state waters. At least that is what your guys tell me. But it could be prosecuted right now in federal waters with no restrictions.

MR. GEER: It seems like every time I mention the word cannonball jellyfish at any meeting, it ends up becoming a lot of questions and a lot of interest in it. Mel and I have shared many 5:30 conversations at night about this topic. It is interesting that Mel said that. It is wide open in federal waters right now. You can do whatever you want pretty much.

We can control our state waters in what we do, and I think we've done a pretty good job of that. We would like to see maybe the feds come on board on the same scale, maybe have some modifications of the TED so they can get those larger animals. Is there anything else? Okay, we are scheduled for a break at 11:00.

MR. PUGLIESE: Yes, we'll go ahead and break; and then what we want to do is come back and break up into individual states and have the opportunity to discuss our priorities relative to impacts in your individual state area in advance of lunch, so we kind of set the stage for some of what we talked about to occur maybe in November. I do have those potential threats at least for

the non-fishing kind of summarized so that you all can at least use as kind of discussion points. –

MR. GEER: Okay, let's be back at 11:05. Let's go ahead and get started to try to stay on schedule. What I am going to ask is somebody in each state – I will take the lead for Georgia. I don't know if the other state leads want to do it or someone else. If you could just write very briefly from what you discussed about before lunch, some of the major issues that you have in your state with non-fishing activities and some of the gears that may be of concern.

It doesn't have to be long; it could just be a series of bullets, forward it to Roger and I and we'll distribute that out to everybody tomorrow, so everybody can get an idea of what we were discussing in the breakout section. Can I ask the state leads to do that; just a very brief discussion of what you guys talked about today, what are the priorities.

It could be simple bullets. I don't know if you got to the fishing gears as well, but just what are the major priorities in your state and some of the discussions you had during that breakout section. When you get a chance later today or tonight, just e-mail it to Roger and I, and we will distribute it to the group. The next item on the agenda is Roger is going to be talking about the food web and connectivity section of the FEP.

MR. PUGLIESE: One of the real opportunities we have in moving forward with the move toward ecosystem-based management is to really refine some of what was started in the last round of the council's deliberations and what was provided for in the fishery ecosystem plan, a more refined focus on what we know about the South Atlantic food web and then the connectivity of systems throughout the entire region. In this case it really is the broader scope.

In order to facilitate the movement toward development of a new section for the fishery ecosystem plan – because there are some components that address it in a very general way in the existing plan – the idea of creating a separate section for the plan is what we've been discussing, as well as the opportunity to see how that translates as some of these other ones into potentially a policy statement or policies that the council can look at into the future.

Given that, there has been a team identified to provide the structure and ultimately a new section for the fishery ecosystem plan, has been contacted; and it is a broad scope. It does cover, as I said, everything from food webs to the connectivity in the bigger sense. Because one of the things that I think we want to do is go even beyond where we did before and engage groups like I had mentioned earlier, the South Atlantic Alliance or the South Atlantic Landscape Conservation Cooperative where they are doing analysis of really the impacts all the way from the mountains to off the Continental Shelf, the opportunity to understand really the big connectivity.

But then also the connectivity of habitats, the species interactions, and get into our latest understanding of the food web systems. To support some of those deliberations, we held a modeling workshop, an ecosystem modeling workshop that we're trying to tap in on some of the newest capabilities and understandings of the latest ecopath model that was collaboratively built with our partners at Pew, really with a focus on forage basis and how some of the variability that may be associated with climate changes or other natural events may affect – base populations that may affect managed populations.

In addition, looking at broader, bigger modeling efforts that look at ecosystem simulation models. The Atlantic ASIS model that was done, something similar to a South Atlantic version of that, and all the supporting oceanographic capabilities that would go into that. So, looking at the bigger picture of the food webs, the connections between the systems, habitats, is what the focus of the efforts that this group is going to be engaging in.

The big thing is to again connect the managed species, the habitats and preys within our areas, and really refine what we understand and what we know and what some of the implications for our areas are. What I wanted to do was really just open up that broader scope to this group in advance of really that team itself on focusing that to some of the concepts of what individuals – when we talk about food webs, we talk about connections, what individual advisory panel members feel are going to be important components of that subsection to highlight.

I think we have some expertise here that really can help provide some scope or guidance to the group as it moves forward. With that, I just wanted to kind of open that door, or specifically policy type of issues the council may want to be addressing in terms of how to address changes, the forage bases, different things like that. With that, I was going to kind of just open that up to the general discussion and start that.

MR. GEER: Clark is already hitting his button.

DR. ALEXANDER: Well, that is because we just had someone come and give a seminar about all this ecopath modeling for jellyfish at Skidaway. I was wondering are there any – and the thing that impressed me about the ecopath modeling is everything depends on how good your parameterization is for the transfer between the different species and trophic levels, from primary production up to the apex predators. Are there any of those specific linkages that are unknown that are needed to be known that would be priorities for this effort?

MR. PUGLIESE: Yes, I think in our area it is given that there definitely are. The effort that we have had – to kind of catch up on there, we have had – the first iteration of an ecopath model for the South Atlantic region was collaboration when the "Sea Around Us" Project Lenfest was moving forward. That foundation document or effort was the first component that we moved forward.

We subsequently worked on an updated model effort, but never got the full parameterization of that. Both those efforts were really drawing on other modeling efforts, primarily that Gulf of Mexico/West Florida Shelf Model. The nature of ecopath, where there aren't parameters in individual species, it will draw on diet compositions or whatever from similar areas.

There are still a lot of those. I think probably one of the most significant ones that is needed in our area is going to be not only diet composition for literally the entire suite of managed species, but then what really helps drive this more is understanding by life stage, having juveniles as well as adults integrated into the system.

The most recent effort with Tom Okey, who we worked with earlier and funded through Pew on forage-based model, got a lot further down the road to get especially some of those individual forage species really refined. But there is still in that effort a lot of the managed species diet composition information, ranges; a lot of things that are still unknowns or are ones that are being

borrowed from other models. The answer is there still is I think a suite of those that could be highlighted as priorities for collection into the future or for elaboration in a better way.

The good thing is that since that model has happened, there still are a lot of assessments that have been done that have a lot of that information in it that were not able to be tapped in on the last round. We have a number of different efforts that may expedite this discussion with – I know we've done a presentation before on an ecospecies, and you are familiar with that effort; the opportunity to reach out to literally the entire region, anybody doing research, to get some of these types of parameters and have them available in on-line type of a system, so that as they are compiled or people are doing research that we can get this.

A long answer to a short question is there are still unknowns within those species-specific unknowns that will enhance and make that effort move forward. The intent is to provide the opportunity – I mentioned the ecosystem modeling workshop – is to provide that kind of capability and the ability to refine that.

As well as the other side of it is the ability to integrate and connect to other modeling capabilities, the opportunity to figure out how you would integrate; maybe circulation, better production models, primary production efforts – those are also to be tested – or needs that are critical. But I think we are getting to that point where we are bringing the right people together to have those discussions on how to get there.

DR. ALEXANDER: Well, I would just say that any modeling effort is only good as the parameters you put into it and trying to link models that you don't have the right parameters is putting the cart before the horse. I would encourage you to support gathering those important parameters first before you even worry about doing those sorts of things.

MR. GEER: Who beyond SEAMAP and MARMAP are doing dive studies right now?

MR. PUGLIESE: The state of Florida has a gut lab. As least as far as I know they are collecting as much as they can in any of the state programs that are collecting fish; but beyond that I'm not sure if there is a whole lot beyond that. That is a critical component of the input parameters in here, again, because many of those are being pulled from other areas, and that point that is really important is about getting both adult and juvenile, because there are differences.

MR. GEER: Anyone else have any comments or recommendations? I think you need that information and you need it on an annual basis. It can't just be one shot, because a lot of places have done gut content studies for two or three years and then either the budget gets cut or they lose the funding and then it discontinued. Those kind of things need to be continuous.

MR. PUGLIESE: Yes, and I think one of the important things is that, as you know, we have some of the players with the overall SERFS and SEAMAP/MARMAP and SEFIS, are very keen to the fact that we don't need to be just collecting an individual species diet continuously. To the point where I think – and you know those discussions about getting to the point where you are collecting to a certain point and then moving on to additional species to continue – both important to AMSFC, to the council, to the states, and keep on expanding that array of information for individual species; so that you ultimately get to that point where you are at least covering both the key prey and the most significant component of the managed species.

I think that is the track that we're in right now, but what I look at is the next steps of the modeling effort are really going to focus on where those are, so you get a very clear indication of the priorities. Some of the efforts right now ongoing with having that so direct connection with the independent programs to very much focus; okay, we definitely do not have anything for these key species that we need to at least get this for this next iteration, so that we have some baseline in that. I think we're in a good state to maybe be able to step those forward.

DR. ROSS: Roger, you probably remember when we first started looking at this effort; we had a workshop in Beaufort at the NOAA Lab and compiled a list of all the fish in the region and what we thought we knew. What was disturbing about that was that we knew very little about most of them, of the 800 species or so that we had listed.

I don't think that has really changed a whole lot in the last 15 years. There have been a few masters theses here and there and a few studies here and there, and some of the states take up diet studies from time to time, but it doesn't seem like to me we've really focused on where the biggest issues are.

The further offshore you go, the less we know; and the further away you get from a commercial or recreational species, the less we know. How are we going to focus resources, state or federal or university, to addressing that issue? I agree with Clark, no matter how sophisticated the model, it is going to be dependent on its inputs and now these things are problematic.

I guess the focus of the question is how do we narrow that big problem into what are the key places to look? Is it noncommercial forage fish; is it some benthic key species? Is there a way to do that so that the problem becomes something that you can state; whereas, now it is just a big problem of we don't know. We don't know what a lot of things eat and that is not good enough.

MR. PUGLIESE: I think the effort to get a new fully parameterized ecopath model funded is going to have – at least the intent is to have a focus that it is going to be focused on being something useful for management. It hopefully will be able to identify to a great degree what we know and what may be the needs that still need to be accomplished in terms of individual species or key species of management concern.

One of the things I think that is pretty critical is that of, say, at least in the managed side that we've jumped a pretty significant ways forward in terms of at least getting probably the bulk of what key managed species diet composition are; not bulk in terms of numbers, but bulk in terms of biomass.

Because, if you look at the collected species in the fishery-independent surveys, I think probably those top 10 or so highest volume species have some fairly good – I mean, it is a pretty big jump from where we were before in terms of really understanding diet. Now that is not saying by life stage, it is saying by at least that biomass. It is a step forward from where we were, but a far cry from a full complement.

I think the effort to move down that road is going to have a couple facets of building some tools that can begin to at least put "what if" scenarios on the table for the council to be able to at least see how some of these fluctuations may begin to interact with species versus being the complete perfect one that will fully do it. Because, from the beginning of the discussion for ecosystem

modeling was it is going to do one thing, it is going to highlight what we don't know right from the beginning and then provide the mechanisms to refine that over time.

MR. GEER: Steve, did you have a follow-up on that?

DR. ROSS: Sort of. Yes, I know we've gone further, but that is still a fraction of the number of animals out there that could be addressed. I am not really clear on how the model is going to show us what we don't know, because we already sort of know what we don't know. We don't know what most of these animals eat.

Not only do we not know what their diet is composed of, we don't know the energetics of their diet, which is even more important. How much do they consume? What is their daily intake? How much does that transfer into growth? That is just as important as knowing what they eat. Is there a way to focus this question into something where 15 years from now we don't say the same thing? I know we've made progress, Roger, we certainly have, but making progress is not necessarily adequate for the model yet, I would think. We're not going to get everything, I understand that.

MR. PUGLIESE: Yes, and I think – right back to George's as a follow up to that – I think the intent is to go as far as we can with what we know and then really set the stage to – through whatever mechanism, a combination of collection through fishery-independent surveys, collection through – there is a big push for citizen science getting species that may not be collected elsewhere to do diet, the ability to have collection through other avenues.

I think we could set up a scenario to address at least where we can go from here and into the future and making sure that we highlight what species we don't have information for. That is going to be part of this next step. It is going to have to be. I guess if you all will bear with me, what I will do is I will connect – I want to do it, but I was trying to hold it for the next session, because you are leading directly into the discussion from – I mean, these are two major sections that are being developed.

You've got the food web and connectivity that is trying to build the connections and understand what we do know at this point, building on what is in there and then expanding to the degree. The next one is fisheries oceanography and climate variability. In that effort, in bringing that group together, that is exactly what – it is building on kind of what we initiated with that ecosystem modeling, bringing the oceanographers together with the biologist, and with a focus on management needs for the SSC's review, the council's efforts.

The idea there would be able to really define what we know about the oceanographic characteristics of the South Atlantic Region and be able to highlight that and understand the state of the ocean, the land/water interface, and the inlands, so we go beyond that with our other partners.

But the oceanographic component would then lead to knowing the baseline, then knowing the variability, the connections to managed species and habitats, and then ultimately what that activity may be in terms of how it will respond and how you may see responses in habitat changes or species changes or foraged-based changed relative to those oceanographic parameters

either being changed, or having some continued episodic events like increased upwelling events, what that implication may be.

That led directly into that next subsection, and that was intentionally done because not knowing the baseline doesn't provide you that connection to why those species are having some changes, and then how that translates to really understanding what responses we may have as managers to those changes.

MR. GEER: I have one comment. Would it be an advantage – because Steve has said and Clark has said the number of species we don't know anything about and trying to gather that information is going to be difficult. What if we identified a single species in each trophic level and tried to look at those more intensely; have better data on those?

DR. ROSS: Well, I think that is the kind of strategy I was thinking about. There has got to be some kind of way for us to focus. We are not going to get complete diets and energetics and oceanographic connections for 1,200 species; but we need to pick out ones that are potentially key or abundant or important in some kind of way, that fit into some niche that is representative.

Feeding guilds, for instance, what is representative of a particular feeding guild? That would be one way to focus it; but if we don't put that word out to the universities or the funders, nobody knows what we need. It is too huge of a problem.

MR. GEER: Would it be a benefit for us to identify those species or save that for another day?

MR. PUGLIESE: I think what we're going to have in the next steps for the modeling effort is to review what has been done with the latest, say, for example, the ecosystem model/the Ecopath model on how far some of those have advanced in terms of forage, the other bases – what the priorities managed species are, because that has also a driver on the way the model is done.

We actually had an iteration in between that had like 120 things that just basically melted down, because we had just too much, and plus it didn't have a management focus. I think there is going to be a combination of those; and with that, it would highlight which other key species are understood within that model effort and which ones still are being either used from other regions or other are still unknown. I think that process is going to evolve, and we can reengage the entire group as it evolves to kind of what the suite, what the focus is, and where it can go from here.

MR. WILBER: I have a dumb question. Let's just pretend for a moment the model is fully working, it is correctly parameterized, everybody is happy with it. What are you guys going to do with it? Is the purpose of the model to basically point towards currently unmanaged species that are important enough to manage because of their connection through the food webs or is to better understand how oceanographic variability kind of ripples through the system and leads to a lot of the variance we see in abundance or what?

MR. PUGLIESE: I think when we talk about the model, we're talking somewhat simplistically in terms of what its initial – the ecopath, ecosim, and ecospace have functions that can provide at least at a baseline is if you at least get core inputs into that; is what some of the response is. If you put in a 50 percent reduction in an individual species, is that going to translate to what types of individual species may be affected in terms of where winners and losers are?

At least the council will have a perspective. It goes beyond that; we did not investigate or get into fleet dynamics in the last iterations on these things and there is that possibility to really actually connect in the operations of fisheries and if they are dependent on individual species, how that may respond. There are opportunities to understand.

If you get to ecospace, there actually is the capability of beginning to at least understand connectivity between managed areas. That is ultimately getting down the road, and that was something that was highlighted at the modeling workshop by our SSC members about that may be something that actually could be a tool that the SSC could begin to evaluate some various spatial management type of capabilities.

I think some of it is to see what the focus of what your management need, because you can design that to some degree to really get at either at just say the snapper grouper complex or the primary key components of snapper grouper, primary key components of coastal migratory pelagics, and come up with those bigger ones and then see responses between that.

At least the council has – or the SSC potentially in advance of the council reviewing it has an understanding of what some of the implications may be of affecting biomass or changes in catch rates even. Say if they are going to put in a reduction in the fishery, is that going to respond to something?

It is in an investigation stage to really what we can do, because right now we're not doing any of that type of stuff. We are really looking at setting allocations and then looking at how that response – basically responding to the responses that happen. Here at least it begins to look at what unanticipated things may happen or if you have environmental changes, if you have a reduction, if that would respond and how that could change some of that.

That was some of the effort that was specifically in this last forage round was if you had major reductions – say you had a 50 percent reduction in this forage base, where could you see that actually respond in terms of managed species? It is beginning to at least open up some of those interactions to understand that there may be different types of changes than maybe anticipated or that there potentially would be any change, because right now we're really kind of still in this pure single-species management efforts, and this would at least begin to understand what the implications across species, potentially across fleets, or even aerial spatial connectivity in some of those.

MR. GEIGER: I come back to Ockham's razor. The simple effects for a nation is most obviously the most probably complete or accurate. I would rather pick one or two or three species and look at those intensively and look at the interactions of those. If we have learned anything from mariculture and aquaculture of fish species, if you know the dynamics between final plankton and zooplankton and temperature extremes – and if you are doing marine species, saltwater and temperature interactions – you can predict and put models together that can predict those productivities in intensive aquaculture situations.

I think there is a lot of data there that can fill in some of these holes, because obviously I wouldn't expect a state marine agency to collect vital plankton and zooplankton information when they are really hard pressed to do standard fisheries assessment. I would pick a couple of target or indicator species, so to speak.

I would look at the key parameters that the model depends upon, and I would try to have as most information in terms of basic bioenergetics as I could. I would run that one in the ground. I admire the big picture approach, but in this kind of situation I think sometimes it is better to bite off a smaller chunk and verify rather than be more ambitious.

Again, I don't want to do another 5, 10, and 15 years asking the same questions. I think we did this before in some of the other biological studies we've done. Keep it simple. Get the right parameters, identify the right parameters, and then generate the resources necessary to test it out. That would be my advice.

MR. GEER: I think that is what they did in Chesapeake Bay. They just picked a few key species and they worked off of those.

MR. GEIGER: My experience working with striped bass restoration in Chesapeake Bay for 15 years led me to that conclusion; but even then we still had holes in the system that left a lot to be desired, because we did not have the resources necessary to look at the lower trophic interactions.

Okay, people, we didn't make the necessary connections and the rationale to fund those lower trophic level interactions. Again, keep it simple, identify the key parameters you need, and then gang-tackle those, or we are going to be asking ourselves the same questions the next generation of fisheries' biologists.

MR. GEER: Are there any other comments before we move on? Those are good comments. It is how to eat an elephant one piece at a time, one bite at a time.

MR. PUGLIESE: This whole discussion wasn't just supposed to be about modeling, because the idea is that you're building the real information within the fishery ecosystem plan that does highlight what we know about those individual food webs. Modeling is just one piece of the equation that we may be able to elaborate further.

I understand about the simplicity on it. However, when I look at some of what has been done in say the Mid-Atlantic, one thing where they had the multispecies model that is touted as a really good effort; it has striped bass, menhaden, spiny dogfish and bluefish?

MR. GEER: Prey items are blue crabs and menhaden.

MR. PUGLIESE: The one problem is it doesn't have king mackerel in it, which is like a pretty significant piece of that equation.

MR. GEIGER: Okay, but they had to make some assumptions based upon the data needs and the resources they had available. Again, I am not saying that was perfect. It was far from perfect; but at least I think that may offer you a template or a model to move forward with. Even then, I think that model was still too aggressive. We tried to bite too much too soon with too few resources.

MR. PUGLIESE: One thing, I kind of touched on this. There were a couple other points that I may touch on a little later is part of this fisheries oceanography component really to kind of put

the scope is, as I said, to describe kind of the state of the region, the ocean, look at what the oceanographic and environmental variability and change in the system is; look at the links between managed species and the habitats; and then really look at the effects of the variability change on managed species and the habitats.

A couple pieces that fit into that is part of the original fishery ecosystem plan, the oceanographic group and it was before it became – SECOORA was under the SECOOS Group – had provided kind of a state of the oceanography. It was giving you parameters over time for the entire region; the opportunity to refine, update or expand that capability is one opportunity.

The other thing is part of the Atlantic Coast Climate and Fisheries Workshop that was held is we had built an analysis of council-managed species and talking about it at least in very general context is what some of the vulnerabilities based on change; whether it be because of habitat or other aspects, and the opportunity to expand that, refine that so that we get to a point where we have those species, and then look at what their kind of based parameters on temperature, genes, vulnerability to annual other current systems or whatever.

To build up at least – what we don't have right now is almost an overall general vulnerability analysis for the systems; so that we begin to look at all of the system. Those are just two additional aspects that could help refine that. I was going to touch on that later. I provided you the core of what we have so far in one of the documents.

But I wanted to at least get these two components on the table, because as these groups move forward in refining this, I think we get a little bit more then we can provide I think, more input directly as that evolves. But these are the rationales of why the important need to move this forward and to advance the efforts so that both our Scientific and Statistical Committee can provide recommendations to the council, and then the council can respond in terms of how they integrate this into the longer-term management, and some of the more variability that has not right now taken in account in any of the management efforts.

MR. GEER: I am going to suggest since Roger has led perfectly into the South Atlantic Fisheries Oceanography and Climate Variability that we skip over the NOAA Fisheries, talk about this topic, and then go back to NOAA Fisheries, if no one has any objections to that since we fed right into that.

MR. PUGLIESE: What it is is Attachment 7, I think, of the material provided is a product that was a good exercise to go through. It was considered a rapid assessment of the governance. What they were trying to do was to see if there were governance limitations on trying to address some of these change issues.

Some of them were very obvious in the Mid-Atlantic and New England area where they had allocations, state-by-state allocations where shifts in some of the species like cod were outside the bounds of some of the management areas. They were having some very significant issues. I think ours highlighted the variability, the increased episodic events, rain events, on hurricanes, on upwelling events that were a lot maybe driving it.

However, what this did is at least what it did; it laid out the South Atlantic Council's managed species. We covered the coastal migratory pelagics, the mackerels primarily, and cobia, coral,

coral reef live hard-bottom habitat, dolphin and wahoo, golden crab, sargassum, shrimp, snapper grouper and spiny lobster. Under snapper grouper trying to cover as many individual species as possible to look at what some of the implication.

It got into providing information on management authorities, on climate vulnerability of the species. Ones that are obvious, for example, just right off the bat, looking at something like Spanish mackerel, its linkages to estuarine-dependent species and how river flow and other types of impacts to those systems would make them obviously vulnerable. As well as you look at current changes, temperature and productivity offshore habitats and effects on migration, schooling behavior, on prey availability and spawning.

That really gets to the idea of what some of the considerations are for that individual species. This is done for all the managed species, and it was done fairly quickly. That is why it was called a rapid assessment. We have an opportunity to take this as a footprint and expand and refine this and more of what would constitute a vulnerability type of analysis input.

As I mentioned before, some of the biologic parameters; it even gets into issues as if there are linkages to other fisheries. It is talking about potentially like if there are shifts from this, would they be moving into other managed species potentially for actions; or if there are prey implications in the change?

Then it was also getting into any of the specific socioeconomic concerns or climate-related concerns that may be either being observed, because in some cases some of these things are not documented, but the fishermen are actually observing some of this on the water already. This was getting to try to at least tease out as much as we know for an individual species at a very first level.

It also even got into the existing management measures, what is in place for the fishery, communication and coordination with other regions and other partners. That is kind of the scope of each one of these that was highlighted, which was a first good step forward to kind of put it in context. We need to refine it and expand it. I think it could really provide a good basis from which we take what we know now and move it forward in terms of vulnerability of the individual species that the council manages. That is what is anticipated being refined as we move forward.

MR. GEER: I can say, and I think Mel can probably back me up on this one as well, at least for shrimp it has worked very well. Having some of these measures that are in place that can be enacted very quickly; whereas, in the past we had to wait until the council meeting in March if we had cold temperatures to do anything, by then it was too late. Now it is under some of these authorities, management authorities; 48 hours, maybe. It happens very rapidly, which is a good thing. These kinds of things are productive and they do work.

MR. PUGLIESE: I guess what I would just kind of open is in the context I've laid out, are there other components of this that would be worthwhile including as items for individual species or groups to be added, if you were looking at vulnerability or potential impacts? Just a very general question, I think this is something that we're going to be working on; but I just wanted to at least lay it on the table and kind of open it up for that thought process. Now that it is in front of

everybody, I think there is going to be follow-up on a number of these key ones from this discussion.

I think it is laying it on the table and the opportunity to engage the individual subpanels or the AP in whole to have input on this, I think can come after this meeting as a follow-up. Maybe very specific kind of like an outline and saying this is where we are going, how can we advance this further? What is missing in terms of the parameters that would give us a better scope of what the vulnerability may be for an individual species in our region?

DR. ALEXANDER: I hesitate to bring it up, Pat, but jellyfish are one of the things that supposedly are going to be really proliferating as warming climates, lower oxygen. If there is a fishery in them now, there may be greater fishery in them in the future. They might be something you might want to include in this assessment.

MR. GEER: The federal government does not recognize the fishery, so to speak.

MR. PUGLIESE: Yet.

DR. ALEXANDER: Is that something actively being worked on to get it recognized, or is it something that you don't think will ever happen? I know it keeps coming back to jellyballs, right?

MR. GEER: We've had it for 12 years and have had no success.

MR. PUGLIESE: We had an option paper on the table one time for a jellyball management plan. That was a number of years ago, but that was before anybody got to this level. We're talking about millions. If you are talking about going from five vessels to twenty vessels or something like that; that may have a lot more implications especially when you get into vessels that don't have any of the gear that all the other vessels that are trawling offshore and some of the implications of the operations, if they are significant.

If they are dragging a thousand pounds, if that is going to have implications for the bottom. That is why it was kind of laid on the table are some of those. Maybe we're not there yet, but as this expands, is that going to be a significant issue? If nothing else, just to understand that as part of the overall system, both production and what the implications are. It gets back to that other section on food webs and what that may mean. Is that going to affect the way the dynamics are? That may be a climate –

MR. GEER: I don't mean to be critical of anyone, but the problem is everybody is busy and to ask NMFS to take on this responsibility to go ahead and explore this; it gets brought up but then other things that are more important come up. It will have its day eventually, I'm sure. We get asked periodically about bycatch issues on it and things like that.

It is kind of like on the edge of the radar screen. I don't know what would bring it up, but it would have to be a slow news day, I guess, type of thing; a slow business day that somebody wants to take on something new; or as Roger said, the fishery explodes in both participants and harvest. But it is there.

MR. PUGLIESE: As part of that general discussion on fisheries oceanography and the climate variability, one of the things that happened at the last council meeting was a highlighting of the movement and creation of a climate strategy. It was provided by Jason Link. I provided this to the group, and I wanted to at least let me get to the climate.

He talked about the broader move toward ecosystem-based management and what the council is involved in, but I wanted to get to the climate section of this. He was getting into the details of what some of the considerations are in climate change and the changing oceans. What it really led to is the fact that NOAA Fisheries has developed and is providing a climate strategy; the draft climate strategy with the goal of understanding and increasing production, delivery, use of climate-related information through NOAA Fisheries and the stakeholders.

What it has done is identified seven key objectives to meet NOAA Fisheries information and to guide NOAA Fisheries and how they began to look at the incorporation of this type of science at the regional levels. What is intended is it is supposed to be providing information that goes from observation research synthesis and then ultimately into management.

The strategy is just the springboard from which they are supposed to be developing regional plans. It was ensured that the council would be a significant player in understanding or being provided input directly into how this regional plan may happen. What they identified were these seven objectives that went from climate-informed reference points, management strategies, adaptive management processes, projections for future conditions, information and mechanism then change, status and trends, and early warning, and ultimately science infrastructure to produce and deliver actions. All of those, as it is indicated, were really connected.

They've provided this as a baseline from which to guide the overall efforts. It is to look at conducting living marine resources climate vulnerability analysis. I think what we're trying to do is to get a step ahead of the process to be able to get some of this done. They've done a vulnerability analysis in the Northeast and Mid-Atlantic region species where they had informed input on individual species to do exactly what we had just discussed.

I am looking at what their potential vulnerabilities are. We're trying to get a step moving forward that way, because I'm not sure – while this process is moving forward, I'm not sure where resources are actually going to be dedicated to be able to accomplish some of these. It may be through our partners.

They are looking at ecosystem status report to look and track changes and increased capacity on climate-informed management strategies for our region. Their time frame was between 6 and 24 months is to move forward, as I mentioned, these regional action plans and to strengthen their climate science, increase resource-oriented research, and have some ready terms of reference for ESA, for the Magnuson Act, Marine Mammal Protection Act assessments and biological opinions.

They want to be able to better track the ecosystem changes, understanding the mechanisms and changes in fish stocks and communities and having better forecast capabilities and climate-sensitive – understanding climate-sensitive stocks and biological reference points. They were provided the strategy with input through the end of this month, or last month. Their action plans are going to be developed in 2015 and rollout past that. They have provided this.

I guess what I would like to highlight is that in reality, unless more resources actually I think are proposed for NOAA – now the question is; is it actually going to get funded into the future? That is uncertain at this point. We do have partners in our region that we're already working with; the Landscape Conservation Cooperative that connects directly to the USGS Climate Science Centers.

Those groups are actually funded and are doing – right now they are doing the down-scale climate models and have the capability of addressing I think some of what is being recommended in here. I think ultimately there may be partnerships to accomplish what is being recommended through some of our partnerships in the region, to get the types of information we need, both documenting what the characteristics of change or variability may be, and then how that impacts either the fish we mange or habitats that they are dependent on.

I did want to at least lay that on the table and identify that effort, as well as the connection into other partners. Are there any other thoughts or comments on the bigger picture of fisheries oceanography and climate variability in our region, either/or the food web or connectivity issues before we move on?

DR. HALPIN: Two comments. This is the Climate Review Committee that I'm on for the national program, so we were in Silver Spring working on that document two weeks ago, so I have some ties. The document is actually being edited right now. Then also I am working with the South Atlantic Landscape Council on indices, so we are tied into those as well, so two different scales, so I can help out with that.

MR. GEER: Anyone else? I'll tell you what; we're going to switch things up a little bit more. We are going to take a break right now, and we are going to come back at 2:55. Thank you for being almost on time. That is good though; we are ahead of schedule. Since we flip-flopped things a little bit, Pace is going to be talking about the removal and addition of some species in FMP management units.

MR. WILBER: I have a few slides. My goal here really is to just bring the advisory panel up to speed on some council activities that are related to the management of the snapper grouper complex that in my opinion affect habitat issues. Then at the end, to get some input from the advisory panel members on how the panel might want to provide input should the council propose future removal of species from the snapper grouper fishery management plan.

Now, this is the cover from Amendment 35 to the Snapper Grouper FMP. Its schedule is over there on the right and it is about to go to the council for approval. I believe in June is when it is scheduled for approval. Then after that, it would go to the National Marine Fisheries Service for approval at some time after that.

To give you sort of a quick introduction to the fishery management plan for the snapper grouper fishery; one thing that you quickly learn is that it has a whole lot to do with things that are not snappers nor groupers. There are 59 species in the snapper grouper fishery management plan, and they are broken out by families.

It is broken out by families on this particular slide. This is down from a number that was up in the seventies a few years ago. Now, Amendment 35 to the fishery management plan for snapper

grouper is proposing two sets of actions. One set is the removal of some species from this fishery management plan and the other set of actions deal with management of tilefish. I'm not going to talk at all about the tilefish in this presentation, so we're going to skip over that stuff.

But the purpose of Amendment 35 is to ensure that only snapper grouper species that require federal management are included in the snapper grouper fishery management plan, and the justification for this is the need to simplify federal management of the fishery without reducing protection for species rarely caught in states other than Florida.

Now to accomplish this purpose, they are currently proposing removal of four species from the management plan, and those four species are black snapper, dog snapper, mahogany snapper, and schoolmaster. They are listed as Action 1 in the amendment, so I've listed it as Action 1 here on this slide.

If you actually go into the details of how the amendment is being constructed, Action 1 has five proposed alternatives; one, the no action alternative; the second alternative, removal of black snapper; the third, removal of dog snapper, and so on down the list. The currently proposed action is the actual removal of all four species.

They are proposing adopting the four alternatives, Alternatives 2 through 5 in the actual document. Now, the justification for removal of these species is really well laid out inside the amendment. It is due to the extremely low commercial landings in state and federal waters; almost all of the harvest for these species occurring in south Florida, and the fact that Florida is willing to extend state regulations for those species into federal waters.

If you go, like I said, into the amendment itself, all of these points are very well laid out and all of the data needed to support these decisions is actually quite clear. There are some habitat issues that are involved in this removal, and most of these center on schoolmaster. Schoolmaster is an ecosystem component species.

NMFS established the ecosystem component species to promote ecosystem-based approaches to management. They didn't really get much more detailed in describing what ecosystem component species could be, but the intent is to recognize that some species that are either part of a fishery management plan or related to the fish within a fishery management plan play a very key role in the structure of an ecosystem and should be considered in how that fishery management plan is executed.

Now, if something is designated an ecosystem component species, it requires neither an annual catch limit nor an accountability measure. That is important, because the Fisheries Service measures its success and the success of the councils by the percentage of species that have annual catch limits and accountability measures.

If you are bringing in a species simply because it is important to consider from an ecosystem perspective but it is really not a prosecuted fishery, you don't want that species in your fishery management plan to count against you in your performance metrics. That is why that exemption is here for ecosystem component species. One of the other points to make about these ecosystem component species, there are very few of them that have been designated; but when they are designated, they tend to be species with really extensive scientific literature.

A lot is known about these species, a lot of active research; much of it in peer-reviewed literature, very accessible, widely disseminated kind of stuff. When you want to go and prepare some general recommendations for the snapper grouper complex, you often run into the schoolmaster because of its extensive literature.

I'll come back to that point in a moment when I get down to the last bullet on this slide. Now one thing to note, while right now four species have been proposed for removal, we've actually already removed 14 species from the snapper grouper plan going back to 2011. In 2011 thirteen species were removed when I believe it was called the Annual Catch Limit Comprehensive Amendment was put into effect.

Later I think in Amendment 27, blue runner was removed. With these four additional species, the total number of species that will have been removed from the plan since 2011 will jump to 18. Part of the question then for me, anyway, is does this have implication for how EFH consultations are conducted?

That is the point I really want to get to with the last bullet on this slide. When we do EFH consultations, we try to focus our consultations on the species that have the most in-depth and broadest scientific literature available; because ultimately when you do a consultation, this turns into negotiation with someone on the other side of the table who wants to do something that you really don't want to see them do.

You have to make your compelling case, and you have to tell a good story. Both your case and your story has to be fairly well supported by the scientific literature or very quickly you start learning about gap analysis and what that means during a negotiation. For the EFH consultations that we typically do in southeast Florida focus on impacts to coral reefs and hard-bottom literature and seagrass.

The species that have the most abundant literature and that we focus on are white grunt, gray snapper, lane snapper, mutton snapper, schoolmaster, dog snapper, Goliath grouper, and gag. Now, the past iterations, when the 14 species were removed from the snapper grouper plan, had a relatively minor effect on how the EFH consultations were done, because none of those species that were listed up there were really the focal species when we got down to discussing impacts of a beach nourishment project or an offshore pipeline or something on snapper grouper species.

But now two of the four species that are proposed for removal are among the seven or eight species that we typically focus on. We are a little concerned that by having these species taken out of the plan, we're not going to be able to really draw upon their literature any more, particularly for schoolmaster to justify the EFH conservation recommendations that we proposed.

The question that Roger and I have talked about for a good bit and also with Wilson Laney that we would like some input on is when these species are proposed for removal from the plans; how should the EFH implications of these removals really be considered when the actual removal itself is evaluated and a decision is made on whether to move forward with it?

Then second question, and it is kind of related to the first one, is this is the third time that a set of species have been removed from the snapper grouper complex, but we really haven't had much

engagement by this particular panel during these proposed removals. This is kind of a topic area that this panel feels it should be engaged in in the future. Those are the two questions that we would like some input on, and we will just sort of turn it over to you for whatever input you wish to provide.

DR. LANEY: I'll just make a comment for hopefully the benefit of the group, and that is that when this comes up on the floor of the council committee for discussion and/or the council for discussion, the perception often is, well, this is just one of – going back to the beginning -- one of 72 species; and undoubtedly these species share a lot of habitats in common, so this is not going to affect things very much.

In fact that is what was written into the assessment section of this document when Pace and I first looked at it, what, six months ago, I guess back in December. I think at the December council meeting we collaborated, and I asked a bunch of questions of the IPT, the Interagency Planning Team, that was responsible for assessing the impact of the removal.

Some of those questions I think got answered to a certain extent, because I know the IPT had some discussion about it. I didn't raise all the detailed questions on the record. I sent them out in an e-mail, which I can certainly circulate around to this group if you want to see those, but I think it merits some discussion.

The reason it does, as Pace pointed out, originally one of the first species that was transferred from the council's jurisdiction entirely to ASMFC was red drum. I raised some concerns about that one when that happened; because when jurisdiction is totally transferred as opposed to being delegated, I guess is the technical term, then EFH goes away.

Now you have a situation where EFH is still present for red drum in the Gulf of Mexico, but we don't have it on the east coast. The importance of red drum on the east coast was I think – Pace, correct me if I misspeak – that was the only species for which the surf zone was designated as EFH.

It was certainly one that you all were able to site in particular with regard to beach dredge-and-fill projects. You no longer can do that now on the east coast, because it is no longer a federally managed species, per se. It is of concern, and I would certainly appreciate hearing what the panel thinks about it.

I think Pace has shared his concerns with you, and we did ask some very specific questions relative to the number of consultations that might be affected and those sorts of things. I don't know whether the IPT actually got back to you and the other folks in the Habitat Conservation Division with a request for any of those numbers or not, but that might be one thing that might help to convince the council to consider further the implications of removal; I don't know.

DR. ROSS: The issue here is if you remove one of these species, are you removing a unique EFH that is not shared necessarily by the rest of the group?

MR. GEER: Not necessarily.

DR. LANEY: That was the issue for red drum; but that is behind us, we've moved on. The snapper grouper EFH designations are done at this gestalt sort of level. They don't mention specific species; and if you go through that list of species in the snapper grouper management plan, some of them actually don't even hang out on hard bottom. They are mud species, and we have to deal with those through some other process.

But the issue really is how strong of a case you can make for protecting a particular bit of hard-bottom habitat. That strength is supposed to be derived from reaching into the snapper grouper plan, picking the species that are locally abundant, use that particular kind of hard bottom; and you can make that point really, really well with compelling scientific information.

You guys mentioned before in the last discussion we have no idea what most of the species of fish in the ocean eat, swim, or do. That is true for the snapper grouper complex. When you take away the species, particularly inshore species, and the ones that are ecosystem component species out of the plan, you are taking out of the arsenal of species you can use in an EFH consultation, the ones that have the most amount of information available.

You are left with species that aren't always reported in a survey, not a whole lot of information about them and so on, and it kind of weakens the negotiation that is during the consultation. Now, that is a negative, but it is not necessarily a negative that should drive the train. There are clearly benefits from removing these species from the fishery management plan.

If there is really no reason to have a federal interest in it, they really should be removed. But understanding the pros and the cons and maybe trying to find out that proverbial win-win scenario where you can remove the species because they don't require federal fishery management anymore, but find some way to still retain their strength in a consultation process would be sort of the idea solution to find. That is where we are having some problems finding what that ideal solution would be.

MR. GEIGER: I would ask what is your next best surrogate species within the assemblage did you have the best available data in?

MR. WILBER: Right now I am not a big expert on the grouper, but I think it is white grunt.

MR. GEIGER: Okay, so that being said, I would from a third party perspective make an argument that that is where I would put my eggs in my EFH consultations; and whatever additional information I may need, I would look at that one. That is the tradeoff I see.

I am hard pressed to see making a rationale against removing these species from an overly large management unit that almost seems unmanageable as it is from my perspective. That would be my recommendation. If you can identify a good, strong, surrogate species that shares that same kind of habitat type and could put some resources towards that; that is where I would lean on this particular issue.

MR. KELLY: In looking at this we're undergoing those regional management discussions in south Florida with the Fish and Wildlife Commission and both councils. When you have data-poor species like this, I think wouldn't it behoove us to take a look at the key indicator species in the South Atlantic and the Keys; mutton snapper and yellowtails as an example?

Both have been formally assessed within the past two years, rated excellent in both cases, no additional management measures are necessary. These species don't form large aggregations as a rule. They are spotted on patch reefs in smaller numbers and so forth. They are out in the deeper reefs. They are certainly not targeted, because they don't form such large aggregations.

I don't see them, as I mentioned, the target of either the commercial or the recreational industry. You don't say hey, come on, let's go catch some schoolmaster sappers. It just doesn't happen. But considering the overall health of the fishery primarily in the South Atlantic, and as I mentioned those key indicator species of mutton snapper and yellowtail, I don't know why we would have so much management uncertainty or concern about removing them from the EFH.

MR. WATTERSON: I was looking at the species you used to talk about when you are doing EFH assessments. I guess the very last bullet; I didn't see red snapper on there. I know there is a lot of data out there on red snapper. A lot of it comes from the Gulf, but there is a lot of habitat information available. Would that not be a decent substitute species you could add in there?

MR. WILBER: We certainly would look into that, but red snapper has not been reported in big numbers on the hard bottoms that are impacted by beach nourishment projects in southeast Florida. That is why they are not listed. We do pull in red snapper when we talk about impacts from various DoD type agencies that might be doing stuff out in federal waters.

DR. SEDBERRY: (Microphone was not turned on and could not hear remarks.)

MS. DEATON: This is more of a process question. When they were working on that fishery management plan, they considered the life history, the habitat use, the habitat niche. Do they take the habitat use into consideration? Did they document that in the FMP before they made this decision?

MR. PUGLIESE: Well, I think the decision was really driven by the fact that it, number one, was not going to put – at this point being ecosystem species, there was not going to be any regulatory measures put in place; and that pulling those out, the state actually could put in the comparable bag limits that apply to the state level.

It was kind of an overarching view. You had that balance of, well, removing may have some implications; but if you do, you actually could put regulations in place to protect the populations more than exist now. It was somewhat of a balance. The detailed information on life history was not really, I think, included necessarily. It was more driving it by the fact that you could encompass those by putting state regulations in place for those specific Florida-managed species.

MS. DEATON: I would just say that is from a fishery regulation. It seems like a change in the process should occur that they should look at the habitat piece of that; whether it is that it comes to us before it is final, that would be fine, or if it is incorporated in the FMP process.

In this case, I think you do have some other species that would co-occur, so you could say – if there is a beach nourishment project on hard bottom, you could still say, well, there is hard bottom, it is used by white grunts, it is used by – you would have fewer, but you still have enough to base your concerns on.

MR. PUGLIESE: I think that is exactly kind of what Pace, in our discussions, what we wanted this group to kind of field is that this process doesn't – it should have that habitat component, it should have that discussion up front early before we get to this point where all of a sudden realize, oh, wait a minute, this was a key species.

Now in the perfect world, if we had all the EFH at the highest level, we could very easily document that this is very unique habitats that would removed, and in some cases we don't. I think the process you are talking about is something that definitely is what I think what Pace has been looking for and we've discussed about having early input on what the implications would be for those species,

If they are surrogate – getting to that point; if there are surrogate species, are there unique habitats that they occupy during spawning; things that may be of concern that gets lost in the process, so to get that – and that is the biggest thing is to get that acknowledged up front; that that be a process that is early versus getting at the end of this process.

MR. GEER: I was kind of curious, along with what you were saying, Anne; if the management of these species is going to Florida, is there any habitat designation of these species in Florida that may be a proxy? You may not be able to use it in your – but if you can, I don't know if there are or not. If there was a habitat designation for these species in Florida waters, would that suffice?

MS. DEATON: But does it have to be a designation? Would a document that those, like, for example, those habitat profile books, they are U.S. Fish and Wildlife, and it says, okay, species X, Y, and Z are dependent on this habitat, blah, blah, blah. You can use that in your –

MR. GEER: I think it would have to be something in state.

MR. WILBER: All right, so there is some overlap between this panel and the Habitat Committee at the Atlantic States Marine Fisheries Commission. We did have this discussion at the commission, but the Atlantic States Commission does, in its fishery management plans, make some specific habitat designations that are very analogous to the EFH and the HAPC designations under the Magnuson-Stevens Act.

We are able to make use of those commission designations in the consultation process. The way I think Pat is asking the question is that if the state of Florida similarly made formal designations that certain habitats should be protected in order to deal with these species, then that would provide us with another avenue to pulling them into the consultation.

MR. PUGLIESE: Yes; and to that, if you think about going back to our EFH designations, one of the things we did acknowledge was any state designated areas. It got to originally it was trying to focus on the CHAs and the estuarine. Actually, first were the primary nursery areas in North Carolina.

But the intent was that if the state has any other designations, that that would also be identified as a central habitat or areas of particular concern. We kind of had that door open, so it really is kind of set up so that if the state does want to get into that and provide that type of a – that may be

discussions to figure out creative ways of making sure that some of these types of habitats don't get lost in the shuffle and provide the tool to the consultation process.

Because I think that is the key we're talking about here, because there are overlaps; but if you have one slip through and you don't have that capability, then that is one more piece you lose in that process and the strength. I think out of any region in the country, the southeast has done the best job of really taking to heart that mandate and how that translates to conservation.

I do applaud our partners and Pace's group, because you look at how much investment there is here and then look at some of the other areas, they just don't go quite as far. Anything that we can retain this good work is going to be important.

MR. PARKER: I guess I could say something about sheepshead. Of course, three years ago, four years ago it was removed from federal and put in state in South Carolina DNR. Moved swiftly to figure out new bag limits and so forth and what minimum size limits. I think that worked out real well.

It went into action, and it is just an example of the state taking over and quickly making decisions about new rules and regulations dealing with a species. If we hadn't done something quick, especially this time of year the bigger sheepshead move from inshore waters actually out to SMZs, the manmade reefs beyond three miles and do their spawning aggregation. They get hit fairly hard; but sheepshead, they are hard to catch. They are kind of self-preserving in that way. It is a great fish and we've got plenty of them, and I think we'll continue to do that.

MR. GEER: I guess the one thing I would say about that is that they took over the management harvesting, but did they do anything with habitat?

MS. DEATON: In North Carolina they haven't done any fishery regulations on sheepshead yet. That was 2011.

MR. GEER: Dealing with one state, some of these suggestions may work, but using that example of red drum again; that is coastwide and you would have to get all the states to agree. It is going to get a little more difficult. I'm thinking about what you said what do we do moving forward? It is easy if that species is only caught off of one state or something like that.

MR. PUGLIESE: Truthfully, this whole discussion really is a lead-out from that focus discussion on Florida, because we have an entire group that is very focused on looking at to what degree we can have comparable regulations between the Gulf and South Atlantic and south Florida, and there is that whole discussion.

A lot of this came directly from those deliberations on how do you more effectively deal with that, and these were some areas where they could get regulations in place fast in that area. There are other things that are being addressed, but it had to do with that south Florida perspective and the joint discussion between the Gulf and South Atlantic. It did have a very single state-specific type of discussion.

MR. GEER: What is the actual transfer process? Is it just a wave and a nod and the hands, and a sign on a piece of paper and it's done or does the state say they are going to take on certain

responsibilities and follow certain – because if that is the case, could you throw in there that they would have to identify – in addition to managing and regulating the fishery, put in there that they designate habitat.

MR. PUGLIESE: Yes; that is a unique question, because I think with regard to the species and the management on species, that is assumed, but I am not sure they have ever tried to or have considered if there is any type of a potential for a designation to ensure. I think some of that may have been the discussion on red drum when they did that, but it was just not –

MR. GEER: It was a long time ago.

MR. PUGLIESE: That was ASMFC; that was not an individual state.

MR. WILBER: I believe there is a letter from the Florida Fish and Wildlife Commission that is sort of used to document that Florida is willing to take on the responsibility of extending its state regulations into federal waters for these species. I don't think it is anything more formal than that particular letter.

MR. PUGLIESE: But what is formal is that we have to do an amendment that actually formally removes them from the plan with then the acknowledgement of the state that they are willing to implement regulations at the state level.

MR. WILBER: For me, the big picture message is really what Anne articulated really well in that we're all supporting more effective and efficient management of fisheries. No one is questioning whether removal of these fisheries from federal management and transferring to state management is not a smart thing to do from an efficiency perspective of federal management.

The only issue has been that in sort of the rush to do this the habitat stuff gets added either not at all or gets added at the last minute. Literally, I was asked to provide input on this on a 30-minute fuse when Wilson sent me a panicky e-mail one time while he was sitting in a council meeting. We need to somehow get a little bit more lead time on these questions beforehand, so that the habitat implications of this transfer or delegation or whatever particular form it is taking can be explored and we can find some sort of way to not sort of lose the habitat benefits of the species. There has got to be ways to do it, and I think you just hit on one in particular.

MR. BELL: A couple things. One, when sheepshead came off out of the management group, I can't recall. I think there were several other species as well, maybe, when sheepshead came out. I think in that case the species were just removed from the management group, and it wasn't sort of; hey, South Carolina, you've got it. It was just a fly ball out and then who's got it?

We picked it up, because as Bill said it is an important species for us. Actually the majority of the landings are in state waters, so we took appropriate action as a state to regulate within state waters in that case. In the case with what we're talking about now; I think it was the feeling of the council that these species would be better regulated under Florida because the landings were in Florida waters, and Florida had agreed to.

On our part I think it was trying to make things better for the species, but I will admit that I wasn't thinking about how that might weaken our position related to arguing for consultations or

whatever based on habitat concerns. That is I think the way forward now is we have learned a lesson with this. As someone said, we started out with – what was it – with 83 or whatever we originally had. It is an enormous group of species to try to manage. The idea was to kind of whittle it down to the ones we could focus resources on.

But I think the lesson learned here is to take this into consideration and what are the other implications of removing species in the future, and we need to ask that habitat question. As just myself as a council member, I would definitely tell you I will be willing to ask that question now, but I didn't necessarily think about it in those terms. Wilson doesn't send panicky e-mails; he is very calm, cool, and collected in the midst of the meeting.

MR. GEIGER: It sounds like there is an action item here, and again it sounds like there is sort of a transition in the process of the council. Would it not be beneficial for either this group or somebody, Mr. Chairman, sending a letter to the council to encourage, as they make these kinds of decisions, to have an active discussion of the appropriate habitat issues of that particular species? Is there some mechanism by which that could be incorporated into it to just get a placeholder that may give more time for that kind of debate or discussion?

MR. GEER: I was just going to say you can either do the report out or ask the council for their support on it. If the AP feels that strongly, you could do a letter, but I don't know what is more appropriate.

MR. PUGLIESE: This is an AP to the council, so I think the message is in the record. We've got three council members here that have heard it very clearly. I think Anne has done a good job of kind of highlighting exactly what we do. Pace has built the case for it. I think the message is loud and clear.

This is not something that is going to slip through the cracks again on these types of things. I think me as staff on this; a lot of this was generated in that south Florida discussion totally separate from anything. We can ensure that I think it is pretty clear the direction with the council. Mel has done a good job of saying that it is on his radar now, too. That is pretty direct in terms of response of council members to be able to react, and Wilson will pick it up one step even further.

DR. LANEY: Well, I was just going to say if I was going to write such a letter, the focus of it I think ought to be on the continuing erosion, maybe to put it that way, of the only tool as far as I know that is available for addressing habitat impacts on these species. That is the problem. I agree with Bill that there is no increased management risk by transferring a species to state management from federal management especially in this case where they are largely confined to south Florida and where the state can pick up all the regulatory tools that the council uses for managing the people.

That is what we're talking about, and managing the harvest of the fish, but the habitat management tools are what is of most concern I think to MR. WILBER and myself because those are so limited. We've just got the one that NMFS has consultation authority on and Pace can tell you how many teeth it really has in it. That can be the topic of discussion for another day, maybe, but that is the big concern to me.

Maybe the tenor of the letter would be; hey, the Habitat and Ecosystem-Based Management AP is not concerned about the management of the specie themselves because we believe that the states are going to continue to do a great job of managing the species; it is the habitat protection implications that we're concerned about.

The more you keep whittling down the unit, the more difficult it makes the Habitat Conservation Division's job to protect the habitat. To me that would be the focus of the message, I think. Then the other thing that we can consider is, maybe – and I will defer to Gregg on this point. Maybe I prompted his arrival at the table.

The one thing that I think about, Gregg, is what is the possibility of developing some sort of a mechanism whereby when a species – is it possible at all? I guess the answer is probably, no, it isn't possible under the way Magnuson is written now; but might it be possible in the future for it to be – during reauthorization, maybe, for there to be some mechanism developed for continuing to provide for EFH to be defined and designated even if management of the species is transferred to some other management authority. That is a question.

MR. GEER: I had thought about that too, Wilson. It would probably require a definition change, first of all.

MR. WAUGH: Wilson, I think that would require some change to Magnuson to be able to do that. But a couple of points I was going to make is the council – and I will probably get shot by Myra for this – but the council isn't finished with this amendment yet. It does come up for final vote at our next council meeting.

If you all feel strongly enough that removal of these species, in particular schoolmaster, does a lot of damage to our ability to comment on EFH issues, then I would encourage you to put a letter together and send it to the council and encourage them to change their position. More longer term, as Roger said, we can make sure that you get cranked into the discussion of any future amendments.

What would be helpful is when we did the snapper grouper fishery management unit originally, we were very broad, and let no good deed go unpunished. That was for data collection. Now with the changes to Magnuson, there is a high, high cost to having a species in a fishery management unit in terms of needs for stock assessment, annual catch limits, tracking them and so forth, so there is going to be a continued push to look and refine that list over time.

If you all could, not necessarily today, but at some point come up with some mechanism to give the council a feel for what is the cost to EFH protection from removing a species; then that would give us something to balance with the perceived savings on the Magnuson side. But, again, if you feel strongly that we're really making a mistake with schoolmaster in particular or some of the others and you want to voice that concern; the council could make that change.

MR. GEER: If you want to write a letter, we can write a letter. I can draft it. What is the pleasure of the AP? The meeting in June is in Key West? If that is what you want to do, we can draft a letter, if that is what you feel, or we can put it in our minutes and put it in our report at the next AP meeting. I can see the advantage of the letter, because the letter is one page and it is

directly and to the point versus, say, a 20- or 30-page documents of minutes and then a summary, which is going to be a couple of pages. It is up to the AP. What does everybody want to do?

MR. GEIGER: Well, from my perspective, I think as long as we're cautious and we are not infringing upon somebody else's jurisdiction or responsibility; but making the points very clear and very brief that somehow this process needs to be considered in actions such as this; but also if this is executed as proposed, what would be from our perspective a follow-up action that may be required to ensure appropriate EFH determination.

I think that is fair to give the council that kind of information, so you're not just leaving them – we're not putting the sour grapes on there. We're giving them, okay, if you choose to make that decision, that is fine, but this is the alternative that we may suggest to go forward to not compromise the overall EFH determination we may make in the future. Plus it reinforces the importance of habitat issues in any fisheries management plan determination. I think that in itself is a positive.

MS. DEATON: I am just going to add one more thing. I think there is a lot of value to having federal protection at this time. We don't assume that the state will adequately protect. It works both ways and it changes over time. I would defer to Pace; and if he thinks it weakens – that there is a good reason to have schoolmaster, because he is the one doing the EFH consultations, I would go with whatever he says.

MR. GEER: That is usually a good way to go. All right, Pace, will you help me write a letter? Will you look it over after we draft it, I should say. We've got this issue here, but we're going to have the issue moving forward as well as other species maybe. I think we want to make sure it is dealt with the best way we can. Is there anything else on this?

DR. LANEY: I'll ask Gregg to remind me again. We've had this discussion in the context of red drum. I don't think we've had it in the context of this discussion, and maybe you all have talked about it at the South Florida Workgroup meetings, but remind me again the difference between – what we are talking here is transfer as opposed to delegation. There is a relatively subtle difference between those two terms, I think. If I remember, with delegation we don't gain the administrative efficiencies that the council and the state are seeking. Is that the difference between those two in a nutshell?

MR. WAUGH: Yes; when we transfer, we're giving up all management authority. It is up to the state then to handle all management. If we delegate, depending on how much you delegate, the federal system is still involved. Then the state has to meet all the federal requirements, and you get a polite "thanks, but no thanks."

DR. LANEY: Right; that is generally the reason. Delegation would maintain EFH in place, but it doesn't result in the administrative efficiency either for the federal side of the shop or the state side of the shop, because all the federal requirements still would remain in place. Then Florida could manage the species, but they would have to comply with NEPA and ESA and all that sort of stuff, and we would still have to do all the same documents under delegation?

MR. WAUGH: That's correct.

MR. GEER: Gregg, would there still be an ACL?

MR. WAUGH: Yes.

MR. GEER: Is there anything else on this? It was a good topic, interesting points, and we will work through it. I keep saying this, but right now it is just Florida, but there may be a species that comes off that affects us all. It is better to be proactive; and if it affects your ability to do effectively make judgment on some projects, it is an issue. All right, nothing else? All right, folks, moving on.

The last topic for the day, Roger is going to be speaking to us about the South Atlantic Landscape Conservation Cooperative Regional, their blueprint version Number 2. It is Attachments 8 through 12 in our booklet. I wasn't sure if you were going to do this or if somebody from the group was going to come or something.

MR. PUGLIESE: I have provided all of the documents to everybody. I wanted to highlight where some of the activities in the South Atlantic Landscape Conservation Cooperative is in a process of building a blueprint. We've had presentations in the past or had materials provided in the development of the original blueprint.

It is moving forward as well as one of the other documents I provided, and I alluded to it potentially providing a foundation for another EFH related type of a document, is the state of the South Atlantic that talks about indicators and everything from the marine systems to estuarine systems to inlands and building that connectivity of systems and states and conditions of those.

What is going on right now is that I had distributed a notice when it came out of the workshop process that has gone underway for the entire South Atlantic, engaging individuals and providing inputs on an evolution of this conservation blueprint for the region. This blueprint really is trying to look at the highest level condition.

It is going even higher than we're focused on, to a great degree on the coastal and offshore areas. It is going all the way from the mountains to off into the Continental Shelf. It does cover the entire EEZ in trying to look at how all these areas are connected and then what some of the implications, conditions, and collaboration between the different partners are.

We had a presentation by Hillary Morris, who is coordinating some of the efforts on the latest round on the Landscape Conservation Cooperative's Blueprint, at the council meeting recently. This provided the context of where we stand with this and with the LCC is this broader forum. That's why I talked about being kind of the highest level looking down at all the different types of management across the entire region.

It is really the only place where you are seeing discussions between land managers species, upland species, water, marine, and estuarine. It is really crossing all the different habitats, all the different areas in our region and what the implications may be across these systems. It is a real cooperative effort.

As I mentioned before, some of the real benefits of being able to tap in on some of this effort there is to be able to see how that impacts or potentially could affect our overall region and how

areas way outside the bounds of our region may have impacts. For example, one of the things that they've been doing is that extensive work on evaluating urbanization. Urbanization a lot of times is focusing on all the movement toward the coast.

Well, if you look at some of the biggest impacts that are going to happen, you've got these two major corridors part way inland and then all the way even further that are going to have really massive urbanization, and with that is probably going to go along fairly significant water withdrawal situations.

If anybody has been watching the saga in the Pacific Northwest and California going down the tubes in terms of water situations; with this kind of growth in our region, we're going to have some really probably pretty significant issues on our flow regimes for many of the river systems. I have mentioned the LCC before in the South Atlantic.

The blue is our South Atlantic Region. There is a Florida Peninsula, if you look at this map, that is also really part of the South Atlantic. It is a separate group, but if you want to look at the entire – for our jurisdiction, it kind of covers both. There are efforts in that group to build very similar things to this conservation blueprint that the SALCC is building; so that would actually end up covering our entire region.

But you see this as a national effort and have LCCs designated throughout the nation. It has a lot of horsepower, a lot of support through core participation by U.S. Fish and Wildlife, USGS. As I mentioned before, the USGS Climate Science Centers; their primary responsibility is to each of these individual LCCs.

There is a direct link and them meeting climate information needs for each one of these different groups. Our participation and membership in this group really does link these climate science centers with other activities such as NOAA's risk and science assessment groups that are getting to climate science also and the USDA climate hubs. It makes a bridge between that.

These are the participants of the overall steering committee oversight of which the council, all the states and other key major federal groups from EPA, the Corps, NOAA, Fish and Wildlife, Park Service, Forest Service, it really covers the entire breadth of shared area. The area, as I mentioned before, goes from the EEZ up through the inland areas of the states.

The conservation blueprint is therefore really trying to look at building on a lot of other efforts, and some of the different things that have happened with the council's fishery ecosystem plan, our EFH designations, a lot of that is integrated into the deliberations and discussion, as well as many of the other partners.

What you are really trying to do is plan for the entire area; and again that gets back to this whole issue of looking at the broader scope that nobody else has really had an opportunity to do and look at something that could adapt a strategy that provides for issues, including climate change, urban growth, and other future changes.

It is at that broader scale. The intent is that this be something that actually can be used in the different partners, different regions, and move potentially additional resources to the area; so tap in on some of these different foundations and different areas for either land acquisition or more

significant research efforts or anything that would support not only understanding the baseline, but then how to better manage across all these different partners.

Also providing input as infrastructure in the entire region is building what are some of the implications, everything from maintenance of corridors across the entire – from the upland areas to the beach areas and north and south through our region, to providing repairing buffers in all the river systems. It really is trying to get it at a broader level.

The unique situation is that again that connection between multiple species, multiple management efforts that may be complementary and not even really realizing some of that. But it is also intended to go not only from the highest level, but provide some potential to go all the way down to the local adaptation and how that fits directly into the systems; the ability to then also use this information to look at planning and what may be issues on disaster preparedness, et cetera.

The indicators and targets that have been built cover everything from ecosystem integrity, cultural landscapes. That proceeded to what I had mentioned earlier on was the state of the South Atlantic. That document, I think it is Attachment 8, but it is one of the attachments that is provided, and that is the first cut at this that highlights what those indicators are for the different areas, and what the state is for this component.

The idea with this whole process is that they try to get these types of products done fairly quickly so that you can see where it is and then evolve from that point. This is a fairly good effort that accomplished. In this case, it is the marine component looking at some of the stressors, the conditions, and where you anticipate potentially evolving.

Originally, the Blueprint Version 1 was created. For our inputs into this; a lot of what we did is through the regional workshops, et cetera. We were able to provide the foundation of some of our information on essential fish habitat and the areas of particular concern designations, and that very effectively got integrated into the deliberations and the discussion.

In addition to a lot of these other partner plans, kind of connecting everything from bird conservation to forest conservation and coming up with the first iteration of kind of priority areas for focused conservation. Some areas probably obvious in the marine are connected directly to some of our EFH or HAPC designations as opportunities to elaborate or connect into conservation in the marine.

Then the estuarine systems, the importance of the estuarine systems, river corridors and that gets to both other activities needing river corridors, but also things such as water flow regimes and maintenance, et cetera. It provides both the high level and then areas for review further in refining information to understand how that moves forward.

The entire group looked at the combination of everything from freshwater, terrestrial marine, coastal infrastructure energy, working lands, and cultural. We had extensive user teams. One of the things that we highlighted was the opportunity to connect these to other activities. One of the things we wanted to definitely do is have this very closely connected with our fishery ecosystem plan. The blueprint builds on and complements what we're working on through our activities.

Again, it is such a cross-section that it does everything from in this case working with some of the quail-focused areas, being able to provide benefits of quail management throughout the entire region, public land planning, and that moves it really into the process I mentioned before. I had distributed the Blueprint Version 2 Workshops that have been held everywhere from Charleston and in Florida all the way up through Raleigh. The last ones I think were in Raleigh.

Actually they were last week in Raleigh. It was trying to take that baseline and take it even a step further with informed newer information on other indicator evaluations. It has moved it forward to where we are now. The intent was to get even finer spatial resolution within the area and to take what was that and then start to try to even get to a further resolution or refinement of the presentation.

The intent is to look at the landscape stressors, to translate to conservation actions and how you would look at everything from land, water, species management, education, livelihood and law and policy; and then how that balances out in terms of ecosystem integrity. That is what is highlighted in the state of the – somewhat of the state of the South Atlantic, but it is being refined in the version.

Also, one of the efforts is to use this zonation, which was developed back in 2004, but it is used for a kind of a broader terrestrial freshwater, marine, highlighting climate resilience, urban conservation, and its attempt to try to process the indicators, give you basis of ecosystem integrity and base it on the parameters that this group has come up with – these different groups that show everything.

For estuaries for example, you are looking at wetland patch size, water vegetation edges, and coastal condition indexes. Freshwater aquatic, you are looking at repairing buffers, impervious surfaces. It is giving you the indicators and drivers, and then you are balancing out the integrity within that system.

It is something that is ultimately going to provide you a resolution that goes further than what we had done in the past to look at the analysis of what the conditions of some of these different areas are. Ultimately you'll get to an evaluation of the conditions in the estuaries and different areas. This is just focused on the estuary system here, but it goes beyond this for all the entire region.

It kind of balances out the condition in all those different states that provide you focus areas on where areas may be of the highest priority, go in for either land acquisition, for regulation. The interesting thing about this entire process is in terms of the spatial tools that are provided – and one of the attachments has all the links to their online system – is you can really drill down and see what the justifications are.

You walk right into it and see that it is based on these different parameters. This is providing a whole 'nother level of opportunity to understand what the connectivity of the systems are, how the cross-conservation efforts may be complementary, may be connected as I mentioned without even knowing some of those connections.

It does connect to some of the other activities in the southeast. Some of the other efforts were the Southeast Conservation Adaptation Strategy that is already ongoing that is looking at how some of these different changes may happen in multiple states in our region and the opportunity

to tap in on that effort and that activity through multiple states and other partners. Those workshops have been held and the follow up is going to be coming from here into later this year to look at Version 2.0, and how it moves forward.

I think some of you may have participated directly in those workshops. The guidance especially on the marine and estuarine components will get elaborated and added into and refining the product that moves forward. I wanted to catch everybody up on where things stand with that and its connection into our efforts.

I think it is an excellent opportunity to tap in on some pretty powerful and directed efforts that are definitely going to complement what the fishery ecosystem plan is working on and what our each individual state is already working on with a lot of commitment. The more important part is resources to make some of these things happen. Any questions specifically on the efforts of the Conservation Cooperative?

MR. WILBER: I've been to many of these workshops with the SALCC and serve on a couple of the user group teams. I am going to give you three criticisms of the blueprint; but before I do that, I want to tell you this is really a cool effort. They have made a lot of progress and they deserve a lot of applause and our continuing support.

I will repeat that after I give my three criticisms. There are a couple of things that are kind of worth noting is that it is still largely an expert opinion kind of a thing, so you pull people together into workshops and everybody votes. If you look at Blueprint Version 1 and you take away all the fluff from the roads and things like that that would distract your eye, the first thing that is really obvious is that the high priority areas are all right below the fall line and the low priority areas are right above the fall line.

There has been a substantial lack of experts attending these meetings that represent the areas that are above the fall line in the Carolinas and Georgia. You have to kind of take that a little bit into consideration. Second, in Blueprint Version 2, they've got some really great criteria for prioritizing undeveloped areas for conservation activities, but those same criteria when applied to urban areas result in nothing in an urban center is worth preserving or conserving; no effort needs to be spent there.

That really I think is an artifact of how they put their criteria together, and some folks that are on the various groups have been trying to kind of prod them to come up with some criteria that work in urban areas and apply those to the urban parts of the landscape and leave your good criteria for the rural parts of the landscape alone.

Then the third point I would make is that they are trying very hard, harder than any group I've ever seen for basically a terrestrial-oriented group, to extend out to the EEZ in a really meaningful way. Despite that effort, they are struggling. They are asking for a lot of input. I haven't provided them with good input.

Other people that I've seen haven't really been doing a good job with their input either, so coming up with really a good way to characterize the offshore areas is really a challenge that still lies in front of them. One particular criterion that they are using, because it is easy for them to

use it, is hard-bottom habitat. My criticism of using hard-bottom habitat is that it is not going to change.

Part of having these criteria is that you can track the effectiveness of management actions; you can look for trends over time to see if additional management actions are necessary. If all you really have is a hard-bottom map, it is not going to change in any meaningful way in these offshore areas.

Coming up with some way to kind of really accurately characterize what is going on offshore is something really that they need. Some of us have been also involved in I guess a quasi-companion effort at the Nature Conservancy where they have been trying to link estuaries and offshore fisheries through some magic GIS and algorithm kind of development.

I don't really understand exactly what they did, but the maps looked really cool and they looked really promising. Trying to kind of marry on that effort to do that onshore/offshore linkages, I think would be a really good thing for the SALCC to do, and it actually would be something really good to eventually incorporate somehow into the fishery ecosystem plan.

MR. GEER: I would like to add a couple comments as sell. The report card itself; the folks that do that are out of University of Maryland and they are really neat looking. It is condensing a lot of material and putting it in a score that the general public can understand. We are going through that process with these same folks in our state.

You can sit there and look at those different criteria, like you said, potential hard bottom is why they picked that for the marine environment. They picked marine turtles and mammals as another one. I looked at some of the ones they've done and I have questioned why they picked those things, and it was probably availability.

When they came to see us, we told them exactly what we wanted. We told them to the marine estuarine environment for fish, this is what is going in it, period. But it is kind of a neat process with the report cards, because it is not as difficult as you would think. It is kind of like they don't want everything. They want it simplified. They didn't want 25 species going into this,

They said give us an apex predator, give us a forage species, and give we picked blue crabs. Those are our three species and said go from there. They did that – you know, give us all your DO data. We don't need to have DO and all these other environmental factors. We want to have just a couple of parameters from each one of those categories. It is a generalization, but it seems to work. You've got to be careful what you put into it to start with. Any other comments, any other questions for Roger on this? Let's go with Wilson first and then we'll go with George.

DR. LANEY: Well, one question just out of curiosity. How many folks around the table did make it to one of those SALCC workshops? That is a pretty good representation. To Pace's three criticisms, all of which are very valid, numbers one and two were discussed in the workshop I participated in last week. We pointed those very two same ones out, so I hope the staff heard that and will address those.

Number three wasn't, but that is a good observation as well. I hope there will be – and I think Roger can confirm or deny whether this is the case, but I think there is going to be a more

focused effort with a smaller group on the marine side of things that we will have an opportunity for input into. Hopefully, that one could be more directly addressed during that process. At least that was my understanding from Rua and Hillary.

MR. PUGLIESE: Yes, and I think you're right on that. To your point on some of the activities, the TNC; that is in the queue and we actually looked at some of the products that were provided and went beyond that. We looked at what they provided. There were other even analysis that we were looking at. I think this is a process, so there is some real opportunity.

I'll guarantee you that we will try to get as much as possible, sitting on the steering committee and on the executive committee now for that group, to try to make it as effective as we can for the marine side. That was one of the reasons I tried to engage the entire AP when those workshops hit the table just because we wanted to get as much marine representation in the discussions early on in this process.

I think we just need to have some more concerted view exactly of it. One of the other things is considering that there is this desire to ramp that up, there is a very directed effort to look at providing the foundation for some of this next generation of ecosystem modeling efforts to get funded through here, to maybe provide some even closer connectivity between what is being done on there – not just on the modeling but all the information that is going in that could highlight then more specifically some of the species connections, use patterns, et cetera.

I think there is a real opportunity, again, since they have resources available and this real opportunity to connect and refine that information for the marine side of this. That may be one of the ways that we can really step forward on this and with that real partner view in mind.

DR. SEDBERRY: (no recording)

DR. LANEY: To that point, George, that very topic was discussed at the table I was at last week. I think they are going to go back and tinker with their corridor algorithm that they used to connect up those high diversity terrestrial areas and see if they can't fix that. They are well aware that when those things were generated by whatever program they used, there were some issues with large mega-malls being right smack in the middle of a proposed connecting corridor and things like that. They are going to try and address that and fix that issue.

MR. GEER: Anybody else? We're not looking for any recommendations on this; are we?

MR. PUGLIESE: No.

MR. GEER: Nobody else. Any other business today? All right; hearing none, we will adjourn for today and we will meet up tomorrow at 9:00 a.m. We have BOEM giving us presentations almost the entire morning pretty much and discussions with them. I am sure that will be informative and lively. Then in the afternoon we're going to talk about energy exploration and development.

MR. PUGLIESE: Just a point to that; BOEM did make presentations to the council at the March meeting and it was clear that they kind of really covered broad-scope points, but the point was that this meeting is where they were going to kind of get into the details of this. They have been

given some very specific directions on information that should provide a lot more detailed perspectives of what they've been doing and the types of potential impacts.

Definitely we want to engage them as far as we can to help provide this group providing recommendations to the council and how we refine our energy policy into the future. Hopefully it ought to be an interesting session in the morning.

DR. ALEXANDER: I just had a question for Roger since he seems to know what they are going to be talking about tomorrow. BOEM recently completed a large-scale summarization and study of offshore shoals and their importance as fishery habitat. I didn't see that as being – has that been described to this group before?

MR. PUGLIESE: No, I don't think so. I remember when they had the workshop in Charleston and kind of kicked that off originally.

DR. ALEXANDER: Because it would be great if you have contact information or at least let them know we would like to hear about that, because I would certainly like to hear a summary about that.

MR. GEER: Anything else? All right, we are adjourned for today.

The Habitat Protection and Ecosystem-Based Management Advisory Panel of the South Atlantic Fishery Management Council reconvened in the Crowne Plaza, Charleston, South Carolina, April 8, 2014, and was called to order at 9:00 o'clock a.m. by Chairman Patrick Geer.

MR. GEER: All right, let's get started. We have a pretty busy agenda today. We've got multiple presentations from BOEM. We have Brian Krevor and Brian Hooker will be giving presentations first thing this morning, and then a new crew will be coming in the next group and they will be heading the section on activities in the South Atlantic.

What I would like to do for the Brian's sake, so that they can put a name with a face, is just quickly go around the room and say your name and your affiliation very quickly.

DR. ELKINS: Chris Elkins; North Carolina, recreational seat.

MR. KELLY: Bill Kelly. I am the Executive Director of Florida Keys Commercial Fishermen's Association.

DR. KEMP: Dustin Kemp; University of Georgia.

DR. ALEXANDER: Clark Alexander; Skidaway Institute of Oceanography; and pertinent to this discussion, the BOEM Sand Resource Study PI for Georgia.

MR. WATTERSON: Carter Watterson; U.S. Department of the Navy.

MR. PARKER: Captain Bill Parker; recreational fishing.

MR. GEIGER: Jamie Geiger; conservationist, South Carolina.

DR. HALPIN: Pat Halpin; Marine Geospatial Ecology Lab, Duke University.

MR. CARTER: Mark Carter; Florida recreational seat.

MS. WENDT: Priscilla Wendt; South Carolina DNR.

MR. GEER: I'm Pat Geer; Georgia Department of Natural Resources.

MR. PUGLIESE: Roger Pugliese; council staff.

MR. WILBER: Pace Wilber; NOAA Fisheries.

MS. LAWRENCE: Alice Lawrence; U.S. Fish and Wildlife Service out of Athens, Georgia.

MS. DEATON: Anne Deaton; North Carolina Division of Marine Fisheries in Wilmington, North Carolina.

MR. ELLIS: John Ellis; U.S. Fish and Wildlife Service, Raleigh, North Carolina.

MS. WHITTLE: Amber Whittle with the Florida Fish and Wildlife Commission in St. Pete.

MS. DALY: Jaclyn Daly; NOAA Fisheries.

MR. CALDWELL: Mark Caldwell; Fish and Wildlife Service here in Charleston.

MR. TROWELL: Steve Trowell; North Carolina Division of Coastal Management; Washington.

DR. ROSS: Steve Ross; University of North Carolina in Wilmington.

MR. GEER: Okay, thank you very much everybody for doing that. Sorry, we have people in the back I didn't see.

MR. HAMSTEAD: Byron Hampstead; Fish and Wildlife Service, Charleston, South Carolina.

MS. CLARK: Laura Clark; Pew Charitable Trust, Charleston, South Carolina.

MR. GEER: Okay, that is everyone. All right, Brian, you have the floor.

MR. KREVOR: Okay, first I just want to thank the council for inviting us to speak today. My name is Brian Krevor. I am an environmental protection specialist with the Bureau of Ocean Energy Management, Office of Renewable Energy Programs. Some of the states I cover are Massachusetts, North Carolina and South Carolina. I am going to start with an overview.

This is what we'll be looking at in this PowerPoint, but an overview of some of the activities going on in the South Atlantic. For North Carolina we have three wind energy areas that went out in August of 2014. An EA was recently published, environmental assessment, in January of 2015, and the next steps are to finalize the environmental review. We will go into more of that later.

South Carolina; we've held our third task force meeting back in September of 2014. The next steps are to publish a call for information and nominations. In Georgia we have an interim policy lease for a meteorological tower or buoy. That EA is being finalized as well.

For Florida, we actually have a lease that has been issued to the Florida Atlantic University for testing of marine hydrokinetic technologies, so underwater turbines. There also has been a task force established in December of 2014. That is really one of the few states we have on the east coast that is looking at something other than wind; so looking at using the Florida current for marine hydrokinetic technologies.

The North Carolina planning efforts have been going on for quite some time; but kind of jumping forward to more pertinent information, the call for information and nominations was published in December of 2013. For those who don't know, a call for information and nominations gauges industry interest in areas offshore, generally for offshore wind, as well as looking at key issues; so giving us information on issues that need to be resolved that are outstanding.

In North Carolina those were primarily visual impacts and navigational safety. You can see the large areas offshore Kitty Hawk in particular; and these lines represent some viewpoints, a buffer from the coast. One of the main things we had to figure out was maritime safety, and we held stakeholder meetings with various maritime stakeholders up and down the coast.

We really tried to figure out what some options could be that would work for the different groups that used the OCS environment, so tug and barge operators, cargo vessels and we looked at military earlier. This is AIS data up there; so you can see that although the volumes aren't too high, they cover a wide area, so we really had to take a deeper look.

On the right were some of the options that we presented during the maritime stakeholder meetings. I think there are four options up there that we looked at. The other main issue was visual impacts. Really, the driver of this was the National Park Service, who was concerned about impacts to Cape Hatteras National Seashore.

That line you see out there is a 20 nautical mile buffer from Cape Hatteras National Seashore that they had originally requested. We also did a visual simulation study. We partnered with the Park Service to simulate what an offshore wind energy facility would look like. We held public open houses to show these results and held numerous meetings with the National Park Service.

Out of all of these efforts, we ended up with these wind energy areas that you see. We removed large chunks of the Kitty Hawk Call Area; and the Kitty Hawk Call Area is now 24 nautical miles offshore. That was primarily for vessel traffic, but the southern part of that wind energy area was removed for Park Service concerns; 33.7 nautical miles from the Bodie Island Light House is what the Park Service requested.

Then you can see the Wilmington West and Wilmington East areas on the left part of the slide. Those areas were removed for visual impacts from 10 nautical miles, and also for vessel traffic. Trying to keep people having easy access to the TSS, so we essentially extended the TSS and had people keep the same angles of entry and exit. Once we had our wind energy areas, we went ahead and did an environmental assessment.

I am not going to really go into what an EA covers to save time. Really, what we looked at in the EA was issuing leases in all three areas and the associated site characterization and site assessment activities, so GNG surveys as well as construction and operation of a meteorological tower or buoy. We are not actually looking at full construction at this point.

We had three alternatives. One was to remove the Wilmington West wind energy area due to migrating North Atlantic right whales. One was to prohibit GNG surveys during the months where whales are migrating; and Alternative D, the no action alternative. The different impact-producing factors, we look at vessel traffic, noise, vessel collision allisions, bottom disturbance, emissions and discharges, lighting, severe storms, visual and esthetic interference.

Then some of the resources we look at, and probably the most important for you guys, commercial and recreational fishing. One thing we do to try to mitigate impacts is we have standard operating conditions that are part of the proposed action, and they also become lease stipulations when we actually issue leases. These are based on previous and ongoing consultations with NOAA/NMFS, and the Fish and Wildlife Service.

They are developed to reduce or eliminate potential environmental impacts, and as I said, we put them as lease stipulations. They include things like vessel strike avoidance measures, protected species, observer requirements, exclusion zones, and ramp-up requirements for pile-driving. The next steps is either publish a finding of no significant impact, revise the EA, or determine that an environmental impact statement is required.

From reviewing the comments and from what we found in the EA, it is likely we will revise the EA and do a FONSI. The next state I'll talk about is South Carolina. Right now we've held three task force meetings. We've removed areas for conflicts with military uses and navigational safety. It is a little hard to see, but the shaded areas up there I am putting the cursor on are the areas that remain after removing for navigational safety and for military use.

We're really focusing on the four northern areas right now, kind of off the Grand Strand and then south of Georgetown, and then two small areas further offshore. The shaded things you see here are wind speeds. We're currently trying to compile additional information, and then we'll hopefully hold another task force meeting and then have a call for information and nominations to gauge industry interest and get more public feedback on these areas.

One thing before we get to this slide; I have some more information I wanted to talk about specifically to you guys today, because we are trying to focus more on some of the state issues today. We have a cooperative agreement with South Carolina Sea Grant Consortium, and it is called the Atlantic Offshore Wind Energy Development, Geophysical Mapping and Identification of Paleo Landscape and Historic Shipwrecks Offshore South Carolina.

A lot of fancy words, but it really means we're going to be surveying areas off of South Carolina looking for hard bottom and any cultural resources out there. It is expected to be completed in November 2016. The survey efforts should be starting very soon off of South Carolina now that the weather is getting better. We are looking at areas generally 11 to 16 miles offshore. There are some great Army Corps work that has been done closer to shore that they have data on, so they wanted to look further offshore and then they can kind of try to fill in the rest; so looking at areas kind of on the North Carolina/South Carolina border, going west in that 11 to 16 nautical

mile range and then an area south of Georgetown as well they will be looking. I am going to hand it over to Brian to cover some of the studies and other concerns we have.

MR. HOOKER: Again, my name is Brian Hooker and I am a biologist with the Bureau of Ocean Energy Management. I work closely with Brian Krevor. We're termed a subject matter expert. We work across different areas in the Atlantic, but just strictly on renewable energy. Did this have an internet connection?

MR. PUGLIESE: I'm not sure.

MR. HOOKER: I can give it a try. One of the things I always get asked is where to find all this information, so I just wanted to take a moment, if we can get on, to just kind of show you guys where our information is found especially on studies, because after today you'll go back and what was that study that Brian was talking about, either one of us, and I want to know where those are found.

For the renewable energy programs, it is pretty straightforward. You go to renewable energy and click studies. Then right on here we have ongoing studies and completed studies. What these do are bullets of all the different studies and what we call study profiles. It is just these little one-pagers on each of these.

For the completed studies, we have the actual final reports posted to our ESPIS website, and that is also on here as well under environmental studies. Sorry; I am trying to tell you how easy it is and I'm not getting there. There it is. It is the Environmental Studies Program Information System, ESPIS.

You click on here and this is where you can search our whole database of completed studies; and that is across all programs throughout all years and throughout all regions. I just wanted to quickly take an opportunity to just orient you to our website and where a lot of these studies are found in case you have questions after today's meeting.

I wanted to highlight some of the types of activities that we're doing. Not all of these are taking place in the South Atlantic Region. For instance, the first bullet there, one of the things we often hear about is studies on circulation and what potential impacts placing offshore wind structures would do to ocean circulation models.

We are taking an opportunity to try to evaluate what that is in the North Atlantic. Although all EMF, electromagnetic field studies, to date don't seem to indicate a physiological impact to fish other than a fish's ability to detect EMF fields; we realize this is a concern so we're continuing studies in this area.

One that we just launched in the Atlantic – we have one in the Pacific right now. The Department of Energy has completed lab-based studies; but one we're about to kick off in Long Island Sound is with using the cross-island cable. This is a power cable that crosses underneath Long Island Sound to Long Island from New York. That is going to be looking at lobster and fish movement in pens over the electrified cable to even further try to look at what the differences in fish movement are across electromagnetic fields produced by that power cable.

As I'll get into later, we've spent a lot of time going into the effects of pile-driving sounds on fish. This isn't just a concern of obviously the renewable energy program. A lot of this work was originally done by bridgework on the west coast with endangered salmon and that type of thing. We're building off some of that experience.

Another example of a study that we're doing is we've tried to take a regional approach to looking at monitoring of resources. A few years ago we compiled a national study with the University of Rhode Island looking at monitoring protocols. What we found is it is great. It provides a great suite of different monitoring protocols that will be appropriate for offshore renewable energy.

We've incorporated those into our preconstruction survey guidelines and our post-construction monitoring guidelines are under development. However, we had an interest from some folks who want to dig deeper into regional-specific monitoring guidelines. For instance, the Commercial Fisheries Resource Foundation in Rhode Island wanted to look more specifically at long-term monitoring that would be appropriate in Southern New England.

We were able to partner with them for them to look deeper into very a very specific area monitoring protocols specific to fisheries resources in that area. Along those same lines, from Massachusetts to North Carolina, we partnered through an interagency agreement with the NMFS Sandy Hook Lab to compile basically a broad benthic habitat assessment to try to really put a standard baseline across all these different wind energy areas.

We have data collected under various projects by states, by BOEM, by university researchers, and they are using that data along with data they are collecting to the project to put everything into a CEMEX classification system and just really trying to establish some baseline areas in those wind energy areas.

We've received an interim report for the Maryland wind energy area and others are forthcoming. The co-op study that Brian mentioned is a good place where we acquire some of that initial baseline information through those surveys and looking at not only hard bottom but also cultural resources as well.

Just another study in Southern New England, cooperative ventless trap surveys; and then I do also want to mention the importance of the Atlantic Marine Assessment Program for Protected Species, also known as AMAPPS. That project is in the final modeling stage right now, modeling densities of priority species through the past five years of aerial and ship-based surveys.

Once again that is for primarily large whales that they have been able to identify, although there is a marine bird component to AMAPPS as well. There is an AMAPPS 2 that is in the works that is going to be following up on AMAPPS 1, and so that will continue this work and I think also build on some of the past acoustic monitoring that really wasn't a part of AMAPPS 1.

Lastly, I wanted to mention that we are trying to learn from some of our early projects, so we have what we called RODEO Project where we can evaluate and study projects that are getting built. For instance, probably two of the projects that are furthest along on the east coast is the State Waters Project, the Deepwater Wind Block Island Project.

They anticipate to start construction this summer. We have a contract in place to be able to actually look at and evaluate and get more empirical data on that construction effort. We can continue that with the Virginia Offshore VOWTAP project that is for two turbines. The Block Island Turbine is five turbines and the Virginia project is two turbines. The Virginia one is a BOEM lease, whereas, as I said, the Block Island is not.

I quickly want to just touch base on some of the ones that I know you're interested in. Unfortunately, Chris Taylor is offshore. He was one of the PIs on this particular project. This was collaboration not only with NOS but also with UNCIMS, and looking at once again hard-bottom habitat, also interviews with fishermen, trying to understand their concerns and use of the offshore area.

The first part of this project with the fishermen interviews has been completed, and I think that report is posted on our website. The second report is still under development. This is just an example of the type of work that they were able to map the Wilmington East Call Area, and not only remotely but did dives on it as well to really groundtruth what they were seeing in the sidescan sonar and multibeam returns.

Again, this is I think a large part of what we would learn from this study is what Brian mentioned as being built off of for South Carolina as well. This is just another example; this is fish returns. They have their – I forgot the name of it, but it is a sonar that is looking for fish in the water column, and this is just a bubble plot of fish densities from that equipment.

Roger also asked are there other mapping efforts that we've done. This isn't necessarily a new mapping effort; this is somewhat historical. But oftentimes when we go up and down the coast, folks ask I don't necessarily care so much about where we fish now. These leases are for 30 years. Things are going to change over 30 years. You need to also evaluate where we fished previously.

We went back and went to the Freeman and Walford Anglers' Guide to the United States and digitized all the features that were recorded through those interviews that Freeman and Walford did in the late sixties. We have this information both as PDF GeoTIFFs that you can overlay on top of and all the features such as Frying Pan Shoals, which you can see on here.

Any of the basically polygon features that were identified as being fish havens or areas of importance were digitized separately. You can pull those out and overlay them over different base maps, so they are not only tied to this particular GeoTIFF. One of the other things that Roger asked that we talk about is the sounds on fish.

We completed a complete literature synthesis back in February 2012, and then we held a workshop also in 2012 that Roger was able to attend in San Diego. It was not only pile-driving, but we looked at geological and geophysical activity surveys within that same workshop as well, but there were separate breakout groups for pile-driving. That report was also completed in January '13 and is available on our website as well. We have the two reports. We have the complete literature synthesis, the notes from the workshop, and that final report all available.

Basically, the report had lots of conclusions. One of I think more interesting ones was in Norway. There was some evidence during noise activity. This wasn't pile-driving. This was a

survey activity that catch rates were somewhat reduced during that time, but that varied by gear type.

Gillnet catch rates actually increased, so there is the thought that fish may have been fleeing the noise source and then increasing the gillnet catch rates as a result. However, I think one takeaway is that they are temporary effects. Things go back to normal once the sound has dissipated; but there have been some documented results of reduced catch rates during noise activity.

Another important study or aspect of this; there is a separate pile-driving study that came out that had recommendations looking at barotrauma in fish. Basically, NMFS has these interim criteria for fish noise impacts, and one of the most difficult I think to understand is the cumulative sound-exposure level.

That is based upon a fish being exposed over a long period of time to a sound source; and an enclosed environment where a fish is not able to move around that cumulative SEL makes some sense. It is difficult in an open water environment where the fish is constantly moving that you can't say that fish is going to remain static and exposed to that same noise source repetitively again and again.

The bottom line is it had some recommendations for what they saw in barotrauma. Again, even for most fish, they were able to recover fairly quickly even if they were exposed to some of the higher sound levels. Once again, this was in an enclosed tank-setting where they were not allowed to flee.

What has happened; most of the injury is from fish with bladders; whereas that bladder is vibrating against other organs in the fish, and that is what causes some of the trauma there. It is an interesting study. Once again it is available on our website.

MR. PUGLIESE: I just wanted to make a point, because when we are looking at some of the most significant species relative to some of these areas, they are going to be benthic species, our snapper grouper complex. In most cases many of those species will stay tight to those habitats. Where some of the pelagics like mackerel and whatnot probably are going to be moving more significantly, depending on the level of exposure, you are probably going to see some of these species basically staying in the area and enduring whatever. Some of those studies actually may be more relevant to maybe snapper grouper and may be more realistic in terms of some of the impacts.

MR. HOOKER: That's a good point, and I don't mean to diminish that too much.

MR. PUGLIESE: But I know what you mean.

MR. HOOKER: If there is a source of agitation, so to speak, or something that would cause a disturbance to the fish, given swimming speeds and stuff, they should be able to extend their distance from the area. I don't know what the forage distance is or the home range is of the different – I would love to discuss the home range of the snapper grouper complex, but the distances we're talking about on a lot of the pile-driving for injury level is within like 25 meters.

We are not talking about a huge range. It is the behavioral range that has a much larger footprint, because it is a much lower threshold, and that we're talking about probably reduced feeding during that time. I definitely want to have that discussion, and that is why we have an hour and a half I think to do that. I don't actually have that many more slides.

Although Roger didn't ask me to talk about socioeconomic studies, I did want to touch upon the fact that we are trying to engage with fishermen early and often and understanding concerns, and a lot of their concern is related to monitoring and how that monitoring plan will work. We've had several.

We have one in a cooperative agreement with the state of Virginia right now. One of the more interesting that I have another slide on is an interagency agreement with the Northeast Fisheries Science Center where they are combining their AIS data and VTR data to really get explicit value estimates from the fish harvested from each individual wind energy area.

It is what they term fishery exposure. It is not an impact, per se, but it is the amount of harvest from a particular area that would be exposed to offshore wind development. Here is just an example for offshore Virginia. You can see that this is the old call area polygons. Brian had showed an updated one that had the smaller areas.

But as you can see, generally speaking it is in a fairly low-dollar amount areas at least off of North Carolina. Unfortunately, the data was getting really difficult south of Virginia, because of the VTRs in the South Atlantic or the statistical areas are much broader and larger. I don't think the lat/long is a requirement on those VTRs as well.

MR. PUGLIESE: What about size limitations and the AIS how –

MR. HOOKER: The AIS was just used to compare against the VTR to look at accuracy. We didn't leave out any group due to AIS because obviously not all fisheries have AIS. But they were able to crosscheck this methodology against AIS, and they found very good agreement with that. Anyway, from this study we were able to look at – and unfortunately, again, the farthest south that this study goes down to is North Carolina.

But I wanted to point out we get the percent of their total income that is derived from potential wind energy areas; and again this was the larger wind energy areas that are reflected here. It is a fairly small percentage amount for North Carolina; and you can see the FMPs. We have many, many different ways of breaking this down.

MR. PUGLIESE: Commercial fisheries?

MR. HOOKER: Yes, commercial and for-hire. Again, you can see you are not anticipated – those are just FMPs that are along the bottom and you can see where our highest overlap of fisheries and wind energy areas are. As you can see, it is mostly in the Southern New England and New York Bight area. New Jersey is driven largely by surf clam and ocean quahog. That is really all I had.

I just wanted to open it up and allow you guys to ask Brian and I questions on your concerns and studies that you have in mind. Actually one thing I did want to mention is there are some other

mapping studies obviously raised with the sand-and-gravel program. Most of their resources are more inshore of where our interest is although we are coordinating with them on a lot of their state co-ops and such.

There is a coordination that is happening with both our oil and gas program as well as our sand and gravel program; but what I presented today are primarily our studies out of the Office of Renewable Energy Programs and not the Sand and Gravel Programs or the Oil and Gas Program. Questions?

MR. KELLY: Could you please tell me the typical methods for securing these transmission cables to the ocean floor and what negative impacts you may be experiencing on benthic habitat? Then the other part of it would be could you tell us how this wind-driven energy compares cost-wise to more traditional forms?

MR. HOOKER: I'll handle the first one first. For the power cables, our recommended burial depth – and they are just buried – is six feet under the surface. In some areas that target burial depth may not be able to be reached due to the bottom type, if it is a hard bottom, for instance, in which case there are other mitigation measures such as rock dumps or concrete mattresses that could be used.

These would also be in place where there might be a cable crossing another cable, they would secure that as well. Generally it is done with a jet plow and the jet plow just moves through, blows a trench and the cable falls into the trench and then it naturally recovers after that. Regarding the cost; I don't know, Brian, do you want to talk about cost?

MR. KREVOR: It is a little bit outside of what we actually look at, but cost depends on a number of factors. The two most important are probably distance from shore that effects the cost of cabling, which can be pretty expensive, and then water depth. Those are two primary factors in cost that change it from one offshore wind facility to another. As compared with traditional energy forms, it is different. Most all the costs of a wind energy facility are up front.

There is no cost for wind, so it is a steady price throughout the life of the project. To the rate payer, well, prices for traditional energy go up and down. Offshore wind is going to be more expensive than most traditional energy, because it is for the United States a fairly new technology. There are no economies of scale right now. As technology continues to develop, the prices will go down such as we've seen with solar energy, but it is more expensive than traditional energy forms.

MR. GEIGER: Obviously on some of this technology, you are dealing with vibration, you are dealing with sound. Are you also investigating latest mechanical engineering advances, looking at hydraulic; rather than typical pile-driving, some of the hydraulic rams that reduce vibrations, reduce sound, as well as some other mechanical ways to shield or deflect sound or vibration underwater?

MR. HOOKER: Absolutely. There are some really exciting things happening in that field not only through different installation designs, but also through different foundations and different mitigations. All that is on the table. One of the things that we hope to do through the RODEO Project I had mentioned is gathering that empirical data and finding out what might work.

We don't have a particular project right now, but we are working closely with some folks who have new designs for encapsulated bubble curtains. Just to back up a little bit; we have a couple studies on the best type of pile-driving mitigation to mitigate noise. The most promising or the most widely used, in Germany they do have a set threshold that they are not allowed to exceed.

They are the furthest along and actually implementing some of these requirements for mitigation on all pile-driving. It is primarily bubble curtains. Bubble curtains have some of their own limitations. Some projects encapsulate the entire work area in bubble curtains; some would encapsulate just right around the foundation type itself.

That appears to be the most promising; however, its effectiveness deteriorates the deeper water you go just because those bubbles won't stay in the curtain. One opportunity is the encapsulated bubble curtains. Those are basically – they used to be basically like boat bumpers, all tied together in a string.

But the technology they've developed; I think it is ABM technologies has developed a different model that can be put around some structures. They've identified primarily doing that for a monopile. As we're seeing with the two projects that are currently underway, we're looking at a twisted jacket structure.

This type of foundation that folks seem to be tending toward in the deeper environment has oblique legs, three oblique legs that go in a center caisson, and the center caisson doesn't go as deep as a normal monopile. It would have a much different – and the oblique ones are pen piles. It has a much different sound profile than the traditional large six meter diameter monopiles that have been studied and used widely in Europe. A long answer to your question; we are evaluating it, but also understanding that we have very different foundation designs than have been used previously.

MR. GEIGER: Thank you for the explanation, Brian. I do think it is extremely important to bring up new kinds of technologies that are being developed in terms of mechanical engineering any hydraulic engineering and everything else to make sure that people have that understanding that there is also concurrent work going in that arena that can mitigate somewhat and maybe more so on some of these effects of some of the current engineering practices.

MR. HOOKER: I just wanted to quickly show everybody, too, is the – I know the South Atlantic has done tremendous work on their online mapping tools. We have the Marine Cadastre, it is up and running, and I just wanted to make sure that everyone was aware. All of our stuff is on Map Server, so you can link it to your own stuff. You don't' have to download anything. We have thematic maps that we have established; so, for instance, if you wanted to look at the South Carolina Renewable Energy Planning Effort – this is not all the data sets that Brian showed, but we do have this as well, and I just wanted to make sure you were aware of all of our different resources.

DR. LANEY: Brian, the mapping that you showed us for the Wilmington, East, I believe it was, call areas is very impressive. Are you going to fund that same kind of mapping in Wilmington West and also the Kitty Hawk call areas? Is that part of the contract with IMS and NOS? That is question one. Question two is will all that information be available to us?

MR. HOOKER: To answer your last question first; the information will be available to you. Obviously it is federal data, so obviously you can put in a request. I think they are still finalizing those final data products; and then it is just a matter of what you would like the raw data or some of the interpreted data and establishing what it is exactly you are interested in. At this point we don't have further studies in the North Carolina call areas.

MR. KREVOR: We have some other studies we're looking at with some of the seismic that might be going on, trying to establish some baseline information, and then also monitor – actually get out there when the seismic testing is happening and trying to see direct impacts. That is one thing we are doing with that particular cooperative agreement.

But as far as survey efforts, we don't have anything else planned off of North Carolina right now. The developer would have to do survey efforts above what was done in this study for Wilmington West and Kitty Hawk if those areas get leased. That is probably the next step for those areas.

MR. HOOKER: I will stress, too, that one of the reasons why Wilmington East was a priority, as you probably all know, is it had some known hard bottom in that area, so we saw that one as a priority. Whereas you go further up to Kitty Hawk, it is mostly sand in that particular area, and I believe it is similar on the Wilmington West. Through that prioritization process, that is why Wilmington East was selected.

MS. LAWRENCE: You had mentioned about the coast of Georgia that there was an EA being finalized for an interim policy lease. I was just hoping to get a little bit more information on that.

MR. HOOKER: These interim policy leases are difficult not only for BOEM but for the public as well, because they are very limited term leases. They were developed to be a stopgap before our regulations went into place. They are only for limited data collection purposes entirely. Off of Georgia, there was an interim policy lease issued – not issued but nominated and held by Southern Company.

You can see the areas right here; these are the Southern Company blocks down there. All that would do is allow them to put a meteorological tower or meteorological buoys offshore Georgia to characterize wind speed. They are almost exclusively for characterizing wind resources offshore. What they are proposing to do is survey an area to put a met tower in.

Off of Florida it is a little slightly different in that is a marine hydrokinetic device and it is a single deployment just to test that technology of a marine hydrokinetic device in the Florida current. But the status of that is that we're concluding our ESA consultation, and that is kind of – I think the EA is pretty much done. We're just waiting for our ESA consultation to be completed.

MS. LAWRENCE: Is that for a certain time period; the lease?

MR. HOOKER: Yes, the interim policy leases are valid I think just for five years. They are only valid for five years after they are issued.

DR. ALEXANDER: I just had a follow up on that. BOEM G&G had a meeting in Savannah last month, and I talked to some woman from the Renewable Energy Program. She said that BOEM is just waiting on NOAA to give them a finding of no harm to endangered species, and then NOAA is waiting to determine the new critical habitat for right whales before they'll certify the project; and that is where it stands, waiting on NOAA.

MR. HOOKER: Yes, that was the status when we had that meeting; and it was in North Carolina I believe. That was Desiree Reed who I believe you probably spoke to, who was at that meeting. It was Clancy? Oh, I'm sorry. Anyway, the status is that all that information is had and we are just now finalizing some final details on the biological opinion.

DR. ALEXANDER: Can you give us a time frame then to when that is going to be roughly maybe completed?

MR. HOOKER: When it is in NOAA's court, I tried to ask them the same exact question. It is an endangered species side of things. EFH folks are spectacular and stellar and always give us our stuff on time. I am hoping within six months. That is the goal.

MS. DEATON: I just was wondering; it was in the papers recently that the governor wants in North Carolina the wind farms to be 24 nautical miles offshore. I believe that would be past where Wilmington East and West are. How will that affect those and where does that stand?

MR. KREVOR: We got a request from North Carolina Department of Environmental and Natural Resources in their letter on the environmental assessment requesting a 24 nautical mile buffer from the coast for tourism, for a full build-out. That comment is out of scope for the environmental assessment as we didn't look at full build-out of a wind energy facility.

That is one thing. Also, they sited four studies; three of those studies don't actually consider tourism; and the fourth study that they site looks at tourism but it states that after six nautical miles, there would be a positive impact. The study doesn't really support the comment. Things can change, but from our perspective I don't know if we're going to honor that request of 24 nautical miles unless we really see some data to support it.

MR. GEER: I saw some strange looks when you said after six miles, it is actually a positive aspect of tourism. Can you explain why?

MR. KREVOR: Yes. From what the study showed, really there would be like a net zero impact after six; and then once you get into the 20 range, you start to see – or I think it was maybe 15 you start to see positive impacts on tourism. That is because in the studies they've done, they usually look at how many people would avoid a beach because of turbines and how many people would to a beach because of turbines. Once you start getting them further away, people stop avoiding the beach. This is all perceptions.

It is not based on what people have actually seen; because unless you've been to Europe, you haven't seen an offshore wind facility. But more people would go to a beach to actually see the turbines than to avoid them. Then they also factor in money from actually going out and touring wind facilities, which they do in Europe. That was something when Cape Wind was a full go,

there was actually a ferry company that was going to have part of their business plan to take people out to visit the wind facilities.

DR. HALPIN: Just a comment on the protected species models; we delivered all the new citation models to NOAA last month; and the AMAPPS models are not going to be ready in time for some of these, so they are using models that go all the data up until the AMAPP surveys have been delivered to NOAA Protected Species. I just wanted to let you know that is in process.

MR. HOOKER: Pat, that is the CERTIV models that you delivered or which?

DR. HALPIN: These are a whole new round that was developed. They are supporting NOAA protected species as well as other additional models extrapolating offshore for the Navy as well. Two different sets were delivered this last month.

MR. HOOKER: Excellent.

MR. GEIGER: Brian, in Europe I guess we have a pretty good history of these wind farms offshore, especially off Norway and so on. I am assuming that there is associated long-term assessment monitoring evaluation protocols along with that. My question is are those in effect in Europe, and do you have access to those long-term assessment monitoring evaluation studies? Thirdly, who pays for those? I am assuming a private company paid for those; and fourthly, are they either proprietary or available for outside review and comment?

MR. HOOKER: I've seen a mix. There are a lot of studies that the companies themselves do. But they don't have the robust – when we had a conference here and invited the EU regulators over, they saw what we were doing was actually an advance and further along than what they were doing as far as like planning and getting the baseline studies to try to be able to look better at impacts.

I think most of the monitoring you will see there is actually just monitoring to ensure like the cables are buried or the facility is functional, and then there is not any damage to the facility. As far as like environmental monitoring in general, I haven't seen all that much. There are specific universities and such that have done studies once they are in place, but they are not necessarily part of a long-term monitoring program.

Some of the best have looked at potential fish aggregation or fish usage in the areas. Obviously sound and marine mammals are also large, but that is primarily it. There isn't that hugely robust long-term environmental natural resource monitoring type program. But we're going down a different path in that regard.

DR. ALEXANDER: I was curious about the cable corridor surveys that you do prior to allowing any placement on the seafloor. Does that only look at the surface expression of what is at the seafloor or does it doe sub-bottom geophysics as well?

MR. HOOKER: Generally what we've done as part of what Brian has mentioned and what we did off of North Carolina is basically what we would call kind of reconnaissance level surveys that we want to do to try to establish a baseline for cultural resources and benthic resources. What the company does when they actually survey the cable route is, yes, they will get several

layers. They will usually use a chirp sub-bottom profiler to get several meters below the surface. But what we've highlighted here is mostly surficial surveys.

DR. ALEXANDER: Okay, I just wanted to make sure, because we're very well known for having shallowly buried and ephemeral hard bottoms that you may or may not see if you're only looking at the surface.

MR. PUGLIESE: Getting back to the sound issue on fish; we're going all the way down to the lower levels. Excuse me if I didn't see it in there; has there been any other work done on impacts on the larval stages? I guess the problem is though you are crossing between the renewable side and seismic and whatever; so just in general.

I do applaud BOEM, especially renewable to tackle that, because everything has always been in the context of mammals, so really getting a handle on issues such as settlement and impacts to the larvae is something that is pretty significant to know not just for the small footprints, but as you see these expand to larger areas. I think that is the biggest thing is if you see a really significant expansion, it may have a lot more implication than individual areas. Has anything been done on earlier life stage impacts?

MR. HOOKER: I have to go back to that one pile drive. I think they did do some larval; but again, when we get to smaller body mass, the sound doesn't have the same impact that it would on a larger body mass where things are vibrating and potentially rupturing. It is similar to – I can't recall exactly that study, but what I've seen, and it is limited, is that there doesn't seem to be as much of an impact on larval fish.

Now, also going back to what you're saying about larger build-out and potentially cumulative; we haven't seen anything where we're getting into the situation where there has going to be multiple facilities being built simultaneously across like a large area where you could have a larger footprint.

How we've seen it are largely acute events that occur in each area. I think it is important to note that even though these planning sites are of one size, that doesn't necessarily mean that the entire area is built out. It depends on what the developer is able to sell, what power the developer is able to sell, and that will determine how many turbines they put in there.

MR. PUGLIESE: To follow up with that on that same vein with the early life history, but also kind of tied directly to what you're talking about here is opportunities for flexibility in design, where potentially you could actually lay out corridors to allow – it may be allow trolling; not trawling. Whenever I mention that, it is always they are thinking about the commercial fishery from the northeast. I'm talking about being able to have trolling corridors or whatever.

The other aspect is on the larval fish. The one persistent sound issue, the fact that many of our reef fish species, snapper grouper species use sound for settlement in zones is more of if you have a large array built; has anybody done enough work to understand if that is going to produce a low-level sound that would not just affect that footprint there, but maybe along that entire shelf edge area where you have settlement of juvenile snappers.

MR. HOOKER: What you are talking about is probably more along the lines of masking of sound and their ability to communicate. There has been some work in that area, but again the operational noise is very limited and has a small footprint. Now if there is an isolated patch reef right near a turbine, there perhaps could be some impact there.

But generally for our sighting purposes, we've been I think pretty good about avoiding areas like that. I think those areas should be able to be identified prior to construction taking place. But once again, one of the reasons we're here is to hear your input on studies that you would like to see in some of these areas, especially as North Carolina is getting closer, South Carolina is developing and then Florida is even a little further behind.

If there are studies that you think are pertinent and are relevant to the South Atlantic, I would love to hear them and get them into our planning process. One thing I didn't necessarily go into in detail is our environmental studies planning process. It is annual. We have a Scientific Advisory Committee; it is a committee that reviews the proposals.

But we also do some money outside of that through just general environmental assessment type fund. Anytime that you feel that there is a project that you would like to have to see happen, send it our way. We would be happy to look at it.

MR. BELL: Actually, the questions I have are more related to seismic works. Would it be better to wait? You are going to do a seismic presentation next?

MR. HOOKER: Yes, hold off on seismic. For renewable energy, the largest sound source; we do some sub-bottom work. It is not an air gun array that you see that would search for oil and gas. It is sub-bottom chirp profilers, which are very common. I think there is a bubble pulsar that is occasionally used, but these are single fish towed behind a vessel and not nearly on the same scale as what they call 3D seismic.

MR. BELL: The reason I thought about this right now is because we started talking about fish and reef fish behaviors and things and how do they respond to acute insults from noise or whatever. One of the things I've come across in talking to folks and geologists about this is there are a lot of assumptions about how the fish will behave or won't behave related to certain levels of noise.

I think perhaps another thing to keep in mind; we've mentioned species that we're interested in managing, from a management standpoint, but you have an entire reef community there with a lot of cryptic species and a lot of smaller fish that are so tightly bound to that habitat. I don't think they would flee necessarily. And then we start talking about louder noises related to seismic stuff; that could become problematic. But I'll wait until we do the seismic stuff.

MR. HOOKER: Roger seemed to indicate he might know the forage distance or the distances for around the homing range for some fish. Do you know is that generally known or not really?

MR. BELL: I wouldn't claim to be an expert on that. George Sedberry is here. We have got folks that do know those sorts of things, but I can tell you in spending hundreds and hundreds of hours watching fish on reefs; in some cases they are extremely tightly bound to that habitat. You get off the habitat just a little bit out into the sand and you lose them.

But there is foraging behaviors for some species that do work out there, but they are a lot more tightly bound to this hard bottom than you might imagine – at least the geologists I've talked to, certainly a lot tighter than they imagined. I think there is a perception that, well, the fish will just move; well, maybe not. Then that could become problematic with higher energy levels of surveying activity. But I can wait.

MR. HOOKER: Yes, it would be good to know we know what that is; so then when we are evaluating cumulative sound exposure; that I know that is something the Fisheries Service has expressed an interest in what that cumulative exposure is and what the ability is for that fish to leave the insonified area. That is definitely something that we're interested in and any input you would have on that would be appreciated.

But as I said, unless you are within that injury zone, the likely impact is probably reduced foraging during that period, which could have potentially life history, depending on when that was occurring, if it was occurring during spawning. Obviously, we wouldn't want to do that during a spawning period. But these are good things to know and good things to point out to us and comment or just in general communication between myself or Brian Krevor or other staff.

MR. GEER: I'm going to skip to George first, because I want George to address what Mel was talking about. Then I will go back to Wilson and Clark.

DR. SEDBERRY: (no recording)

MR. HOOKER: You bring up a very important point that a lot of what we do is analyzing our sound in isolation, so to speak. NOAA has done some really good baseline assessments on the kind of what we could term baseline noise in the environment is through vessel traffic and other such measures. It is not like the sound from pile-driving increases the vessel traffic background noise. Sound doesn't operate in that same way where it just would be somehow louder by that frequency.

It is important to understand what the ambient noise level is in that particular area. Around a port, for instance, if you did some of this work, the impacts would be less because the background noise would be higher than if it were in a quieter area where there is not a higher level of background. Noise is one of those difficult areas to really understand. It depends on not only – there is the orientation of the animal to the noise as well.

DR. ROSS: There is another issue besides the things that George mentioned. There is some very recent developing literature that indicates that larval reef fish use sounds to actually locate the appropriate reef. While mortality may or may not be direct, the indirect impact of masking the reef sounds that they are queuing on could be significant.

It could cause a complete recruitment failure; and the recruitment season, if you consider a wide range of species, is fairly long. There is not a lot of work yet that I am aware of that teases out exactly what those sounds and thresholds are, but it has always been intriguing about how these fish find these isolated patches of reefs; and sound makes a lot of sense because there are specific sound signatures that would be related to like George said snapping shrimp or a variety of other things on the reef. That would be an area I think that nobody has really investigated is that sublethal effect.

MR. HOOKER: When I was speaking earlier, I was thinking more of just physical barotrauma injury and the masking issue is real and one that we do address in our assessments.

DR. LANEY: I just wanted to make the point that Steve made and Roger touched on. There are two different sound effects we're talking about. The one is the physical impact, the barotrauma impact, the vibrations and I guess more of an issue when we talk about seismic sound at the decibel levels; but then the other impact is that masking impact.

And as Steve noted, some of these recent studies, I think Roger and I have one that appeared in Science, I believe, that showed that these larvae are definitely keying in on sounds to locate settlement habitats. I just wanted to make sure that everybody caught that fact that we need to look at both of those things. It is the masking and the physical impacts both.

DR. ALEXANDER: The BOEM fellows, you had a nice segue into your Environmental Studies Program. I wanted to let this group know that there has been a proposed project through the Governor's South Atlantic Alliance to map hard-bottom habitat in the southeast. It has been an accepted project. It has been sitting in their scheduling, and it has been pushed back every year since fiscal year 2015.

Now it is scheduled for fiscal year '16, I guess. or '17. It would go a long way. Any kind of support for that project, getting behind its importance would be a way to give it a higher priority at BOEM. If this group wanted to come out with a statement of support for that project, mapping hard bottom here, that would be a good thing. I think it would support the efforts that this group wants to support.

The other comment I did want to make is that in some ways we're talking about all this acoustic energy out there. Fisheries scientists have to remember you've met the enemy and he is us, because you are all out there mapping the water column with your high frequency sonars to get at fish abundances and all kinds of things. It is not just the geologists out there putting sound in the water; it is all kinds of other groups as well.

MR. GEER: Good point.

MR. WATTERSON: Looking at the research topics you brought up, a lot of these are along the same lines as work the Navy has ongoing. I know we've collaborated on several things such as AMAPPS; but it looked like there were some other areas we could coordinate on and probably exchange information. I would love to talk with you more afterwards. I was curious about the pile-driving impacts on fish studies you were doing. We're also doing similar work, but I was curious what species specifically you were working with.

MR. HOOKER: We've been in touch about sturgeon before. Sturgeon is obviously a priority species where we're operating in some areas especially in regards to offshore overwintering habitat. Obviously, ESA drives a lot of how our prioritization occurs. But also commercially economic important species, basically that is where our drivers are; but if there is a recommendation for another particular species that we need to look at, then that is –

MR. WATTERSON: I was curious about your ongoing pile-driving studies that you're doing looking at impacts.

MR. HOOKER: I think for that one, they weren't using – I only think they were even using lake sturgeon in that. It has been a while since I looked at that study, but there is quite a suite of species that are listed. I can follow up with you and let you know what species exactly were looked at in that pile-driving setting.

DR. ROSS: I just wanted to make one more point about the noise issue. That impact would go far – I think I remember you said the critical barotrauma would be within a relatively short distance; did you say 25 feet or something like that?

MR. HOOKER: I said 25 meters. Once again, that varies upon the substrate and the foundation type that we're looking at. I think that was a reference to the VOWTAP Study.

DR. ROSS: Okay, that is a shorter distance than I would have expected maybe for some fish; but considering that sound travels so much faster in water, the sublethal effects could extend a significant distance beyond where the pile-driving is occurring and beyond 25 meters. It seems like it would be appropriate to consider – I'm not sure what work would have to be done to nail this down – the range of hearing of larval fish. The impact zone would then be a buffer around the pile-driving, and that could require some additional habitat surveys beyond the actual wind leasing areas.

MR. HOOKER: That is a good point; and when we design studies in our study preconstruction survey guidelines, we say in appropriate area of potential effect, which is often larger than the footprint of the facility. That is something that we consider. We don't have necessarily a fish buffer distance. I think we look at the priority being injury.

We do model out the entire area of insonification at the different interim thresholds that we have, so we do know if there is a known area. The reason I'm saying that is the current interim NMFS criteria for behavioral modification goes out several kilometers from the area for these species. Again, that is modeled in isolation and not considering what the ambient level is.

DR. ROSS: Yes, I guess what I'm suggesting is that a lot of this information on the larval fish use of sound is fairly new. It requires some additional work to figure out what exactly the correct buffer would be before there is a disruption. I was suggesting incorporating that thinking into the existing buffer calculations somehow.

DR. HALPIN: A couple comments on some of the sound modeling that has been done to date. NOAA has a set sound program where they have done physics models for looking at – actually there are three different levels. There is supposed to be ambient noise, and then what is called chronic noise, and then event noise.

The word ambient noise has come up several times; but the way that they are dealing with the term ambient noise should be the actual ambient noise of the ocean without human interference. Chronic noise would be when you have shipping traffic and other things like that. It gets confused a lot in the language, but they actually want to reserve that term for what would be the natural noise state of the ocean, which we don't know.

For about ten years there has actually been an effort to try to have a quiet ocean day so we could actually measure it for one day, but that has not gone anywhere. I am not kidding; that has been

something that has been proposed for a long time is to get one day where everyone decides to take a break for one day so we could actually find out what the actual ambient noise in the ocean is, because we have no idea.

The other issue is these models are only the chronic noise is built solely from large vessel shipping traffic. There are no small vessels at all. It is actually very crude, it is ocean base and scale models. I just want to make that point, because it came up – the comments about small vessels, recreational vessels, things like that are contributing a lot to local noise.

Those aren't actually in the models at all. Then the event noise is looking at specific events. I have maps of these if people want to look at them at a break. I've got the Atlantic Seaboard chronic noise and a couple of event noise ones, so I could show people to see what the scales are and what they look like.

MR. HOOKER: Thank you, Pat, for bringing that up and clarifying the true ambient definition there. We do have one pile-driving event scenario in that as well for Cape Wind in there as well.

MR. PARKER: I've got just kind of a general question. At present what percentage of power generation in the United States is wind energy; and what do you think it might be in 20 or 30 years?

MR. HOOKER: Offshore or wind entirely for the U.S?

MR. PARKER: Offshore.

MR. HOOKER: Zero; there is no offshore production currently. I don't think the current administration has set a target megawatt goal; did they?

MR. KREVOR: Some states have, but I don't think there is a national goal. DOE would have the best information on that, I would guess.

MR. HOOKER: Yes, the Department of Energy really runs that side of what the energy makeup of the U.S. should be. I think there is a goal by 2050 to have a certain number of gigawatts, but I don't recall off the top of my head what that is. But once again, the Department of Energy would be the ones to have that information. BOEM's role is primarily just in leasing the grounds and not necessarily the considerations for what the administrations priorities are for the energy mix for the nation. That is more of the Department of Energy.

MR. GEER: But we have an idea how large some of these wind farms would be; is it like a 5 gigawatt or whatever? How big are some of these projects that are going on, because then you can pretty much look at is that going to be able to power up a hundred thousand person city or something like that.

MR. HOOKER: That's a good question. As Brian mentioned, a lot of it depends on what they can sell. It depends on the market set up by the individual state. They could build it out to the full capacity; but if there is no market for it or if the state is – most states will have a percentage amount from renewable sources. If they are getting all their renewable sources from, let's say,

biomass, then they may not be interested in buying a large portion of their energy from offshore wind. It really is state-specific on how those individual utilities are regulated.

MR. KREVOR: We might see states development. We might see them take – let's say somebody comes in on Wilmington East, for example; they might take the first portion here and do a 200 megawatt project; and then 10 years down the line, once that has been operational, they've been selling that power; they sell additional power and then they bring another 300 megawatts online, something like that.

That is some of the things we might see off Virginia, some state development. Probably also in the Northeast, we have some deeper water depths up there, so the shallow areas will probably be developed first; and then as technology develops, they might go into the deeper areas with some new technology.

MS. DEATON: Just one question. It seems like Renewable Energy, you've done a lot in terms of the studies and the sighting before you ever get to the point where you are going to actually implement the renewable energy. How does the oil and gas and the renewable all within BOEM interact? Can they use your information; how does that process work?

MR. HOOKER: That is a good question. Generally speaking, our sites are not overlapping. Obviously they are welcome to all of our studies, but generally they are looking in deeper water than we are. On the Marine Cadastre we have some information that I know they've looked at in Environmental Sensitivity Index Analyses from oil spills and that type of thing.

AMAPPS was originally conceived back in the beginning to support both programs, so AMAPPS surveys both inshore shelf and shelf break where the oil and gas interests are more heavy. The oil & gas side does have the same – I mean, we didn't invent ourselves entirely separate from the Oil & Gas Program.

They have what they called Notice to Lessees that require the same type of monitoring and pre-drilling survey work. They just have – under the Outer Continental Shelf Lands Act; they have a slightly different set of regulations than we do. Our regulations came in under the Energy Policy Act of 2005. It is a slightly different set, which are bended oxyla; so slightly different regulations, but generally the same approach is used in both programs.

MR. GEER: Any other comments right now? I want to thank Brian and Brian very much. This was a very good conversation. I think the input from everyone was very good and much appreciated. I'm sure that everybody learned something. What I am going to suggest is that we take a break; because we are going to start up at 10:45 and you guys are not doing that set of presentations. If there are no further questions, we'll take a break and our guests will hopefully come in the room pretty quickly. We'll plan on starting back up at 10:45.

MR. GEER: All right, we had a really good first session this morning talking about renewable energies. Now we're going to be talking about G&G and some of the work that is going on. Please keep up that same energy. You guys asked a lot of really good questions this morning, so let's keep that up. Our presenters today from BOEM are Arie Kaller and John Johnson.

MS. KALLER: I'm Arie Kaller with the Bureau of Ocean Energy Management. We are at the Gulf of Mexico Region. I am part of the Office of the Environment; so myself and Mark Belter here look at the different applications and do the environmental reviews and all the consultations that go along with each of the applications.

John Johnson is going to talk more about the technical side of the activities and whatnot. His group does the process of the permits. They kind of take them in. We do our reviews and give it back to them. He will talk more about the actual activities that you possibly will see in the Atlantic. He also has Terrie Campbell with him from his group as well.

MR. JOHNSON: My name is John Johnson. I'm the supervisor of the Permitting Group there at BOEM. We permit G&G activities both in the Gulf of Mexico; and if things continue to move forward, we'll be doing it out in the Atlantic as well. We gave a presentation at your main council meeting; and the direction for this get-together was to be a little more technical, so I reworked some stuff and providing some more detailed information.

There are a couple slides in here I'll probably end up kind of blowing past. I kept them in case there were questions on it, but they really aren't the technical type information that was discussed in our e-mail. Moving forward, the area that we've received permits on; we've received 10 permits now over this portion of the Atlantic, the Mid-Atlantic and the South Atlantic.

That is what is currently on the charts at the moment. Okay, this is just a real quick diagram discussing the permitting process, which I won't linger here other than to say that really the two takeaway points from this is the fact that we are not the only agency involved in approving these permits and getting these guys out doing these surveys.

BOEM I involved, you've got Coastal Zone Management from the states, you've also got National Marine Fisheries; particularly National Marine Fisheries because of the IHA that these guys have to get, as well as coordinate with the Department of Defense and NASA. Also something which is different from a while back is that we typically post the public information part of the applications on our website.

However, for the Atlantic permits we are also posting them on www.regulations.gov . This is for public comment. Basically the Deep Penetration Seismic Permit Applications are being posted for 30 days for those who wish to comment on them, and all other applications are being posted for 10 days. That time period started March 30th.

Those are really the two takeaways; the public commenting period and just the number of agencies involved. It is not just BOEM out here by ourselves approving these things. Now, I gathered from the e-mail, there are still some questions on – besides some of the more detailed stuff, there is still some question on 2D versus 3D. I'll go through that relatively fast.

As you can see from this diagram, this is for 2D seismic acquisition, which currently of the eight Deep Penetration Seismic Permit Applications that we have, seven of them are for 2D, the Atlantic. What you are looking at here is pretty much what they are applying to go out and survey with.

Basically what you're talking about is a sound source; in this case it would be air guns. The sound goes down and penetrates the seafloor and reflects back up off the barrier sediment layers, and the survey vessel is towing a long, what they call a streamer behind it, which has all the receivers in it. The receivers pick up the signals that bounce back from the seafloor below.

They process it to some extent on board, but then they go back and they do the major processing onshore. This is what the data looks like. It is basically – in fact it is where the name 2D seismic comes from is the data from this gives you cross-sections through the earth over which the vessel passed. The 2D is because you've got lengths and depth. There is no real width to this.

You are basically looking at a cross-section of the earth. Okay, let's try to get into more details on this. As we talked about, there is a source on the vessel, a sound source as well as these streamers with the receivers. Okay, your typical – you know, what they are asking to permit off the east coast.

These 2D surveys will have one survey vessel; they may have one or two guard vessels, which basically go around and help try to make sure if there is somebody else using the area up ahead. If they can't contact them on the radio, they can go actually try to do an eyeball conversation with them and try to work details out or whatever.

But there is only one survey vessel involved in these 2D surveys. The survey vessels, when they are acquiring data, they are moving at approximately 5 knots, which is almost 6 miles per hour, which means that assuming 24 hours of solid work without any downtime for equipment failures of something like that; they basically can cover about 140 miles in one day, so these guys aren't just sitting in one place working. They are moving along at a reasonable clip.

The sail lines over which you are collecting data are typically several miles apart. We'll get into that very quickly in a few moments. They typically use one streamer behind them with the receivers. The streamers themselves are typically anywhere 8 to 12 kilometers long. For what you are going to see offshore here, I can't give you specific numbers for the permits, because that stuff is considered proprietary.

What you would typically have is the streamers would be towed from 10 to 20 meters deep with a tail buoy on the end. Part of one of the guard boat's duties would be to try to keep shipping from running over these things at the end. These guys have a lot of equipment out and it is expensive. They are very careful to try to not have conflict of use because of the bucks involved with the cabling, et cetera.

Okay, just a quick look at the equipment to give you some idea of the cable involved. Going across the top, there are four slides there. Number 1, this is what it looked like on the vessel itself with the streamers; that is the cable rolled up on the big rolls there, on the reels. See it going off towards the stern. What they do to try to steer these things, they put on what in some cases are called BRDS, which is what the gentleman down in Square Number 3 is attaching. These are used to help steer the cable. Then at the very end of the cable they will have a buoy, which also helps provide the GPS to help locate where the tail end of this is. They serve both as a buoy and a marker and also help GPS positioning. This is the basic equipment that is involved in that streamer. The receivers themselves are incorporated within the streamer itself. Now, that is the streamer that you see; that was the streamer that we have coming off the back.

Okay, now for the environmentally sensitive or interesting aspect of these surveys; the air gun, the source array for these things; the source array, if you start with the very basic unit that you would see is the air gun, which is the little cylinder in Image Number 1. It is maybe like the size, depending on how many cubic inches it is; basically you are looking at like a small scuba tank.

That is the smallest element and it is the active element of an array. What you would term a sub-array or a string is what you see on Image Number 2, which is basically you've got that float there and you've got air guns hanging down below it, and they can raise or lower those air guns depending on what depth they want to operate at.

That whole assembly is what they would call either a string or a sub-array. A source array, which is how these things are normally referred to, is composed of usually three, maybe four sub-arrays. What you see in the lower left-hand corner there, Number 3, is a surface shot of a three sub-array source array.

As they are moving through the water, you can see where it is discharged behind it a little bit. Right where they are now; it is where it is just starting to discharge again. What you see in Number 4 is basically what it looks like. It is a diagram of what it would look like beneath the surface. In that case you've got four sub-arrays that they are towing.

Unfortunately, I apologize, you can't really see it, but it shows the air guns hanging down from there. But that is the source array that is generating the sound and for the most part the controversy. Okay, some details on this. We'll go back to the diagram again. You see the source is that labeled red up there just beneath and a little bit behind the stern of the vessel. These 2D surveys will typically have one source array, which will be composed of three to four sub-arrays.

As far as the number of guns that are on there goes, that is variable depending on what kind of configuration they want to use. You can have up to 30 or 40 guns on there. That is not to say they will, but it is variable just depending on what they want the overall cubic inch of the source array to be.

The source arrays are typically 15 to 20 meters long and typically 15 to 30 meters wide. I'm not talking about the individual sub-arrays. I'm talking about the overall source array itself is 15 to 20 meters long, depending on how many air guns they want to use; and it is typically 15 to 30 meters wide, depending on how many sub-arrays they are going to use.

The source array itself is typically towed between 7 and 10 meters beneath the surface. The depths that they tow these at can vary. Exactly how shallow they can get, it just depends. They obviously can't drag them along the bottom, but there is some adjustment that they can do. As far as giving you a particular depth past which they can't operate, I really can't, because that is up to the company what they are going to do and how deep they're actually going to be trying to run this.

In looking at the surveys that were sent in, these ranges that I've given you are actually from the surveys themselves of what they are proposing to do. These numbers should give you an idea of how deep the water needs to be for these guys to operate. Not that they can't tweak it a little bit,

because technically if we are allowed to issue these permits, technically speaking they can go up as far inshore as the fed/state line.

We do not permit obviously in the state waters. Now whether the water is deep enough to allow them to do that, I can't say they are going to have to go that far. This is pretty much what you would be working with here for a 2D survey, both the streamer length and the source arrays, where the air guns are.

To give you some idea of the scale of these surveys, if you look at our website, it is very bad looking. It looks like they are extremely duplicative. These people are sitting on top of each other, but that is not really the case. Those polygons that are used to represent the public information copy of the map is really an outline that is taken around the grid that these vessels collect data on.

We allow them to expand a little bit on their size and move it a little bit to try to help them protect the proprietary nature of exactly where they are going to be. But to give you some sort of an idea scale-wise of what you're looking at, we've looked at all the grids that are present. I say we've got eight permits. We took a look at what would be a typical grid size.

These grid sizes can vary within a permit and they certainly vary from one permit to the next. But we went and looked through there and we came up with I believe it is four would be typical grid sizes that they would be using. What you see here, the grid that you're seeing, these are the actual sail lines that they would be doing.

This current grid here, which is the smallest grid that they have proposed to use, is about 2.5 by 2.5 mile grid. These are actual sail lines. There is no end fill here or there is no going in between these lines or anything. These are what they proposed to actually collect data on. Typically when they do this, to give you an idea of the scale of what is going on here, we put these grids over – we put them on Google Earth.

In this case since we're in Charleston, we laid them over Charleston itself to give you some kind of idea of what you're looking at. When they are acquiring data along these lines, they tend to go as far as they can before they do a line change. It is not like they will go up two grid squares, turn around and come back and do two grid squares.

It doesn't really work like that. They are going to do it in the most economical way possible. In the ideal world what they would do is they would shoot all of one line, turn around and come back and shoot all of the next line. If that is a 400 mile survey line, in the ideal world they shoot all 400 miles, turn around and come back and shoot the next 400 miles.

Now, because of time/area closures that would be there and the weather or potentially military operations that might not be possible; but from their perspective that is the most economical way to do it, and that is what they would plan to do. I say currently what you've got up here is a 2.5 by 2.5 mile grid. This is the finest grid that they would operate using. Another typical grid size, the 10 mile by 10 mile; and as you can see, Charleston is getting a little bit smaller on that one.

Another grid size, which would be typical, would be a 30 by 40 mile grid, and there you can see the grid completely encompassed Charleston and the surrounding areas. In fact, the largest grid

size that would be out there is a 50 mile by 70 mile grid. If you look on that closely, you can see Charleston, and you can see Savannah down below.

The grids that they would use to collect the data are pretty large. When you look at those maps that the public is allowed to look at, think about these grids here because this gives you an idea of just how large an area they are covering, how far apart they actually are. I guess, too, again they see all these things on top of each other.

Consider that you've got one survey vessel for each of those permits. I would suspect from a market perspective – let's say we get three or four of them that are approved and they go out; I would suspect that we'll have a couple that may not go just because you've got these other people that are out there; they are already collecting the data.

The guys look at it and go, well, okay we lost the race. It is not really economical to go out and for them to shoot the area as well. At that point we personally would not be surprised to see a couple of them canceled before it was over with and maybe partner up with some of the ones that were actually able to get out first.

When you look at those maps, consider the area that is involved; because you are talking from Delaware down below to the top of Florida from basically the fed/state line out in several cases beyond the 200 mile or 200 kilometer exclusive economic zone. That is a very large area. Let's say you've got five vessels out there. If you've got five surveys, you've got five ships collecting data in that entire area using grids like you've seen here for their data collection.

That is not quite as one on top of the other as it might appear just from our maps, just to try to give you some idea of the scale of what is going on. For the 3D, there is one 3D survey out there. Again, this goes back to the 2D/3D question that we were provided. Where with 2D you've got that very wide grid that they are operating off of; and it is basically giving you cross-sections through the earth.

When you do a 3D survey, what you're doing – if you look on the diagram, they typically use two-source arrays, which are these short lines here, and multiple streamers. What you see and what the diagram is trying to show is that they are not collecting cross-sections anymore; they are actually collecting a cube of data.

What that looks like is right here. This would be a typical cube of seismic data that they will have collected; and when used on a workstation, you can slice and dice this any way you would like; and it is an excellent tool for exploration and for determining what is going on in the subsurface.

This also brings up another point. One of the reasons why you see all the 2D is because the Atlantic Coast is considered a frontier area; and typically companies will go in and shoot 2D surveys because you can collect a lot of information very quickly and very economically. That is usually the first thing that happens. The oil companies will buy that from the data acquisition companies, and they will work up the regional geology of the area.

Using that regional geology, they will sit there and go, okay, well, this area looks more perspective. This area over here does not look perspective. These regional surveys kind of serve

two purposes. It helps them concentrate on areas that look good. It also gives them an idea what areas aren't worth it and that they could ignore and leave alone.

DR. WHITTLE: What does that mean? Can you give me a quick description of what that means, like what does the red mean versus – I mean the different layers; what are they looking for?

MR. JOHNSON: What you are looking at here – okay, what the sound waves actually do when they go down and they bounce off, they are not actually technically bouncing off and showing you every sand layer or every shale layer. What they are doing is when you get a density difference – the sound wave comes down and when it hits a density difference, you will get some of the energy reflected back up.

Think of it like light going through different layers of glass. You will get some bending back up because of the density differences. What you are seeing there, the different colors represent different intensities of signal coming back. In this case where it is gray to black, that is a weaker signal.

Where you are getting up into the very dark blacks or the very bright reds, those are much stronger density contrasts. One thing that could be is you are going from a shale, which is something that is a very fine grained, not too much there type material, into a very good, very thick sand that maybe is water-bearing.

There is a high-density contrast there so you are getting a lot of signal bounced back up. The fact is let's say there was to be gas at that level; the density contrast between that and the sediment above can be so great, most of the signal will bounce back up and you'll have a shadow area underneath it and you can't see anything, because most of the signal bounced up right there.

Basically what you're looking at there are the various density contrasts in that portion of the sediment. What the geologists would do, he would look at that and look for faults, highs and lows that could create trapping mechanisms for hydrocarbons. By having a cube of data, it allows you to – you know, what you would want to do is you look at where the traps are, and from other knowledge of the area, where the most perspective intervals might be for hydrocarbons.

Then you would draw a subsurface map on that level and you would follow these color rings around because that basically represents, simply put, a surface in time usually. On that map you then have your faults and you will be able to see your highs and your lows, and that would tell you where your possible trapping mechanisms would be.

Sometimes you can have direct hydrocarbon indicators on these. With gas you have what are called bright spots, which are actually just very intense blacks or reds; not all the time, though, because what you can see here – in this case it would not be, because you are seeing it over a large area; but if you were to have like a domed area and the contrast signal went from a weak signal up to a very strong signal over that dome and back down; that could be an indication of hydrocarbon accumulation there because of the massive density difference between that and the overlying and underlying sediments.

That is basically what you are looking at there. By being able to look at that on a workstation and either cut a line through here, down through here, or maybe over here or whatever; it helps you to be able to, when you are creating your map, tie that around to where you are comfortable you're working with one surface and not moving around between several because you're misinterpreting something.

MR. GEIGER: Do you have observers on these private vessels doing these seismic surveys?

MR. JOHNSON: Yes, there are – I will give you a quick answer. If you want more detail of what, I'll give you to the environmental people.

MR. GEER: Why don't we come back to that? Are you talking about like marine mammal observers?

MR. JOHNSON: They have protected species observers on board, yes.

MR. GEIGER: Okay, but do we have verification that these private companies are following their permit parameters and doing what you say they are doing in terms of depth, speed, everything else? Do you feel confident, using the old trust but verify, that they are doing what they say they are doing?

MR. JOHNSON: A lot of the verification process is being done by our sister agency, Bureau of Environmental Science, Safety and Enforcement. They do most of the inspection and enforcement work; we do not. However, we have participated in inspections. We have people – what we do in an incidence of noncompliance for violations in the past; these violations could either be as simple as they didn't send reports in on time to they were not using the cable they should have been using, et cetera.

Depending on how BESSE determines this, because they are the ones that actually would be involved in working this out; but there can also be pretty large monetary fines as well for it. Also, you do have the protected species observers on board, which they are monitoring that they are following all the mitigations that they should follow as far as the exclusion zones, shutting down when they are supposed to, and that sort of thing. BESSE would be involved in that enforcement.

This is what a 3D survey would look like. If you look behind there, you have two-source arrays, which are used, and basically they alternate these. One will fire and approximately 10 or 15 seconds later the other one will fire and they will alternate back and forth like that. You can see here, here, here, here, here, and across; these are where the streamers start and trail off behind the survey. These vessels are typically on the order of – I had that written down and the number escapes me. I'll have to look it up and get back. Yes, 2 or 300 feet. They are large ocean-going vessels.

Diagram of what that 3D looks like; this is both kind of showing on the surface and beneath the surface. You've got the survey vessel up here. Here is one source array with – in this case they're using three sub-arrays like we talked about before. Here is the other source array with three sub-arrays.

Coming back over to here, these are your streamers that are stretching back here. Typically the numbers I gave you before for the length of those, those are typical for what you would see in the applications to the Atlantic. These right here are some typical 3D streamer lengths that we've seen in the Gulf, 8 to 15 kilometers.

It is highly variable; it depends on what the target is of the survey. The streamers themselves, they range from usually around 25 meters to 50 meters apart. You typically would have 8 to 14 streamers for a 3D survey. Basically from a numbers' perspective, okay, again your speed is typically 5 knots, which would cover about 140 miles a day, all things being equal.

They use two source arrays and they alternate one to the other, approximately every 10 to 15 seconds. The streamers themselves usually have 8 to 14 streamers. These tend to be 25 to 50 meters apart. The length can be 8 to 15 kilometers. The area that would be covered by that – to give you some idea – not just lengths and width like that; but you're talking basically the potential here – and what I used was 50 meters and 14 streamers. You're talking about a 650 meter width and up to 15 kilometers long, which is about 0.4 miles by 9-mile area for the streamers.

The vessel would be a little ways in front of that. In your sail lines, now here like on the 2D, when they do that, as I showed you, the sail lines that they would use, that grid is typically pretty far apart. For 3D, because of the data density that they need to collect for that, it is much closer. The sail lines for 3D are typically 400 meters to 800 meters apart.

It is a quarter mile to half mile apart. It is a whole lot closer. These guys are basically – probably this isn't politically correct, but these guys are out there mowing the yard. We currently only have one of these 3D surveys listed out there that has applied for an application. We question whether or not that is actually going to come to fruition any time soon just because really they have taken no action so far other than to submit the application to us.

But 3D does follow on 2D. The rest of this is just some websites that might provide some information of interest to you all and our contact information there at work. I know before there has been a lot of interest in a potential conflict of use; and basically it is pretty much as I mentioned last time.

These guys are used to having to deal with that because in the Gulf we have commercial fishing, we have many structures, permanent structures that don't move out there, and we also have the fishing tournaments, et cetera. Besides doing the notice to mariners, they can work with the individual fishing groups.

They also try radio contact between themselves. Whoever the guard boats see is out in the area or they see on their radar, and they can go around other users out there if necessary. If the person or whatever is out there cannot move, period, and they have to stay put, they will go ahead, shut down, go around them, go on down and then come back and catch that area later.

It is not a new phenomenon for them. Supposedly, in the very near future, the International Association of Geophysical Contractors is supposed to have up on their website a best practices that their members follow for handling dual-use situations. The last time I talked to them, they were still working on trying to get it up. But if you are interested in that, it is www.IAGC.org

and hopefully in the near future they will have that. But, anyway, that is the technical, more detailed part of this with some real numbers for typical surveys that you would see. Are there any questions on that?

MR. BELL: Thanks for the presentation just a couple things to clear up. What you were referring to as sail lines in the 3D; is that basically lane spacing?

MR. JOHNSON: Yes.

MR. BELL: They are using quarter to half mile lane spacing to do this?

MR. JOHNSON: Yes, the vessel track lines would be a quarter to half mile apart.

MR. BELL: On the 2D, when you were talking about the grids, the 2.2 by 2.2 or 10 by 10; is that the lanes?

MR. JOHNSON: That is the lanes.

MR. BELL: They could have lanes as far as 50 miles apart?

MR. JOHNSON: Yes, exactly. That is why the data is not – they use that kind of information to look at the regional geology. The Atlantic area is a frontier area, and they don't have any data that is more recent than like very early eighties. This allows them to collect data quickly and economically, and that is what they would use to get a regional picture of the geology.

MR. BELL: Okay; and so they could, also, I guess, use the lane spacing to – if there were sensitive areas that might be best not to go directly over, they could use that wider lane spacing and so adjust for that.

MR. JOHNSON: Yes, and all that is generally taken care of. The environmental people would need to comment on that, but, yes, they can move those lines around.

MR. BELL: Are they running any multibeam or anything simultaneously to doing this, because it is different frequencies; but is that too much interference or do they typically do that at the same time or not?

MR. JOHNSON: Typically they are collecting gravity and sometimes magnetics at the same time, but those are passive. There is a survey that we have an application for currently where they would be collecting only multibeam.

MR. BELL: Right; and that would be useful to a lot of the stuff. I'll shut up for a second and let somebody else ask some questions and come back.

DR. HALPIN: Just a couple of clarifying questions. At the beginning of your presentation; you mentioned there were 10 permits, but I've been hearing that there were 8; seven 2D and one 3D.

MR. JOHNSON: Correct; we have a total of 10 permits at the moment. There are 8 of them that are Deep Penetration Seismic. Seven are 2D, one is 3D. We also have one high resolution, which is the multibeam, and then we have one that is an airborne gravity survey.

DR. HALPIN: One other thing on the grids; I have seen a couple maps from some of the contractors, and some of them seem to have higher densities than what you just mentioned. I've got the Spectrum one in front of me right now, and they are saying their coarsest grid was 25 by 25 kilometers, 13.5 miles, and then 8 kilometer, which is 4.3, and then 4 kilometers is 2.2. I see two similar that are higher densities like that and they also overlap in almost the exact same places.

MR. JOHNSON: As far as I see, the high res, I'm not even looking at that, because the high res, the lane; I really don't know what kind of lanes they're going to be using on that. There is one company, which I believe it was Spectrum, wasn't it? Yes; they have applied for two permits. One of them is a much wider spacing, but they have an infill that they have also applied for, which would infill the current.

If they were to shoot one and then go back and shoot the other, that would give you a smaller line space. What I'm talking about here is just strictly each individual permit. Spectrum has applied for two permits; one with a larger grid and then over a portion of it they have infill shooting, which would give you a smaller grid without question.

MS. DALY: Something Mel said about avoiding going directly over sensitive areas such as maybe MPAs or Special Management Zones; you didn't speak to how loud these sources are or what the insonification area is. That is probably the most concerning. An area might be five or ten miles away, but can still be insonified and the impacts can be there.

I don't know if Arie will cover this in her presentation or not about how loud they are and the difference. I mean 3Ds are so intense with their sound than 2Ds; so if they are running a 2D survey and they might want to go back over that and do a 3D survey in a more specified area; do you have the information in the modeling on where the insonification zones are for each of these?

MR. JOHNSON: I'll go to the non-environmental aspect as far as the loudness goes in the modeling. We have basically – if you look at the 2D surveys that are proposed for off the east Coast; the dB level, it is typically somewhere between 210 and I'll say 245 dB RMS. What was it, 1 meter? I forget now what the official units are there, but it is basically 210 to 245 dB RMS. That is from the modeling that they do, which they have to provide us. I will let the environmental questions go to Arie, because those I don't know.

MR. GEER: Can I follow up on that? That is at the source, correct? How much of that energy is lost with depth; is it more? As you go deeper is that energy remaining? I guess that is the question I have; how much energy is going to be there at the bottom?

MR. JOHNSON: I am not familiar. Unfortunately, our acoustician is not here, because we do have one in the agency that handles these types of questions. The only thing I can give you is obviously it depends on how deep it is; but also as you move away. You know, in the array itself they can set that up to try to minimize to some extent horizontal propagation and maximize

down, because that is what they want to do. Now the deeper it is, by normal attenuations you will lose some. I cannot say it is significant. To be honest with you, I do not know.

DR. ALEXANDER: It seems like the follow up from what you just said then is that you can assume that if there is not too much attenuation in the water column, that whatever is coming out of the source is what you are going to see at the bottom; is that correct?

MS. KALLER: The energy is decreased as it goes down.

DR. ALEXANDER: Right. Pat asked how much; is it half the signal strength? Is there any rule of thumb?

PRESENTER: I can tell you what Stan said. Basically his answer is it is complex, because you are looking at the refraction, so it depends on the environment. It depends on where your density changes are, how strong the density changes are, the depth, and, of course, the substrate that it is traveling into. I think we were going to recommend that if you're interested in the modeling aspect of it, the sound field; and the attenuation in particular circumstances is we would recommend speaking directly with Stan Labott, which we can provide this information.

MR. JOHNSON: We can provide contact information for you on that. He is the agency's acoustician, which is basically the guy that he understands the sound, all about the modeling, attenuation, et cetera, et cetera. He is pretty good at providing that kind of information.

PRESENTER: It is also important to distinguish between perception; so sound as we're thinking of perception and, of course, the pressure change that you're looking at, as far as effects directly on a particular species, if that is where you're going with the question. We didn't let you really get to the end of the question.

DR. ALEXANDER: No, it sounded like what he was saying is that there is very little attenuation from his answer to Pat, and I wanted to see if that was the case. Now you are saying it is complicated and you can't tell us; but we need to speak with this other person.

MR. JOHNSON: There would obviously be some attenuation, but how much -- Stan is the man to talk to on that.

DR. ALEXANDER: Okay, and then the other question; you touched on the directionality of the sound sources, and they try as best they can to make them not be multidirectional. How effective are they at doing that or should these be considered just basically multidirectional sound sources?

MR. JOHNSON: They are reasonably directive, but for your purposes, knocking it down to, let's say, 100 dB or something; I would say they are not that successful. But, again, Stan has done a lot of work with the modeling, and he can give you a very good answer or a very detailed in-depth answer to that question. We really can't.

MS. KALLER: If anybody is making it to – we have a public meeting down at Embassy Suites this afternoon. Stan is here. He is actually here, so if anyone can make it there, he can answer these questions. If I thought it would be as much about sound, then we would have had him here right now.

MS. DEATON: Just one question. I don't understand why – on each sub-array there is one air gun?

MR. JOHNSON: No, each sub-array will have multiple air guns.

MS. DEATON: Okay; and so if you have two, let's say, on the 3D and you've got two source arrays, each with three sub-arrays; that is six; and so of those six you are going to have multiple air guns, and they all go off at the same time; is that correct?

MR. JOHNSON: For the 3D you've got two source arrays; and within the source array, they do have some methodologies to where they don't all go off at the same time; but basically, yes, within this array all air guns will fire at once. Within this array, all air guns will fire at once. They will alternate back and forth.

MS. DEATON: What is the advantage of doing that versus just one? Why do they need so many at once, because doesn't that amplify the sound more? I guess they need that.

MR. JOHNSON: Yes; if they could get away with one air gun, it would be a lot simpler; but the energy and the way it is distributed is not the same with one versus multiple air guns, and also they are not able to tune one air gun. If they have multiple ones, they are is constructive or destructive interference. They can do some tuning of the array as well like that. It is a matter of signal strength and tuning to get the signal that they need to get the information that is necessary.

MS. DEATON: If multiple air guns are going off and you have those decimal dBs you talked about, really you multiply that?

MR. JOHNSON: No.

MS. DEATON: That is total?

MR. JOHNSON: That's cumulative.

MS. DEATON: Okay, and then one last question then. All these companies, they could potentially though be in one area at the same time or will they coordinate so that they are spread out?

MR. JOHNSON: In theory I guess you could say so, but in reality that would probably not happen or several reasons. One, they would interfere with each other, and also you are assuming they all would get out there at the same time, start in the same place, and look at the scale of what you're talking about here.

You've got a large area from Delaware all the way down to upper Florida, from the state line out over 200 miles for these things, where these guys would be operating. You are talking about let's say probably at the most five ships in that gigantic area with these large grids. They don't want to be on top of each other because of interference. While technically, yes, it is possible; when you are dealing with that big an area, those few ships, with those type grids; I would say it would be reasonably unlikely just because of the scale of the issue. I can't sit here and swear to you it would not happen.

DR. HALPIN: Actually the time overlap was one of the questions I was going to ask. But just one other issue with the time overlap is I am trying to get my head around what is the accumulative time overlap; so not just whether or not they would be on station, possibly overlapping in space and time at the same time, but are we going to have consistent noise from multiple surveys going on for what length of period? Are we looking at six months or three months?

MR. JOHNSON: Okay, a survey will last multiple months. If you want to look at from here out beyond the EEZ up to here to the shoreline, I don't know how many cubic miles it would be or square miles that would be. But technically, yes, you could have multiple sound sources in that area at the same time.

DR. HALPIN: Do you have an estimate or are you going to have an overall plan for how much exposure in terms of months of time? If you have eight sets of surveys going on, how long is that going to persist?

MR. JOHNSON: From an operational perspective – I don't know what the environmental groups might want to say, but from an operational perspective the permit itself is good for 60 days but can be renewed up to five times for up to one year before the permit actually expires. That is basically the same time length as an Incidental Harassment Authorization from National Marine Fisheries.

From an operational perspective and how we would permit these people; as they are ready to go, we would issue the permit to where they could go out. I would say it could range anywhere from suddenly all these permits pop out at once, these guys all have vessels at one time, to where they are out there for the next nine months together out in that area; but odds are that is not going to happen because the permits and the IHAs are going to come out separately.

They are not going to just suddenly – we don't believe you suddenly have five of them show up at the same time. One of the big problems with this sort of thing is there is a lot of uncertainty as to when these people can go out. They have to contract for these vessels. It is not unusual in the Gulf for somebody to sit around for several months waiting to get their turn with the seismic vessel.

From an operational perspective, I would say you would undoubtedly have a few of them within this entire area at the same time, yes. We don't issue the permits based on how many are out there. We will be issuing permits based on when we get all the environmental work done from our agency; they've got an IHA from National Marine Fisheries, and all the CZM is approved.

At that point we'll go ahead and issue the permit. We're not sitting here looking at, okay, there are three of them or there are two of them out there now. We will not be holding on to the permit to wait. There is definitely the possibility in that entire area there will be several shooting for several months, yes.

DR. HALPIN: One last thing. I was looking through and trying to find as many maps as possible of the actual surveys. The North Carolina Consistency Reports, they have four of them. Only two of them had maps, and I was just curious on the requirement for availability of the

actual surveys, public availability of the survey tracks. Some of them just have a polygon; some of them actually have proposed tracks.

MR. JOHNSON: We receive everything from the company. We get the actual tracks; we get the SHAPE files for those. We know exactly where they are planning to shoot just like National Marine Fisheries will need to know exactly where they are planning to shoot. However, that information is considered proprietary.

On our website we will only have the outline polygons for that. We will not show the actual lines themselves. Now when it comes to CVM, the states can request anything they want to from the company. That is between the state and the company itself. They can request whatever they want and say, well, if you don't give us this we are going to deny it.

DR. HALPIN: The reason I'm asking these questions is we produce a lot of the protected species density models for NMFS, and we are trying to see what the overlaps are. We are having a hard time actually getting that data.

MR. JOHNSON: That information would have to come via the states or directly from the companies themselves because we cannot release that.

DR. HALPIN: We work with the feds not the states.

MR. GEER: Our Sea Grant folks have been able to get some of those exact tracks of where they are doing the work. Only four of them are permitted off Georgia, from what I understand. I think that is what we were told; but at least two of them we have the actual tracks that they are going to be working on. You can get ahold of it.

MR. PUGLIESE: To that specifically; since you're saying that National Marine Fisheries Service has access to it, considering the council is actually putting the regulations in for fisheries, I would assume that we supposedly should be able to collaborate and be able to get detailed information so we know how it may be interacting with some of our managed areas or habitat.

MR. JOHNSON: To be honest, I don't know how that would work with them. I just know with us, while we have access to all that information, it is considered proprietary and we can't release it for 25 years. What exactly National Marine Fisheries has access to they can probably ask – I can assume they could ask for anything for they want; but whether or not they can share it with others, I do not know.

MR. PUGLIESE: I guess just as a follow up to that; we have access directly to all the proprietary fishing information. The council manages these resources. We actually have the habitat plans like coral, coral reef, live hard bottom, habitat that these areas may be interacting with. I would assume – I understood that limitation there, but the fact that National Marine Fisheries Service has access to it; I would assume that there has got to be some way that we can figure out how to actually be able to get at part of our information system; not necessarily distribute it, but able to have access to be able to evaluate it as part of the process or do post processing to maybe provide other types of products, maps or something, added value things that would be useful to the council.

MR. JOHNSON: I'll tell you what; very briefly let me rephrase that. I don't know exactly what National Marine Fisheries gets. They are provided a lot of information. The best thing I could say would be to discuss that with them to see what they have available and whether or not they could share. I truly don't know what their regulations are or how that works. I know what we can do, but I don't know how their setup works.

MS. DALY: As someone who used to issue IHAs for National Marine Fisheries Service and Protected Resources; we do not get the information about where the track lines are.

MR. BELL: Roger was getting at kind of the point that I am I think most concerned about is – and I am going to come to the one o'clock briefing over there with the sound guy. That would be great, because that is one of my concerns is understanding that there is a potential for some swath of bottom for 150, 200 dB, whatever it is; boom, energy hitting that area.

Our concern in some of these areas that I mentioned, there are areas of hard-bottom habitat, whether there are ledge systems or broader areas, that the fish species that we manage are critically tied to. Just from talking to a number of people, there is kind of an assumption, well, the fish will move or the fish can move or the fish will hear this coming and they'll move.

Well, maybe not in some cases. Some of these fish, reacting to a fright type thing, they may have a tendency to hunker down in the habitat or something. And you are going to have some level of energy coming down on these fish for a swath that I don't know how far that swath is or that cone, let's say.

It is good that in a way you are trying to maximize penetration into the sediment through the ocean floor so you want to concentrate that energy into a fairly narrow beam, let's say, which would be a good thing in terms of area impacted; but then if you happen to be a fish that is under that beam, that might not be so good. That is one of our concerns.

Another one is so we know where a good bit of this habitat is, but we don't know where probably most of it is in terms of having already been mapped. That is why I asked about the multibeam and other efforts. In linking to data that Roger or NMFS has access to, we know where some of it is and we could make recommendations on, well, given that it is this much energy, I wouldn't recommend going over this spot or this spot at this time of the year and those sorts of things.

That is why I was curious about lane spacing or track line spacing, because they may be able to avoid areas that we would be particularly concerned about really hitting hard with this kind of event sound. Then the other things I am still kind of confused on is you've got these different contractors doing different things out there, and we don't kind of know when and where or how often.

You may have multiple insults to the same area where the fish kind of recovered from what just happened last week and then, boom, here comes another one through the same area the following week or something. It sounds like that is not something that you guys coordinate. The individual permittees are just sort of doing their own thing, realizing they don't want to be on top of each other either.

That could provide more than one insult to a particular area that would perhaps cause problems, so it is a little more chronic in that case. I think maybe some of the questions I have the sound person could help with; but that would be I think a big concern that I would have from a council perspective or a state resource perspective is what this does to the fish on those particular sensitive areas or critical habitat areas of particular concern.

There are a lot of other areas where that habitat doesn't exist, and it might be just fine, but that is a concern we have I think because we don't really know what the impact necessarily would be on the fish. I know from other work related to explosives and other types of sound sources that you can have negative impacts on fish, but that would be a big one.

Then there is some seasonality to it. There are certain behaviors going on like spawning. That wouldn't be necessarily a good time. But if there is some way we could link up our knowledge of the habitat areas with where it would be good or not good to go; that would be a good thing in terms of protecting the resource and getting the work done as well.

MR. PUGLIESE: Just a real quick comment. I'm sure Brian probably has provided that as part of the follow up for that Sound and Fish Workshop that was held. We had provided a presentation that highlighted habitats, fisheries, spawning times, and all types of things that hopefully you all have been able to at least begin to look at in the process. It is a follow up on Mel's about the opportunity to do that. That was really kind of a concise way of looking at the broad scope of what some of the concerns of the council habitats and fishery operations are.

MR. KREVOR: Absolutely. We are not going to turn down any additional information, but we do take habitat and behaviors and timing into account when we are doing our analysis. Back to I guess first looking at a sensitive habitat. The example that we came up with really is the Flower Garden Banks, if you are familiar with it.

There has been I believe 30 tracks over the actual banks themselves. As you know, we also monitor it. I think recently it was considered the healthiest coral in the northern Gulf, so I know it is limited, but we do track and we do see that there hasn't been at least that we found a measurable impact to the habitat itself.

As far as looking at fish behavior modification or disruption, that is something also considered. The signal on the air guns themselves is – correct me if I'm wrong – about two to three hundredths of a second and then you have your 10 to 15 seconds. Looking at the pulsed signal and the frequency, it is not so much of a masking problem there like you would see with vibroseis, which is a longer, low frequency signal.

In that case considering the type of survey that is going on and the potential for it to mask or mimic biologically important sounds, we can act around that and say this is not a good period because you are going to interfere in that case with maybe drum spawning. The studies that we've looked at regarding fish moving off of habitat and how long they move away from it or return; it is anywhere from a half hour to five-day period based on those studies before our returns and especially the CPUE returns to pre-survey levels.

The movements, from what I was reading, you do see some avoidance moving deeper in the water column, some moving further away, and they have also seen increased biomass moving

further away from it. Of course, that is on a scale; it is going to change. It is hard to address the specifics, because these studies are being done looking at areas in the North Sea or in Alaska or in the Gulf, and we don't have it to address the specific habitat you have in mind or the species.

MR. BELL: I was going to ask about Flower Gardens; because having done a lot of this in the Gulf, I was wondering whether or not that had actually occurred. That would be somewhat similar to what we're talking about. We're talking about a little bit broader areas of shelf type habitat, but it would be somewhat similar. It would be nice to know about the fish, I guess, in terms of any impacts, if there was anything documented or before/after kind of stuff down there. But that would be kind of a comparable type of habitat, anyway.

MR. KREVOR: Hopefully, that kind of gets to it, but the studies are limited. We do have to extrapolate from what's out there. I forgot some of the other questions; so if you can refresh my memory on what I'm missing here.

MR. BELL: Part of it, too, is just we know where some of the habitat is. We don't know where it all is. I guess if it were a perfect world and we were starting from scratch again, if there were an ability to go out and do multibeam work and actually kind of better scope out where the habitats are; that would be helpful for us to give a better-informed input on, okay stay away from this, stay away from this, over here is fine and that kind of thing.

But since there is kind of a data gap in terms of where habitats are, I don't know to what degree there is some collaborative stuff that could go on in terms of helping us map some of this. If I get my perfect world scenario, that is probably not even possible, but ideally it would be nice to know where the habitat is, first, before we went in with the 2D stuff.

MR. KREVOR: You probably didn't read my mind when you said I would love to have this data to know where the habitat is, and we're thinking the same thing. The studies program is really the best link there to getting that information out; because as John said, the surveys themselves are proprietary for 25 years.

MR. JOHNSON: For the deep Penetration. For the high res stuff, it is between 30 and 90 days.

MR. KREVOR: Okay, so even though we have that information, some of it is getting shared in a rather short period of time. They are not concerned with the surface. That is not what they're protecting; we are. It is getting shared. One of the proposed studies as far as it is starting now is with – who is Bruce working with – mapping the deepwater corals, so working with NOAA, do you want to answer the question on studies?

MS. KALLER: We have a Gulf of Mexico Deepwater Coral Study. It is kind of a follow up with the NOAA Coastal Ocean Science Group. That is to kind of help solidify what we found out or know in the Gulf of Mexico where also we're just starting at the very beginning obviously of our study programs for the Atlantic, involving G&G and conventional energy and whatnot. One of the things we are proposing in some of the first studies is a similar one in the Atlantic, as well partnering with NOAAs group to kind of work together to see what data we all have and to get a better understanding of what the benthic communities are out in there.

MR. PUGLIESE: I would like to jump in. It is kind of connected to everything that Mel and whatever has raised. It kind of goes back to that one point I had made about what we had provided earlier. To your comments about Flower Gardens; let me start from there and then work back to it.

Flower Gardens, I assume you did the surveys in those areas back when it was still either being proposed or maybe not as much activity. What would be the reason for including a component that you know you would not want to have exploration on in the overall survey? Is it just you don't want to have a hole in the array or in the footprint that you're looking at? Because if there are obvious ones – and this gets to the other side of this on the deep-water coral systems, because we have really extensive Deepwater Coral HAPCs already designated with a lot of years of work to get to that point of which we still need to have more refined mapping in.

However, those are some fairly significant actions the council has taken over the last number of years. They are kind of connected. Number one, does that leave a hole when you don't complete the thing? Is there the opportunity to literally avoid some of those types of areas or does that cause a real problem with kind of the overall footprint that you're looking at?

MR. JOHNSON: I'll take the first part. In general it could leave a hole in the interpretation, especially if you're talking 3D. However, if they are not allowed to go there, they are not allowed to go there. If it is determined from an environmental perspective and we get the information in a site-specific environmental study that is provided by our environmental group that they have to stay clear of these areas or use offsets or some buffer or whatever around there; that is what they have to use regardless of whether they like it or not. Yes, it could leave a hole, but if there is a buffer there, too bad.

MR. KREVOR: Okay, and then regarding protecting those areas; once that data comes in and we use it to see between 3D and maybe a good multibeam mosaic, if we can identify where there is a potentially sensitive habitat or fragmented habitat that needs to be protected, then we can act to do so.

But we do use a combination of different survey data to determine if it is simply hard bottom that is going to support the corals or if it has got relief and is supporting some other community, which I am not sure what we're going to find yet in the Atlantic OCS, or if we see something that is indicative of seeps and chemosynthetic communities; but we do take it and if there is something that needs to be protected, then we have different mechanisms to protect it. Now as far as the surveys and the potential, right now I believe we're working with NOAA. There is still no determination on that?

MS. KALLER: Are you talking about EFH?

MR. KREVOR: As far as the sanctuaries?

MS. KALLER: Yes, we're working with the National Marine Sanctuaries, obviously, because there are out in the areas. We're also working with GARFO and SERO with EFH consultation, because every single application will have an EFH consultation. That means that process starts over with every single one of the applications we do receive.

We are kind of still in that beginning process, as well as working with NMFS with the IHA information to make sure we're all in communication and we're all kind of going after the same thing to protect. While we're charged to do this, we do want to do it in the most environmentally safe manner we can.

Again, we've just started the kind of conversation with these applications that just came in. When we go forward with the process, we'll use whatever information NMFS can give us as well as all the information we can have. I do want to say that we don't actually get the survey data. We purchase it for our fair market value reviews. We don't actually receive that data. That goes to whoever the contractor bids it out to, but we do not.

MR. JOHNSON: It is not automatic. When they go out and acquire the data, we don't automatically get it. If we need it for our own purposes, for evaluations of lease tracks or whatever, then we will go ahead and buy the data. We will then have that in-house. That is when the 25-year rule or the between 30- and 90-day rule comes into effect. That is strictly for us. The company can release the data or license the data to people. However they want to; that is their business. We only acquire what we need for our own purposes.

MR. BELL: Any data regarding the skin, so to speak, is of value to us and would sure be nice if someone would be willing to, oh, I don't know, work with us, give it to us, sell it at a discount rate; but that is the important part for us. The 2D stuff down, don't care; that is fine; they can keep that proprietary forever.

MR. JOHNSON: To be honest, with like the one survey if it was to go, the multibeam, I don't know if we would feel that we need that or not. I don't know if we would get it or not.

MR. GEER: Okay, we're into our lunchtime already, and I don't want to keep anybody from their lunch, but I want to make sure that you all get a chance to give your full presentation.

MS. KALLER: That was it; we were here for questions.

MR. GEER: Okay, great. I wanted to make sure of that. Now, Brian told me that Stan is going to come over today at 1:30 to talk specifically about sound with us. Save any of those questions for him, because we had a really good discussion about that this morning; and if Stan is the expert, that is who we want to talk to. I am going to open up the floor for continued questions, if that is okay with you guys because I know you guys have a whole bunch of more meetings this afternoon. All right, Anne, I had you on the list for a long time; are you okay?

MS. DEATON: I guess my questions have been answered except one. You say you're going to do some surveys in the Atlantic, a study monitoring, but when would that start? The studies that you say have already been done regarding fish behavior; are those on your website, the BOEM website, or where can we access those?

MS. KALLER: As far as the conventional energy studies for the Atlantic, that is at the very beginning stages. We haven't even made a national studies' list yet for those. That would be at least 2017 before that would happen. I do know we have AMAPPS out there, I don't know if Brian wants to talk to that a little bit, and we have given more money to continue that work.

We can work with the renewables, because they kind of took the lead since their activities were happening sooner than ours; but now we are starting to think about the OCS areas that we would actually be working in in the future if activities were to be approved out in the OCS. The reason I slipped to this – and you have this in the last presentation – the Environmental Studies Program Information System, it is the very last one.

Honestly, I would tell you to go to Google and put in ESCIS. That will get you there probably faster, and then put your queries in there, and you can go by region and key words and things like that. That is all of our studies that we have had published.

MR. KREVOR: I would add to that, if I can one thing, and that is if you haven't had a chance to actually look at the programmatic EIS, the Appendix J really does have a lot of those other references. In the case of fish behavior and response to sound and other potential impacts, we rely heavily on the body of work that has been done. Feel free to add to it, too.

MR. GEIGER: Given that this technology has been used in the Gulf of Mexico for several years at least; is there any lessons learned in terms of the previous studies related to the Gulf of Mexico that you all have utilized to allow us to maybe get a little more proactive in terms of protection of habitat for ongoing and future surveys in the Atlantic?

MR. KREVOR: Really, I think what we've seen in the Gulf of Mexico is that there hasn't been a measurable impact, something that we can tease out from the surveys themselves. Now, right now we're still talking about seismic surveys and air guns. There, of course, are other survey methods, and we do protect habitat if there is something that is going to be on the seafloor. But as far as the seismic surveys, we have not seen an impact that can be teased out of the data.

DR. ALEXANDER: I was just wondering if you could give us some idea of the extent of the multibeam surveys that are proposed, I couldn't get it off that spaghetti map on the slide there.

MR. JOHNSON: Let's see if I can. Well, I am trying to look and see here. Can you pick that off of here; Terrie, can you see? Is it this right here?

MS. CAMPBELL: That's it right there.

MR. JOHNSON: Yes, okay. This is the extent. I was going to say if you want to get a little better view on our website; it is at the other end of the presentation. The Atlantic permits, the third one down, Atlantic permits, they have the individual Atlantic permits there, and it would be the T.D.I. Brooks permit, which would be E14-010.

Each of those has the public version of the permit application as well as the outline map. That might help you a little bit more than the shaky line up on there that we tried to show. The fact is if you come to our talks this afternoon and early this evening, we have binders there where we have public copies of those permit applications with the maps you can see there as well.
Also on our website there is what is called a GEO PDF; I don't know if you are familiar with those. Okay, there is a GEO PDF of all the permit outlines so you can turn off all the other ones and just have that one showing. There are several different options for getting a better look at the extent of that survey.

DR. ROSS: That is a really huge area that we've been trying to get multibeam mapped forever. It overlaps with the coral habitat areas of particular concern to a large extent, which is where a lot of us have worked for the last ten years. Can we have any input to that mapping process? It is possible you would be half a mile away from a very important feature that we would like to see covered; or how can we have some kind of involvement in that process, because that has been an area that is just not going to get mapped.

MR. JOHNSON: As far as input into the extent, adding a little bit more over here, a little bit more over there; I would say your best prospect of that would be to contact the company itself, because that is not something that we get involved in. On the permit applications themselves, they do have contact information for the people doing the survey.

It would give you a place to start if you wanted to call them up and speak with them. The only potential issues there, from an IHA perspective I don't know how much they can vary. They will have turned in an area where they expect to operate, as I understand it. I don't know how much they can vary from that without causing issues with the IHA. But the thing to do would be to call the company, T.D.I Brooks.

DR. ROSS: T.D.I. Brooks has got the multibeam permit?

MR. JOHNSON: Yes.

DR. ROSS: I know Jim Brooks, but at some point it seems like this committee should maybe have involvement there as a bigger group and not just an individual like me or Clark or whoever is interested in this. This is a unique opportunity to get something mapped that we're struggling to have done, which overlaps a lot of area we're interested in. Remind me once again when that permit is likely to be acted on.

MR. JOHNSON: At this point it is in the hopper with all the rest of them. Has T.D.I. Brooks submitted an IHA application? Okay, so that is in the works. The states that will have any CZM review on that would already be within that process. It is currently churning away at that point. Currently quite a few of the 2D as well as the high res is churning away in this point here, which is our environmental review.

Also any states that are going to be allowed to review it is churning away there as well as down here within National Marine Fisheries. That is kind of where it is now. We have not issued permits in the Atlantic since the early eighties. This is a complex process and we really do not know for sure how long this is going to take.

NMFS is an obvious question and the state CZM process is an obvious question as far as time syncs. There are a lot of people that have asked us for a timeline on these things, and we've really given up trying because we've been wrong every time.

DR. ROSS: I would assume, though, that multibeam permits are going to maybe go through the system perhaps more smoothly than a seismic air gun since we're all multi-beaming out there, anyway.

MR. JOHNSON: Right; that is an assumption that I would make, because there are no air guns involved, which eliminates some of the CZM and, like I say, some of the National Marine Fishery stuff. I would assume that, but I don't know, because I don't know how they are handling it at National Marine Fisheries as far as what order they are working on them in.

DR. ROSS: I just want to make one more quick comment that I think a possible action item for us would be to pursue that or somehow have a reference to looking into it when it comes the right time.

MR. GEER: I already have it down as a discussion item this afternoon. I am going to take one more question. Wilson, it is appropriate that you get the last one.

DR. LANEY: This one is about the AMAPPS Survey that several folks have mentioned. I am not sure whether BOEM is appropriate to answer or maybe Pat or Carter. Carter had provided me a while back some very excellent Navy references that generated model distribution maps for marine mammals in particular; so is the AMAPPS work that is ongoing going to update or refine those distributions based on modeling or is it actually based on observer data or acoustic data or some other data source?

MR. KREVOR: I haven't been that closely involved in AMAPPS, but it is supposed to be a refinement of the whole In-Sea Process. Pat can probably speak a little more on it than I can.

DR. HALPIN: Currently right now we've just gone through the process of taking all of the NOAA/NMFS surveys for almost the last 20 years and assembling them together and putting out a new citation density modeling, suite of models that go up to the AMAPPS data. Unfortunately, NOAA did not release the AMAPPS data until we were finished with that process, so we were asking for it for quite a while. Literally the day the last version of models came out, like the next morning they said, "Oh, we're going to give you the new data now."

We will be updating those with the AMAPPS data. There is a parallel process where the NOAA Northeast Fisheries Science Center has done some experimental models using some different methods. They are not as complete, because they are only focusing on the AMAPPS data and not on other inputs. There are actually two versions.

Currently Protected Species at NOAA are using the models from my lab, and Navy are using the models from my lab, and that is likely going to persist into the future, because they have already been finished and developed. We'll be hopefully updating them with the AMAPPS data within the next nine months or so.

DR. LANEY: Yes, I think Brian has some, yes. You mentioned citations, Pat, but you had said earlier protected species. Is it just citations or is it looking at Atlantic sturgeon and other aquatic species or protected seabirds as well? It's only citations?

MR. HOOKER: What I was just saying is that NOS has done most of the avian modeling in coordination with Fish and Wildlife Service. Regarding the AMAPPS, it is mostly citation and sea turtle work, because it is a ship-based and aerial so they are able to capture both of those. They are capturing large marine pelagics on course but that is not a target species, and we're not modeling any of the large pelagic fish species at this point.

Just to back up with what Pat was saying; the AMAPPS modeling that is ongoing right now – this isn't a portion of it – it is only modeling the AMAPPS data, because that was a specific survey design. I think what Pat was talking about is we will have several different models to compare and contrast to see how they line up.

I can't say that was intentional necessarily, but it is seen as a positive outcome to having these different model approaches using different data sources. One, I think as Pat mentioned, is using basically all the available data and modeling. One is using the NMFS Protected Species surveys, and the other is using the AMAPPS survey. It is a little bit of a mix of all the above.

DR. HALPIN: I think Brian did a great job explaining that. My lab is currently working with the NOAA NCOS lab on avian seabird data as well as Northeast Fisheries Science Center on fish surveys to extrapolate density and catch-per-unit effort data for the Atlantic Seaboard to support the Northeast Regional Planning Body with NROC and the Mid-Atlantic MARCO folks with the Mid-Atlantic Regional Planning Body.

It is three labs together, two NOAA Labs and the Duke Lab, combining our resources to do the protected species and fish for those two regions. That is another overlapping project. I have all the maps and things if people want to take a look at some of that stuff at a break.

MR. GEER: We're going to break for lunch in a second, but first I want to thank the BOEM people for coming. I know you have a very, very busy day today. If you have any closing comments you want to make at this time.

MS. KALLER: I was going to say I appreciate you having us and taking your time to talk to us and kind of get the conversation started, because I think this is good. This is going to continue as long as the activities are continuing. We'll probably be chatting just like with renewables from this point to the near future.

I do feel Stan will be able to handle all these sound questions. If I had known that was a big interest, I would have woken him up earlier and made him drive down with us this morning. Hopefully, about 1:30 you'll get a lot of that answered. But thank you for taking the time with us.

MR. PUGLIESE: I would also reiterate the thanks to BOEM for both participating at the council level and get into more details, which we kind of staged this. I think it is working really well. I would also acknowledge while your coordinating directly with NMFS on some of these things, take a look closely at our online atlas systems and different things.

If there are any questions about, because a lot of these areas, the protections and the justifications and the intents are included under those, you will get a clear indication of what we know and what we don't. Also connected to that in terms of the prioritization for our mapping needs that we ultimately might be able to collaborate on as part of the ecosystem plan process we're moving right now.

We're actually going to be looking at a strategy to complete mapping within our existing 0managed areas, to look at key areas between habitats and throughout the region. We are

compiling that through the atlas as being the basis for all our multibeam information and species information.

MS. KALLER: I was going to say Mark Mueller will be contacting you if he can hear me on the phone.

MR. GEER: All right, with that I want to again thank BOEM for coming today. We appreciate all the input on this; it was very informative. We are going to break for lunch now. We're going to come back at 1:45, so see you back at 1:45.

We don't have a lot of time for this, but I'm very grateful that BOEM is willing to come over this afternoon and answer some questions on the physics of sound and water, I guess, and also the biology of sound and how it may impact some of our species. We have Stan Lubbock and Jill Luendanski. They are going to just talk very briefly. They are going to answer questions and they have to be out here by 2:30 at the very latest, because they have a very busy day. They have got to get back over to the Embassy Suite. I am going to turn it over to Stan.

MR. LUBBOCK: I assume you want to know about air guns and what to expect from air guns, not only from the source itself, but then also what you would expect primarily on the bottom. We can talk about the water column, too, because you need that to get to the bottom. The air guns themselves; it depends on the air gun and the type of configuration it has, but typically they have source levels somewhere between 230 to 250, 255 dB RMS.

That is a broadband across all the energy, all the frequencies that it produces. In any discrete frequency, it is something less than that. Most of that energy is in the 50 to 300 hertz band. It drops off at about 10 dB per octave going up above 1,000 hertz and up to about 10,000 hertz. There is energy between 50 and 10,000 hertz. Most of it is in the 50 to 2 or 300 hertz band.

Typically the other thing you need to know about it is the signal itself is a very short signal. It is about a hundredth of a second at the source. It is a distributed signal. The air guns are distributed in an air gun array. There occasionally will be individual air guns themselves, but those are usually smaller and the air gun array is used to form a beam pattern in the structure, in the signal that is sent out.

Most of the energy is directed downward. If you wanted to look at it, it is probably at something on the order of a 30 or 40 degree wide beam that looks downward, but there are side lobes, so there is energy that goes off in a horizontal and in between. What you can expect for most of the propagation that you're probably interested in up to about at least 100 meters, probably 1,000 meters, is spherical spreading, which is a 20 Log(R) loss.

You would use that for the spreading until it starts to interfere with and interact with the bottom or the surface; or if you get about 1,000 meters, then typically it transitions into a cylindrical spreading, which is 10 Log(R). What you would see at the bottom will depend on how deep the water is there. There is a simple calculation. It is more complex than that; but for the simplest way of looking at it; so if it is 100 meters deep, you can expect a 50 dB loss in 20 Log(R), 20 Log of 100 meters. That would be a 40 dB loss.

If it is deeper than that, if it is deep water, if you are worried about deep-water corals or something that is in the deep water, it is at least 1,000 meters deep, then you would expect 60 dB, another 20 dB loss. Let's just use a simple number of the 230 dB RMS source level to start with. For 100 meter depth, that would be down at about 190 dB RMS.

Does that all make sense to everybody? That is a broadband signal. That is a broadband across all the frequencies that have been projected, and it is a very short signal. That is really what you would expect as a peak level in that duration. Typically when you're talking about decibels and you're worrying about the energy in a signal, it is prorated and it is assumed that it is a second-long signal. Now because this is not a second-long signal, that would be reduced somewhat.

That level is the peak pressure level that you would expect as an RMS level. That is a start. How much more do you want to go from there? Propagation out away from it in deep water, and that is probably where most of you – well, you are going to worry about both. You are going to worry about shallow water and deep water.

The propagation pattern is then you will be highly dependent on what the bottom and all the other things that go along with that are there. What is the bottom composition? What is the structure of the sediments close to the bottom? How much penetrates into the bottom? How much is absorbed? How much is backscattered?

If it is shallow water, you can kind of approximate that. One of the quickest easiest approximations is about a 15 Log(R) spreading after that initial spherical spreading. That is typical and reasonable for probably the first mile or two. You will get some interaction and bouncing and spreading as it propagates outward from the source.

Most of the energy is directed downward, because of the slope of the bottom. Because of the irregularities on the bottom and the surface that it is bouncing off of there, it won't stay vertical. It will start to spread out in a pattern away from the source. The types of surveys that we're talking about for G&G surveys are two-dimensional, 2D surveys.

What that means is that there is an air gun array and it has typically a streamer towed behind it for a receiver, but you're taking one slice at a time. They move it about 4 knots, 4 miles per hour. You can expect the sources to be pinging approximately every 10 to 15 seconds. It will vary from survey to survey and from company to company, but that is pretty typical.

Now one of the other things, what I've given you are very cautious and kind of the conservative upper-level numbers. One of the things that you have to worry about when you are in shallow water is the fact that the air gun array; all these things are assuming that the air gun array is a point source.

That is a simple approximation for far-field, long-distance measurements for the source. That is really not the case for when you are in shallow water. I am not sure how familiar you are with beam patterns and near and far field for arrays or for sensors; but probably the easiest way to look at it is if somebody were to ask you a skyscraper that is 100 stories tall and it is at nighttime and all the lights are on it, and they said how bright is that skyscraper; well, if you are in space, it becomes a point source and you can see it as one single light source.

When you are up close to it, if you are right next to the building, a meter away, the floor that you are right next to is going to be the one providing all the light. All the other floors are going to contribute to that a little bit but not as much. The same thing happens, and there are all the intermediate steps away from that.

Until you get to a place where you see the entire building as one light source instead of a bunch of individual floors are adding together, adding or subtracting; the same thing happens in an air gun array. When you are in very shallow water like 100 meters, that beam pattern isn't completely formed. You get something less than that ideal source that I just talked about. It is actually – that is a conservative number and it is probably on the order of 10 to 20 dB less than that because of that near-field affect.

The other thing I would say is just because of the frequencies we were thinking about here that are on the order of 50 to 300 hertz; you are not going to get a lot of attenuation and absorption, because that frequency propagates very well in the water. You are just going to get spreading of the signal over a surface area. That is the primary loss that you are going to have for the first 5 to 10 miles.

MR. GEER: In the first 100 meters, if you are starting at 230, you are down to 190, because there is 40?

MR. LUBBOCK: Right, 20 Log of –

MR. GEER: Is it an additional 60 decibels or is it a total of 60 when you get down to 1,000?

MR. LUBBOCK: It is a total of 60.

MR. GEER: It is a total of 60, so 20 decibels.

MR. LUBBOCK: Right. The standard equation is the receive level is equal to the source level minus transmission loss, so here the source level is 230 and the transmission loss is from one point to the next. That is assuming in this case that source level is at a one meter distance, and so that is a reference unit and it would be whatever the range is, 20 Log of that range divided by one meter.

MR. GEER: You also said typically it is measured as a one-second pulse. Since this is one percent of that –

MR. LUBBOCK: It is $1/100^{th}$ of a second. At the source itself, it is a hundredth of a second long. They all go off simultaneously. In the near field that will be smeared out somewhat, because you will be getting reception from multiple sources. They won't all arrive with you at the same time. The source that you're closest to will arrive and then the others will arrive very quickly.

Air gun arrays are typically no more than about – 48 air guns I think is about as high as they get, and they are spread out over about 100 meters. The speed of sound in water is about 1,500 meters per second, so 100 meters – if you are in the middle of the array, the farthest is probably 15 meters from you, so it is about a $30^{th}$ of a second. You will see the signal for the air gun right

next to you arrive and then 1/30th of a second later the farthest one will arrive. They are pretty close, but they are not exact.

AP MEMBER: If you had one of these guns sitting here and it fired off; well, before it went off again 10 seconds, 15 seconds later, I guess we would all be running for the door. It would really affect at 250 decibels.

MR. LUBBOCK: Now what are you referencing it to? That air gun is not 250 decibels in air. Also, right here is an air, so do you want to change reference units and everything to in air? If you are going to do that, you have to worry about a couple things. The first thing you have to do is compensate for all the things.

When they talk about a decibel, there is a whole series of references, just like the one second that are assumed in that. That includes the density of the materials, so the difference in density from air to water, the difference in the reference unit. The standard reference unit for air is 20 micropascals instead of one micropascal under water.

Those two things combined would automatically correct for – that 230 dB source levels would be reduced by 62.5 dBs, to put it in the air value. You are already down to 130. Now it would be loud, but that would be at the upper end of human – probably causing not injury, but pain or discomfort.

AP MEMBER: And it is a low frequency sound.

MR. LUBBOCK: It is a broadband sound, but most of the energy is low frequency, right.

MR. KELLY: Rather than be blinded by science, let's pretend I'm a scuba diver in the water at 35 meters and one of these things goes over me. Now I don't have to make any type of calculations for the density of air versus density of water and the spread. What happens to me as a scuba diver if one of these things goes over me, because I'm kind of like a fish now?

MR. LUBBOCK: The Navy has set standards for scuba divers for sonar signals. They haven't set them for air guns. There are two thresholds that are typically used for Navy scuba divers, and, of course, you can be more cautious for civilians who don't have to work around ships and things.

The first one is – and I am going to assume that it is not a hard-hatted diver. The standard number that is used –

MR. KELLY: No, I'm in a wet suit.

MR. LUBBOCK: Yes, in a wet suit or snorkeling or whatever. The first standard number is that for a signal that is in the human hearing range, which is typically 20 to 20 kilohertz, so that – it is not a sidescan sonar or something like that, it is 100 kilohertz, but something like the air gun that is in the human hearing range is 185 dB, if I am remembering correctly. That is an in-water level and that is an RMS in-water level. They haven't ever done it for air guns; these are for coherent sonar systems.

The other one that is typically used is for low-frequency active and low-frequency signals which are below 1,000 hertz is 145. They maintain that system. The Navy has agreed to maintain any place where there are divers; that they will not put 145 decibels on dive sites or other places where divers might be. That 145 is for a minute-long signal.

The LFA signal could be a minute long, so again you have to think about that one second and what the energy is. In our case if we had a source that is 230 and you needed to correct for the duration of the signal, so it is really about 210 or so for instantaneous – right, that 10 Log of the duration of the signal, 10 Log of a hundredth of a second; you are looking at roughly about 60 dBs, so you wouldn't want divers anywhere closer than about a kilometer to meet the 145 approximately. You would have to look at it and look at it exactly. You wouldn't want divers within a kilometer away from the source, 1,000 meters. That is rough off the top of my head and back of the envelope.

MR. KELLY: But then I would hear it coming and I would move.

MR. LUBBOCK: I would assume so.

DR. ALEXANDER: I'm having a little trouble wrapping my head around all these dBs and I may be thinking about this incorrectly. What is of concern I think for the organisms is the pressure wave, right? Now, is there a way to convert the signal dB into like PSI over ambient pressure, because that is what can cause a lot of the damage?

MR. LUBBOCK: There is actually two or actually three things that you may be concerned about. The first one is pressure, and so far we've only been talking about pressure, and that is kind of the standard easiest one. The second one is energy; and the energy for air guns, because of the short duration of the signal, is down that 20 to 30 dB.

There is a different threshold for marine mammals for energy and for pressure, and they try to account for both, because what they are trying to account for is something that is not a standard one-second signal, which in many of the sources; some are less, some are more. But the other thing that you would probably be concerned about with fish is particle motion.

Particle motion; that is the main thing that fish perceive, and that particle motion in acoustics, for a source like the air gun, generally transitions from the actual motion that could damage or hurt an animal into a pressure wave. The particles aren't really moving as much. They are more vibrating as opposed to accelerating in a direction. That happens within the first hundred meters of the source, typically. I am not sure which one, depending on what threshold you want to talk about.

DR. ALEXANDER: I was just thinking about all the discussion we've had about swim bladders rupturing, and that being one of the major effects. I was trying to get at what that sort of distance is; and it sounds like it is more this hundred meter range that you're talking about. No?

MR. LUBBOCK: We'll let our fish guy talk about it.

MR. KREVOR: There are limited studies, but the range from those limited studies. if you are looking at physiological effects, excluding hearing damage, then it is going to be in that 5 to 10

meter range. Outside of that, from the studies it looks like about 90 percent of the fish are unharmed without dissecting them and taking a look.

MR. LUBBOCK: On the physics side of it, the swim bladders, if they are a perfect sphere, you would get one resonant frequency. Since they are not, then you get multiple frequencies that it may be excited by. What happens then is in the signal that is sent out, which is a broadband signal – we've been talking about broadband – it is only some small part of that, you know, maybe 10 hertz out of 1,000 hertz or the couple hundred hertz that are the prime energy that are actually exciting that. That again will reduce the range substantially.

MR. KREVOR: One correction to what I said; that was based on a 186 dB RMS, so you can modify.

DR. ALEXANDER: For a 250, it would be a greater distance then, right, because that is quite a bit higher than the numbers you were talking about earlier this morning.

MR. GEER: This morning was for pile-driving, wasn't it? Primarily that was 35 meters.

MS. DEATON: Then one other thing is that you're talking about it might be a quick one-second ping, but it is doing that every second as the boat is moving, so even though –

MR. LUBBOCK: Ten to 15 seconds; one to two hundredths of a second every 10 to 15 seconds.

MS. DEATON: So for the sound will maybe go forward you are saying 5 to 10 meters, but then there will be another ping and then that may be another factor.

AP MEMBER: And the vessel is moving.

MS. DEATON: Right.

MR. HOOKER: But that is not a cumulative –

MS. DEATON: Right, it is going to be a different area affected. But if you are a fish trying to swim away, you could be just following the path.

MR. LUBBOCK: You could pick the wrong direction.

MR. KREVOR: You can't anticipate; that is the other problem with it. Some of the information you notice that we're going to hesitate on answering, because again, limited studies. But also when you look at behavior of the fishes, it is affected by so many things. What is their motivation at the time? What are the environmental conditions? What species? Has it had prior exposures? There can be habituation and on and on, so trying to give a general answer is very difficult.

MR. GEER: I don't know if you can answer this, but I was listening to Brian this morning about the pile-driving, which is pretty much in a specific area, but probably more constant; does that make sense; you constantly pile-drive. You are having this sound in a very specific area again and again and again versus with the air guns you are having this pulse that might be stronger, but

it is moving over time. Is there any way you could put that into a relationship in square miles or something like the energy produced by this in X number of square meters versus that method in square meters?

MR. LUBBOCK: In a lot of ways they are similar; and they are similar in that they're repeated signals and they are typically called pulse signals. Pile-driving is probably a little bit faster than 10 or 15 seconds. It depends on how the pile is driven; it may be as fast as once every couple of seconds.

But the pile-driving also has a lot of the characteristics that an air gun array has; it is not a single source. If you think about when the pile strikes, the pile driver strikes the top of the pile, there is a resonance that goes down that pile; and so the top of the pile starts radiating out into the water first. If you were to look at it very closely, there is actually a beam pattern that is formed; and it actually is driving the signal down.

The first one starts expanding and then there is farther down there, it is time-delayed getting in. Then you have what goes into the bottom and it radiates out of the bottom later. You actually have a beam pattern that is directing a lot of the energy downward. Now pile-driving is typically happening in fairly shallow water; so what you will see happen is it will be – picture instead of that beam being directed downward, it is being directed off, say, at a 45 degree angle and then grazing the bottom, some penetrating in and then moving, expanding.

But it is a similar type of signal, broadband signal again. Pile-driving obviously depends on the size of the pile and the construction, the thickness and the sediment that it is being driven into. It is somewhere—if you want to guess, if I were to guess, I would say 190 to 200 decibels in a broadband signal. Similar in some ways; but again like you said, it is not moving; it is one location.

MR. PUGLIESE: Yes; and actually I was going to ask Brian this earlier on with regard to – kind of in this line with pile-driving; I am just curious if this may apply to seismic testing activities. I know one thing that got laid out at the one workshop that was held a couple years ago was the fact that on some of the pile, not only are you getting propagation of sound in the water, you're getting it translated through the substrate, especially if you are in the hard substrate and it is actually carrying literally miles in some cases.

In the seismic, if you are shallow enough, are you ever at a situation – say if you are going north and south where you would be creating enough sound that it would actually propagate through the substrate itself, if it is a hard structure?

PRESENTER: On a ledge going north.

MR. LUBBOCK: Oh, definitely, the whole point of seismic is to penetrate into the bottom. The signals, when they are looking for oil and gas, can be five or ten miles deep and deep into the bedrock. What happens is that if you think about the surface of the bottom having a reflective angle that it may bounce off and move off in a direction; but all the subsequent layers may have angles, too, and all of those things can contribute to a signal that is being bouncing off of subsequent layers that are angled and not perfectly flat doing the same thing.

As you propagate deeper and deeper into that sediment, you would lose energy. Some is absorbed, some is reflected of scattered back off and it has the tendency to smear the signal; but what you'll find is that typically there are paths through that that eventually can return back to the surface, because the speed is faster there so it tries to get back to slower speed.

MR. PUGLIESE: Yes, and I think I stated it kind of in the beginning, the point is that there may be an opportunity to avoid very specific types of distribution, say, the ledge break, and not doing north and south along that because it would propagate along areas that may be marine protected areas with significant habitats in between all those areas; and just eliminating that kind of core area, you would eliminate a pretty significant potential impact in that area, through an area really unanticipated north and south.

MR. LUBBOCK: The propagation models that are used typically to look at either seismic or pile driving are; the typical one that is used is parabolic equation, which it has a portion of that that it counts for, things going into the sediment and propagating back outward later. That is accounted for in those models when they are done.

MR. PUGLIESE: I've got one more. It is something that really had not been addressed, but in thinking about it, we've been focusing almost all of our discussions on snapper grouper benthic species. I guess it is going to get back to our fish expert. Maybe if you have heard of some of this; are there any frequencies that may affect schooling behavior?

We talk about affecting the local areas; but if you have – whether it be sardines, forage species, or it is migratory species like king mackerel or Spanish mackerel that are tightly schooled and moving; are there frequencies that may be impacting those types of behaviors; so if you have that pulse while they may be going away, you may have some basically breaking up of school patterns or their migration paths that they are going and moving in different directions?

MR. HOOKER: The answer to that is I don't know; I'm sorry.

MR. PUGLIESE: That is fine. It is just something – it is so complex what we're looking at in terms of these species. Some are sedentary, using the areas very specifically, but we have species like gag that are using the life history everywhere from Oculina into using the gyres, inshore, offshore. It is a complexity of many habitats that if you have something that affects their movement or whatever.

MR. HOOKER: That wasn't a flippant response. It is better to know what you don't know, as I think someone said. Actually Jill had brought up that we had a workshop. I'll let you address it.

MS. LUENDANSKI: There are a couple of things that I know I think they went over some of the information earlier today; but we did have a workshop in 2010 that BOEM sponsored that just looked at fish, fisheries and invertebrates and the effects of sound; looking at pile-driving, looking at seismic noise. There was a literature review done with that.

Art Popper and Tony Hawkins were primarily leading that effort, and some folks here may have actually been there. Then obviously we have done some studies since that time. The one thing I want to say, and we try to sort of look at this as how it was approached with marine mammals first.

When you are trying to decide whether a sound is going to affect an animal, you have to first understand what it can hear. That is always sort of the biggest challenge. You took a little while with marine mammals to figure out that they hear different – you know, depending on what kind of marine mammal they are, it depends on whether or not they can hear the noise or detect the noise, what type of noise it is.

I think the same is true for fish and getting a better understanding on particularly whatever the more important species are, what their ability to hear is and whether they have the swim bladders or the air spaces and things like that. I make that point because there can't be an assumption that across the board, just because the sound is occurring, that an animal can either hear it or detect it.

That is sort of the first thing. That is really where I know with marine mammals, the first focus was trying to figure out what can they hear, what can they detect? That is kind of a bit of what we've been also trying to do is figure out. We could use some assistance and some help and guidance on what are those critical species that we need to be finding that information about first. I just add that.

MR. GEER: Mark and then George.

MR. CARTER: Is there a Doppler Effect associated with this in that they are pinged once and then based for 15 where you could have constructive interference of the sound wave?

MR. LUBBOCK: There can be a Doppler Effect in propagation of sound, and it is primarily generated by interactions with the surface. It can happen, too, in what are called internal waves; I don't know if you are familiar with those. Those are waves between layers of the ocean. You can actually have a wave between layers that you don't see, because it is water and water, but it actually happens,

MR. CARTER: Thermoclines.

MR. LUBBOCK: Thermoclines, exactly; but the primary one that you get for Doppler Effect is the reflection off of the surface. You will get a smear of frequencies. The waves are not moving that fast. For the kind of frequency we're talking about, it will be a 5 or 10 hertz maximum smearing of the signal given time, and it is accentuated the more times that it interacts with the surface.

A lot of the propagation especially for deep water doesn't interact with the surface a lot. It goes a long way and it is a bottom bouncer or it is in the water mass itself. That is less prone there. Unless you have a conversion zone, you are looking – a conversion zone is 35 miles away. In the shallow water, typically the waves, because of the characteristics and the way the waves propagate, they are typically smaller than they are in deep water. There is less of that effect but it is still present. You have more interaction with the surface that way.

DR. SEDBERRY: I am trying to think of this as someone who knows nothing about physics, because it is true. If I was a fish but I heard like a human being and was sitting on the bottom at 60 feet and one of these ships was approaching from 20 miles away and the array was going to be right over my head' would I hear this like a Boeing 747.

Would I hear it like a freight train; would I hear it like a car? What can you compare it to just so I can get an idea of what kind of noise is happening down there even though it may not affect fish at all. We don't know that, but how would I hear it as a human?

MR. LUBBOCK: A couple things. First of all, you said the animal is at 60 feet; is he in the water column or down at the bottom?

DR. SEDBERRY: Sitting on the bottom.

MR. LUBBOCK: Okay, we're assuming somewhere on the Continental Shelf, so you are probably in shallow water for the entire way. The first thing to recognize is that the ocean isn't a quiet place. Snapper, shrimp, for animals, whale calls, the waves breaking on the waves, ship traffic; all those things add noise and the shipping traffic and some waves and the shrimp are all right in the frequency bands that we're talking about.

Below 2,000 hertz, typically in the hundreds of hertz, 0 to 500 hertz; that is where a lot of that energy is added; so it is not a perfectly quiet place. Other things that are adding in there that you are probably not even thinking about that can localized and be issues are lightning strikes, earthquakes and that kind of thing.

Lightning strikes are actually louder than air guns. They are typically on the order of 260 to 285; it depends on the strike and a lot of conditions, but those are kind of broadband signals that are pretty loud. They are some of the loudest things that are out there. Typically if it is a thunderstorm, you don't get one, you get multiple in the area.

These kinds of noises are not unknown to the animals. In the environment they're in, they occasionally get these things. You have some ambient noise that you have to rise above before they can even detect the noise. As an air gun array survey started, say, 20 miles away in shallow water, the signal is going to be probably down in the ambient noise or pretty close to it.

You may be able to – if you had a sensor, if you had an array out there and were listening, right, which gives you all the processing power and a hydrophone array, a streamer or a listening array; that gets a lot of gain. You can add all those hydrophones together to get some and to knock down the background noise and look in one direction at a time.

They have some advantages and they would be able to detect the signal. You would probably at some level know it is there, but you can hear this or quieter, but you can hear it above the background noise of the room, but it is not bothering you yet. It is off in the far distance, it is not changing bearing very fast. You probably have an idea that it is far away.

As it got closer, and I would say probably for the first 20 to down to 10 or 5 miles, it probably wouldn't get much louder than that. It would stay similar to that. It would slowly grow – in shallow water it would slowly grow in level. Then as it got closer and closer, then it is really that last five miles or less where you would start to pick up a lot more energy. That is where you would eventually get to the point where whatever its closest point of approach, not only horizontally but in vertical, the slant range, will determine how loud it got for you.

You would hear it coming and you would get to whatever that CPA, the closest point of approach is, and then it would die down again as it moved away. That is assuming you didn't move or try to move away from it. In acoustics and sonar systems, you talk about constant bearing decreasing range.

That is the simplest thing; so if it is on the same bearing and it is getting louder, that means it is coming right at you; or even if you're moving and it stays in that same bearing, that means you are closing on it, and you are keeping the same relative positions. Animals probably do and recognize that. I don't know about fish, but certainly the marine mammals do.

They would avoid – they would change direction or move away to get away from that constant bearing decreasing range issue and open the range some. It would get to whatever the maximum range is that you would get for depth of water and horizontal slant range from it.

DR. SEDBERRY: At 60 feet, how loud would that be when it was right overhead?

MR. LUBBOCK: Sixty feet; that is about 20 meters. Let's say it is down to 210. That would be about 190, roughly if it went right over the top of you and you were 60 meters down.

DR. SEDBERRY: That is about like a jet engine.

MR. LUBBOCK: No.

MS. LUENDANSKI: It is not a good analogy.

MR. LUBBOCK: It is not a good analogy to bring in jet engines, because jet engine is an omni-directional noise that is on continuously and all the things we talked about.

DR. SEDBERRY: There has got to be something, though, because this is what people are comparing – this is what people are telling me; that is going to be like jet engines. I say the same thing; I said, well, what does that sound like underwater, I don't know? I am trying to get something I can tell them.

MR. LUBBOCK: I would say just thinking about it; think about it from the commonsense point of view. A jet engine, think about the amount of fuel, the amount of energy that is producing to make that omni-directional noise continuously. An air gun; even the largest air gun arrays are about 8,000 cubic inches. Eight thousand cubic inches that is 2,000 pound air.

That volume is about 20 inches by 20 inches by 20 inches. Think of two scuba tanks and the air in that being released instantaneously and compare that to the amount of energy that is coming out of a jet engine in any given second. That gives you an idea that it is much less energy. Even if it is a perfect conversion of whatever energy you have stored in those two things into the environment, which neither of them are, then it is not comparable.

MS. LUENDANSKI: I would just add we've heard that. The jet engine comparison actually originated in the early nineties with an ATOC experiment.

MR. LUBBOCK: And it is really sad.

MS. LUENDANSKI: A completely different sound source. It grew in the number of jet engines over time. It got applied to every kind of sounds. It is out there because people are trying to – just like you are trying to do. You are trying to imagine what it means to you; but we're different than the fish, and so we are just trying to think of what it could mean to the fish. But, yes, sonic cannon have been used; that is also correct. It is hard. It is a technical issue so it is hard for people to be able to describe it in the way that they need to.

MR. LUBBOCK: The other thing that is typically part of the reason why it is inaccurate is that when you think of the air gun going off that loud; that really short hundredth of a second; the peak of that is probably only about a thousandth of a second wide, and the rise and die time off of that initial signal makes it out to about a hundredth of a second.

When we're talking pressure, we're talking about that peak pressure that is only there for a hundredth of a second as opposed to the jet engine even if we isolate it for a second. It is a very different thing. The units that I talked about earlier, that 62.5 dB is the first correction. Then you have to worry about frequency corrections, because they don't cover the same; and coupling and beam patterns for both systems and those kinds of things.

MR. GEER: We're going to have to wrap this up soon. I'm going to take one more question and that is from Mark.

MR. BROWN: I've just got one question. When you're doing the pings with these air guns; is it available to make the pings closer together and increase the volume of intensity to be able to overcome some of the environmental conditions or possibly the depth or anything? In other words, would it be available to ping it faster and to make it louder?

MR. LUBBOCK: You can certainly make it louder. One of the ways they can do that by about 3 or 4 dB is by adding a higher pressure, going up to 3,000 pounds instead of the standard 2. That doesn't buy you a lot. When you start talking about air guns, what typically drives that how often it goes off is the time it takes to recharge the air guns.

They release their air and they reset mechanically. They put the plungers back into position so that you can build up the pressure in the cylinder again. Then it takes time to recharge that. Even though they have compressors and things that are doing that constantly, there is some finite amount of time. To be able to do it faster, they would have to change – I think there is some physical limitation to how fast you can recharge and be able to shoot again.

MR. BROWN: The only reason I asked that; I didn't know if it would change like with depth of water or something or if you were closer or in real deep water and what the impacts of that would be if it had a definite increase or decrease.

MR. LUBBOCK: I think those configurations are pretty standard the way they do them now for all depths of water. They change somewhat. Think about in shallow water; they probably reduce the number of air guns that are going off in shallow water because of so much reverberation coming from the nearness of the bottom.

That is kind of like the equivalent of turning off your high beams in the fog, too much is coming back and it is blinding your eyes, as opposed in this case it is blinding the listening sensors, the

towed array that is listening. Generally they turn it down some by having less air guns shoot at the same time. They turn off some of the air guns in the array itself in shallow water. But generally he rate that they do it, it is pretty fixed by the physics of the mechanics that make the air gun run.

MS. LUENDANSKI: One thing to add to that; what they are really trying to do is maximize the vertical direction of the noise, what they are producing. They don't really need any of the horizontal, so they are trying to configure this in a way and add an intensity of the air guns and the way the air guns are configured to have as much sort of downward direction of the sound as possible.

There are a number of companies – there is a joint industry program within the larger oil companies that are trying to look at quieter technologies, other things that could be used that would not be as loud as air guns. Things are progressing in that manner, but we also have to look at what would be used as an alternative.

It may solve a problem for one species group, but could it create a problem for another? For like fish, our continuous noise, is that a greater issue or is it impulsive noise that is a greater issue? Does it depend on the type of sound it is? For example, I know the Norwegian studies that have been done that have shown a reduction in catch rate – one of the things from seismic survey from air guns, one of the things that wasn't in that survey that we would like to see happen is having the exposure run with air guns on and with air guns off and try to determine is it a type of vessel noise?

Quieter vessels could actually also help, and that is another area that we're also trying to look in. We did a quieting technologies workshop about two years ago, and we also have that report on our website. But we're mindful as things change and there is a push to get quieter, that it is something that is workable not just for marine mammals but also for fish and other species as we learn more about them.

MR. LUBBOCK: I was going to say one other thing. The seismic industry, the air gun people in particular are doing what they can to try and change and improve patterns and things. One of the things they had done with air guns – a report just came out this last fall and was presented by the Bolt Company, which makes a lot of the air guns.

The typical hole that releases the air out of the cylinder is typically a circle; and what they've done is they've changed that. They have modified that shape so that it almost looks kind of like a spade, round on the bottom or teardrop so that at first when the piston is released; that small crack, a small amount of the air is released earlier.

And what that does is that steep rise, that peak, it gives it a little bit of a slope and it cuts down the actual upper level of the peak pressure. What that does is not only changes the maximum pressure coming out of the air guns, not by a lot but a little, but what it does is it directs the energy into more of the low frequency part of the spectrum. They are looking at ways to try and change and modify that signal. They are having some success. It is not huge but there is some. What that does is produce less of those other higher frequencies.

MR. GEER: I promised you I would have you out of here by 2:30, and you don't want to be late to your own parade. We greatly appreciate you all coming, Stan and Jill and Mark and all of you. I am sure you will be available if we have any questions.

MR. LUBBOCK: You have our business cards? If you have any questions, call us any time.

MR. GEER: We have business cards. Go look at their website; there is a lot of information there. We appreciate you coming out. I know you have a very busy day and it is only half over. Now we are going to get back to our business. Roger is going to lead us in a discussion on our policy statement on energy, an overview.

MR. PUGLIESE: Pat will be back in a second, but I think I can go ahead and at least just set the stage for what we're going to do. Today what we wanted to do was transition from the discussion and the presentations that we've been provided from BOEM, both renewable energy and OCS, and begin to put it into the context of a standing energy policy.

The policy that we have now is protection and restoration of essential fish habitat from energy exploration, development, transportation, and hydropower licensing. A lot of work went into the original policy, building a lot on the council's interactions and activities that had occurred in the past with the efforts.

If I go all the way back, one of the first discussions was originally looking at drilling in the Florida Keys at one time and consistency determination or indetermination that the state did and the council kind of weighed in on those early discussions. That proceeded to some of the efforts off of North Carolina, both Mobil and Exxon in the area of The Point.

Some individuals here were directly involved in some of the research and identifying the unique habitats that were involved in that. Those were some early deliberations on energy that are still embedded in some of the discussion within the existing policy statement. What I wanted to do is walk through what we have and then have the opportunity with our partners with NOAA Fisheries and in general begin to discuss the areas that are going to be addressed in terms of revisions, updates.

A lot of it is again tied to probably where when we stopped in this, we were just at the beginnings of some of the discussions on alternative energy or renewable energy. LNGs had come up, so we do actually have a significant amount of that identified within here. Now, some of that consideration may be different because of the way that whole system is shifting to an export component versus what we were looking at as importing at that stage.

What I wanted to do is walk through what we have within this front core; and it is a good exercise because it does highlight how in depth the council did look and how a number of you were involved in these early developments and built what was a fairly significant statement to begin with. With that, the context really is to address protection of essential fish habitat in areas of particular concern.

It was made clear that it was intended to look at everything from the beginning to the end; so from the exploration, development, and transportation in these. Then we added in – I think a

hydropower licensing component is one of the adjustments in this interim from when we first started trying to talk about revision to where we are today.

It draws on what was the original habitat plan, many of the policies in there; in the Comprehensive Essential Fish Habitat Amendment, highlighting that; but then it really picked up on the Fishery Ecosystem Plan, which essentially supersedes the habitat plan; update refinement of all that information within that; then the follow-ups on the Comprehensive Ecosystem Amendments 1 and 2, where we had additional refinements of EFH and EFH-HAPCs.

Probably the most significant is the designation of the marine protected areas and the deepwater coral habitat areas of particular concern also as EFH-HAPCs, as essentially a double component, identifying specifically on the Deepwater Coral HAPCs, the council's intent to manage those as an ecosystem and habitats – the entire component of habitats, pelagic and benthic, as a significant part of that system.

The first section is looking at EFH risks from energy, exploration, development and transportation, hydropower. In this case it was looking at – the council, right in the first opening statement -- that oil and gas drilling for exploration, development or closely associated with EFH, including but not limited to coral reef live hard-bottom habitat – and this was when we transitioned to the council's separation from the Gulf of Mexico on a habitat-based coral and bottom habitat plan – or other special biological resources, essentially commercial and recreational fisheries be prohibited.

That was right in the front end of our discussions. All facilities associated with the oil and gas exploration development design to avoid impacts on coastal ecosystems and sand-sharing systems; so not only were we looking at the offshore systems, we were looking at the nearshore and inshore connected and the expansion and growth within the inshore areas.

We looked at everything from spill containment and cleanup and identifying what some of the recommendations on that would be as well as looking at the issue of bonding to make sure that anything that would occur would be able to be addressed in the subsequent actions. Also, that the exploration and development scheduled to avoid migratory patterns, breeding, nesting of endangered and threatened species; very specifically addressing the right whale issue right off the bat in this.

Again, that comprehensive look at not only the council-managed species but the system as a whole. Identifying that for the EIS lease sales; they addressed activities related to natural gas so that if there are any issues on sour gas or hydrogen sulfide; that you would look at what some of those potential issues would be in relationship to transport of those hydrocarbons on the nearshore or inshore habitats, and that also result from the cross-shelf transport from the Gulf Stream and eddies that form and could carry these types of products inshore.

The plan also was that you would look at contingency plans to address any oceanographic conditions or bottom topography and having the need for and availability of the onshore support facilities in any of the coastal areas and analyze what those existing facilities and community services and if you had relative to the coastal development areas.

In addition, it was looking at if the LNG EIS is prepared for the liquid natural gas or pipeline, which was something at that time was just starting to be looked at in our region. Any of those projects or any other energy-related projects fully described the direct and cumulative impacts to EFH. I think that was a key point is to try to look at the broader scope, including deepwater coral communities.

In addition, any impact evaluations should include quantitative analysis for each habitat based on recent scientific studies relative or pertinent to those habitats and using the best available information. Construction and operation of open-loop flow-through LNG would essentially be prohibited. It was clearly identified in our discussions earlier on that that was going to be the biggest potential impact from any of that activity; so right up front that was identified.

Hydropower licensing; the issue through FERC includes specific terms and conditions to ensure the amount of timing of river flows, natural conditions to the extent possible for protection of migratory diadromous species spawning habitats. In addition, best available technologies allow for safe, timely, and effective upstream/downstream fish passage and be integrated in project design.

This was very clearly tied into the last iteration of the FEP that essentially identified the need to have minimum flow regimes identified for hopefully most of the major river systems in our region. It picks up and adds directly to that. Also, when you are looking at any of the projects that require the EFH consultation; that a full range of alternatives be identified and assessments relative to the impacts on each type of EFH, as well as EFH/HAPC and state-designated critical habitat areas.

At this time we were really picking up on mostly North Carolina; but again the intent in those EFH designations, as other states had inshore key habitats, that those be addressed in any of these types of evaluations also. Another area is that the energy development activities had a potential to cause impacts across shelf and nearshore estuarine river systems.

It is really covering here essentially the major components from nearshore to off the systems, water benthic habitats near the actual sites and looking at the potential for sediment moving associated with those areas and any disturbance of the drilling activities and site development; water and benthic habitats near LNG processing facilities or other energy transportation, hard bottoms, reef and live bottom, and shallow and deep-water coastal wetlands, river systems and associated wetlands.

It was really covering the entire suite of habitats within our region. Certain offshore/nearshore river habitats are also identified as important to long-term viability of our managed species. It did specifically identify coral, coral reef live hard bottom, marine estuarine waters, estuarine wetlands, mangroves, marshes, submerged aquatic vegetation, waters supporting diadromous species in spawning, and the hydrologic and ecologic components of water within our system.

Siting and design of the onshore receiving, holding and transfer facilities having impact on wetlands and endangered species habitats, if they are not located properly. Sections of the South Atlantic potentially affected by the project individually and collectively identified as EFH or HAPCs by the council.

Potentially affected species, under Section 3 we have – and this is one of the areas that does need to be tweaked and updated is essentially the list of all essential fish habitat designations or species that have designations in our region that may be affected; not only South Atlantic Council managed species, but ones that are managed by the Mid-Atlantic Council HMS.

Some adjustments have been made such as red drum being removed from the plan, plus new designations with tilefish and some other adjustments that were made for dolphin and wahoo, et cetera; so those types of refinements of the designations, and we do have to look at the other partners and see if they adjusted anything for bluefish and some of the other ones that are in our region – they have designations but are not on under council EFH.

It also applies to – the next one is really HAPC designations also. The next area addresses looking at some of the areas outside of our region or outside of our council specifically in state-designated areas such as critical habitat areas. At that time it was probably the only one that had been designated and the ones that are identified in their coastal habitat protection plans.

One of the areas that was highlighted and actually has been fairly successful in terms of translating this in other policy statements is this highlighted a comment letter that was made relative to 500 species of fish and invertebrates using nearshore live hard bottoms off of Florida and the implications that had and how important those species are to the system. That got into the deliberations.

What it does allude to is the importance of those nearshore bottoms also for other council reef species in the other region. I think there has been enough work to justify that value also beyond just Florida. The last gets to the councils looking at deepwater coral habitat areas of particular concern and both pelagic and benthic species associated with these areas and potential impacts that may be associated with those areas.

That moves us to the second part of the policy statement that addresses threats. It identifies threats relative to the suite of different areas that we talked about, the coral area. This involved either direct mortality and displacement organisms near the drilling, dredging or trenching areas, deposition of fine sediments or sedimentations and drilling muds down-current from the drilling or dredging areas.

Chronic elevated turbidity in and near again the drilling, dredging, trenching or backfill sites; direct mortality of larvae, post-larvae, juveniles and adults in the marine system and estuarine organisms occurring from water intake, spills from pipelines, vessels in transit, near or close to the inlets.

Alteration of long-term shoreline migration patterns, burial of sensitive coral resources and associated habitats from frack-outs associated with horizontal directional drilling and permanent conversion of soft-bottom habitat to artificial hard-bottom habitat through installation of hard line or structures, pipe covered in articulated concrete mats, some of the things that had been identified.

The assumption that mud habitats or soft habitats are not a significant component is kind of being addressed in that specific. Impacts to any of the benthic resources from placements or shifting of pipelines, cables or other direct mechanical damage; alterations in the amount and

timing of river flow and significant blockage or reduction in areas in critical spawning habitats resulting from damming or diverting rivers; alteration of community diversity, composition, food webs and energy flow due to the structures.

Finally, in addition to the interaction between the cumulative and direct lethal and sublethal effects among all of the areas that are previously listed affect the magnitude and overall impacts. These interactions may result in a scale of effects. This is identified as multiplicative instead of just additive.

It may actually magnify if you have all these types of impacts happening within one system. That brings us to actually the policies that were identified in the first round. These policies that were presented include that projects should avoid, minimize, and where possible offset damage to EFH and HAPCs. It should be accomplished in part by integrating the best available and least impact of technology into construction design.

Agencies with oversight authority should require expanded EFH consultation for projects with potential to significantly damage EFH. Projects requiring the expanded EFH consultation should have detailed analysis and full range of alternatives of possible impacts of each type of EFH and EFH-HAPCs and any critical habitat area, including short- and long-term impacts, as well as cumulative impacts.

The analysis should include utilize resource protection assumptions and best available science. Projects should utilize the alternatives that minimize total impacts to EFH, EFH-HAPCs, and critical habitat areas. Projects should include detailed assessments of potentially unavoidable damage to EFH or other marine resources with the preferred or selected alternative and cumulative impacts using conservative assumptions and best available science.

I remember having a lot of discussion on this point specifically that compensatory mitigation should not be considered until avoidance and minimization measures had been duly demonstrated; so that idea of really playing out the entire conservation side of it before you really get into a compensatory mitigation scenario needs to be investigated.

In this case compensatory mitigation should be required to offset losses, including losses associated with temporary impacts, and they should take into account uncertainty and risk of the chosen mitigation measures inadequately offsetting the impacts. Mitigations need to be local, up front, and in kind.

Projects should also include pre-project, project-related and post-project monitoring adequate to document the pre-project conditions, the initial and the long-term accumulative impacts of the project on EFH. All EFH assessments should be based on the best available science, be conservative, follow precautionary principles and developed for various federal and state policies.

All EFH assessments should document the cumulative impacts associated with all natural and anthropogenic stressors on EFH, including other energy exploration, development, transportation, relicensing projects that are geographically and ecologically related. Projects should comply with the existing standards and requirements regulating domestic and international transportation of energy projects, including regulated waste disposal, emissions

which are intended to minimize negative impacts and preserve the quality of the marine environment.

Open LNG processing facilities should be avoided in favor of closed-loop systems. Water intakes associated with the closed loop should be minimized, and the effects on fishery resources should be determined through baseline studies and project monitoring. Some of these actually were incorporated the last time NOAA Fisheries was actually in deliberations and negotiations with the development of some of those LNG facilities; and actually it was fairly effective to get these specific types of recommendations moving forward even though the whole system kind of folded at the end.

But they were very successful and actually getting some of these types of recommendations integrated right up front. The original licensing or relicensing of hydropower projects should provide adequate or ecologically based instream flows and safe, timely, and effective upstream and downstream fish passage. Third party environmental inspectors should be required on all projects to provide for an independent monitoring and permit compliance.

Resource sensitivity training modules should be developed specific to each project. Construction procedures, habitat types found within the project area, and training should be provided to all contractors and subcontractors that are anticipated to work in adjacent areas that support sensitive habitats. Those were the main policy recommendations.

The statement itself goes on to actually get into the specifics of what some of the recommendations are for in advance of actually approval of a license, application, or permit. I may touch on a couple, but I have already overwhelmed everybody. The main thing was to show how much that this policy already has advanced the recommendations of the council and has kind of moved things forward on what protection of essential fish habitat are.

Up to this point are there any thoughts or comments before I just at least touch on this? I'm not sure how far – we're trying to at least start the process. One thing I will identify is that we're working again closely with our partners, and Jocelyn Karazsia under Pace's group is going to be helping spearhead the next generation of this.

I think we've also tapped our chairs about getting some participation from the individual subpanels on the first iteration that we will be working on in advance of the November AP meeting to finalize this document.

MS. LAWRENCE: I was just going to say that our office had commented on this policy last April. If you want, I can resend you those comments. I'm not sure; it sounds like they haven't been incorporated yet. It is from myself and then also our renewable energy biologist, Tamara Johnson. I'll send this to you again so you have them.

MR. PUGLIESE: I thought some of the preliminary comments were included, a number of iterations.

MS. LAWRENCE: I was unable to access this attachment, so if you have been able to – I don't know if you've updated it some since last year. Those comments may have already been incorporated.

MR. PUGLIESE: You actually haven't seen the latest attachment. Hopefully they have because I think that is what we were doing that progression as we moved along to get to this last stage. If not, we have enough time and we'll definitely get those integrated into it.

MR. GEIGER: Roger, I think it sounds like this is really good, but just a few observations. It has been my experience that there is a lot of synergy right now between all the agencies and fish passage, fish passage engineering prescriptions and so on. I am seeing a lot of emphasis on that. The northeast at least in the Fish and Wildlife Service has a whole bioengineering fish passage group of engineers associated with the Fish and Wildlife Service.

In my work in Maine, I've noticed there is sort of a difference in philosophy between some NOAA Fisheries West Coast prescriptions versus Fish and Wildlife Service East Coast prescriptions. The group may want to be aware of that because there is a lot of synergy going on between the professionals in the fish passage universe right now.

I think it is going to get nothing but better. There are several symposiums that were held at UMass Amherst the last couple of years. I see that growing expedientially, so you may want to just keep that on your radar screen. I see that is a big push with a variety of the federal agencies right now. It is well received by Congress when you see the results of these things being implemented on the ground.

MR. PUGLIESE: Yes, and to that specifically, I think the other aspect of this is the fact that we're working closely with again some of our broader partners, working with SARP and Landscape Conservation Cooperative. Some of their targeted efforts were building an entire system that looks at any blockages for fish passage; and the entire system on that, looking at species utilization in those areas, looking at species vulnerability, the flow regime changes, and setting the stage for where there may be priority areas to look at passage modification.

Fish and Wildlife is very much connected directly into keeping a lot of that moving. I think that is definitely timely, and we're only going to see better and more refined information that we can pick up and add to and refine the recommendations for this policy, I would assume.

MR. GEER: Any other questions or comments for Roger at this point? Hearing none; moving forward.

MR. PUGLIESE: Okay, I'll just walk through these couple components relative to some of the recommendations on permitting. The following requirements apply to any permit to drill any exploratory well or wells in a lease sale with the potential to affect EFH in the council's jurisdiction;, and the concerns and issues should be included in a new EIS in any future OCS leasing plan.

The timeliness of these types of recommendations and refinement is going to be important to go from where this initial five-year discussion is and how hit proceeds into the future. Recommendations to be addressed prior to approval of any license are identification of on-site fishery resources, including both pelagic and benthic communities that inhabit, spawn or migrate through the lease sites with a special focus on these specific lease blocks where industry has expressed specific interest in pre-lease phases in the leasing process.

Particular attention should be given to critical life history stages such as egg and larvae. In our area, those are some of the least information we have in our region is really understanding some of the information on larval stages and distribution within the area and these areas being components of life history being the most sensitive to spills and seismic exploration; very timely for the discussion we had today.

Identification of on-site and potentially affected state or federally listed species; endangered, threatened, special concern, marine mammals, pelagic birds, diadromous fish, and all species regulated under federal fishery management plans; and this is becoming even more relevant with the array of species that have been added to this list both inshore and offshore across the board.

It just has become a lot broader list than this entire group. Determination of the impacts of all exploratory and development activities on fishery resources – this is your old connection, MMS; prior to BOEM. A lot of the original references are back to the original Marine Minerals Service. Approval of any applications for permits in the exploratory unit, including the effects of seismic surveys, signals on fish behavior, eggs and larvae.

Identification of commercial and recreational fishing activities in the vicinity of lease or exploratory unit area and the season of occurrence and intensity, temporal or permanent; the potential to continue those activities associated with any project or activity. Determination on a physical or chemical oceanographic and meteorological characteristic; this is really looking at the entire scope; just not the baselines but the entire physical nature of the specific area; so not just a benthic survey but oceanographic characterization.

That would get to understanding sea states, temperature, salinity, water quality, wind storm frequencies, and other things such as even icing conditions. The studies must be required prior to approval of any exploration plans submitted in order to have adequate information to make decisions.

Description of required monitoring activities to be used to evaluate environmental conditions and assess the impacts of exploration activities in the lease area. Identification of the quantity, composition, and method of disposal of solid, liquid, and pollutants likely to be generated by any offshore or onshore and transportation operations associated with oil and gas exploration.

Development of an oil spill contingency plan, which includes oil spill trajectory analyses; that is pretty significant when we talk about how many managed areas we have offshore and the multiple fishery areas that are potentially impacted. Dispersant use, summary of toxicity data, identification of response equipment, strategies, establishment procedures for early detection and timely notification of oil spill and chain of command and notification procedures at local, state, and federal agencies and agency personnel notification once the spill is discovered.

Mapping of environmental sensitive areas, including spawning aggregation of snappers and groupers, very timely again for some of this discussion; coral resources and its significant benthic habitats, unique habitats like tilefish. That was one thing I actually did raise with our BOEM representative.

We were so focused on discussion on a lot of the hard structure; I identified some very unique habitats such as the tilefish, golden tile bottoms and the very tight nature of that habitat area.

Any of the areas along the Continental Shelf Upper Slope, any of the calico scallop, royal red, and other productive benthic habitats in fishery grounds and even getting into the northern right whale calving grounds, migratory routes, and very specifically subsequent deletion from inclusion in respective lease blocks.

Planning for oil and gas product transport should be done to determine methods of transport, pipeline corridors and onshore facilities. The applicant, MMS or BOEM in this case, must provide analysis of biological community dynamics, pathways, flows of energy, and to ascertain accumulation of toxins or impacts in the biological communities.

Due to the critical nature of canyons and steep relief to important fisheries such as billfish, swordfish, and tuna; evaluation of shelf edge down-slope dynamics and a resource assessment to determine transport and fate of contaminants should be required. Discussion of potential adverse impacts upon fishery resources, discharge of all drill cuttings, drill muds that may be approved for use in lease areas, as well as discharge associated with productive areas.

This should include physical and chemical affects on pelagic and benthic species, communities, spawning behavior, effects on eggs, larval stages, effects on site-feeding species of fish, analysis of methods and assumptions underlying the model to predict dispersion of these muds, discharged muds and cuttings.

Discussion of secondary impacts affecting fishery resources associated with any onshore oil and gas related developments such as storage, processing facilities, dredging, dredge material disposal, roads, rails, fuel, electrical transmission line routes, waste disposal and others. That was as far as I was going to get with our material.

It goes into further discussions on some of the preliminary information on alternative energies and recommendations, and a lot of that really does need pretty significant updates beyond here. I wanted to at least get the core of what really is a pretty solid amount of recommendations, connections to our managed species, essential fish habitats and area of particular concerns that a lot of work went into before.

I think we only have a good way up from here to refine and integrate. As I mentioned, the most significant is some of the renewable energy information that we really didn't have, and very specifically we allude to some key things on sound and fish, but I think that is obviously something that we can add a very significant amount into this policy statement. But with that are there any specific questions before I can tap Pace?

MR. GEER: I was just going to ask about revisions. We would have to take this in front of the council again for approval; is there a timeline on that?

MR. PUGLIESE: The intent is to continue and finalize the revision in advance of the November AP meeting, get it wrapped up at the AP. I think that is going to be another significant component of that meeting is actually take it a step beyond what we have now, refine those components between now and that point, approve it by the advisory panel in November so that the council will look at consideration at the December council meeting. They would be looking at both the energy policy and the artificial reef policy. That is kind of the same timeline. We're

looking at that also to develop and refine it in the November. We've got a couple key things to really kind of wrap up and take advantage at the November meeting.

MR. GEER: Any other questions?

DR. LANEY: Not a question but a comment. I looked over it from the perspective of the lengthy discussion we had about the seismic impacts and sound, and so obviously we need to beef up that part of it, especially since I don't think we have that new reference in there about larval settlement and sound as an attractant. I assume we'll just add all that stuff into it between now and November, for sure. I will be happy to volunteer to help work on that part of it.

MR. GEER: It seems like some of the actions we were just talking about earlier, Wilson, are going to be incorporated in this policy statement, it appears.

MR. WILBER: Can we talk for a minute, the path forward from where we are now to where you want to be in November; what is your thought?

MR. PUGLIESE: What I envision the next stage is making sure that if we didn't get some of those last tweaks like Alice said, I am pretty sure we did; but if not, we'll get some of those in advance of getting that copy to Jocelyn, ask the individual state subpanel chairs to identify at least a key contact for each one to be able to be part of this team – I would assume Wilson is going to – so that we get a first iteration of a revision developed.

We'll hopefully talk within that group about how to proceed from there, because what we may do is get even a preliminary iteration out to maybe the whole group to get some kind of bigger picture, these are missing or this type of thing, and then look at getting a document finalized or at least at a more complete stage within a couple months in advance of the November meeting. Then we can bring it to November in a more complete form. That is a general perspective on where we go.

MR. WILBER: Roger and I have had this discussion at the 60,000 foot level and now we're going to in front of you all have it at the 30,000 foot level, so we're getting a little more zeroed in. Jocelyn has been identified to sort of lead the development of the next iteration. You've collected, others have been asked now to provide you with written input, references, ideas and so on that will eventually get to Jocelyn.

We also have some volunteers to be on a team that she will then organize to come up with the next iteration with the idea that it be done at least two months before the November meeting. Okay, so we have successfully negotiated a 30,000 foot discussion.

DR. WHITTLE: Since I don't and I never have worked on any of this permitting, probably a question for you, Pace; are any of these things successfully in the permits now?

MR. WILBER: There is a lot in this policy statement, so that would be one question to put to the group; is this policy statement too big to be a policy statement or is it something that needs to be broken up into several? Many of these recommendations are now sort of routinely part of permits or many of these recommendations are really no longer relevant because the issue has moved off in another direction.

Roger alluded to it already that we don't see open-loop LNG facilities any more. We don't even really see LNG facilities anymore, because the economy is all kind of moved in a completely different direction. But there are some sort of interesting things that the LNG discussion led us to that we haven't really addressed here at all; one of which is a typical ship that is in an estuary running its cooling system is going to be consuming 20 to 30 million gallons of water a day.

If you've got five or six of those ships in the same harbor, well, now you are at 300 million gallons of water a day; and that is the kind of number that used to make everyone go berserk when it was talked about for an LNG facility. Are we sort of learning now how to put these impacts in context and is it leading us to other things that maybe we should be talking about?

Another example for the LNG, the Brunswick Steam Electric Plant in Southport, North Carolina, consumes 1.25 billion gallons of water a day to cool its facility; and its pipeline is sucking right out of the estuary. It is not out 20 miles from shore out in the ocean. There is a lot of stuff that I think we've kind of learned that we can maybe sort of use to either delete or bring a substantially different focus to the current policy statement.

DR. WHITTLE: But there is a lot of biological data that when we were asking all these questions, they just said they didn't know. Then a lot of them, they said it was site-specific. Asking about how the larvae are affected by the sound in this specific lease block or identification of on-site fishery resources; is that something we can really ask for that we could actually get?

MR. WILBER: Yes; we could build that into the recommendations that we make to BOEM for some sort of monitoring plan that would be attached to whatever facility is that they're leasing. How well we make the case in the policy statement will affect how well we communicate the recommendation to BOEM and how well it will be received at BOEM.

We can't ask for stuff just because we think it is an interesting question and we have an opportunity to ask for it. We have to demonstrate there is a real need for that information. This kind of gets back to how big this policy statement is and still having a relatively aggressive schedule for finishing it up is that these brand new items that people might want to see added to it, we're going to need a lot of help in getting the policy statement ready to include those in a meaningful way on this schedule.

MR. PUGLIESE: Just two aspects, one getting specific to the comment you made. I think one of the things that was really positive – and I kind of alluded to it – despite LNG kind of folding even though we went forward is that there was a pretty significant collaboration to get characterization mapping and very specifically getting the right people to do work on characterization of the habitats, mapping of the areas, as well as even probably some of the only larval survey methodology and active characterization of an area.

The opportunity to require that and provide that in the future I think is going to be – as Pace has said, the better we refine the way it is presented in there, the more likely that may be something that can happen as you move forward. I think that is important. The other aspect is what I've gone through here and then maybe some additional components of it are really the core. What you've got is this policy really in terms of the oil and gas, some of the other things, not necessarily the recommendations or the connections and everything; a lot of that is historical

information tied to those original deliberations on Exxon and other ones. There is probably a way to very efficiently condense some of that.

But we can have discussions further about the utility of keeping some of that historical type of perspective in recommendation versus literally getting in there and maybe just even taking what was the core and then adding that and leaving it, because that will eliminate probably a couple pages out of this just there, because it was trying to pick up and keep that stream, like policy recommendations over time into that. But I think there is a better way to do it than the way the end of the policy actually is presented.

DR. ROSS: It is a rather large policy, but it looks like aside from some updating that it is pretty complete. I was wondering if it is relevant to either specifically or at least in concept incorporate lessons learned from the Deepwater Horizon Spill. There may be some things in the policy that I saw as you were reading through that are related and somewhat covered, but it may be some specific cases that are coming out of that.

For instance, the inability to track where the oil went, to even accurately model where it might go was a big issue. Of course, oceanography issues are embedded in here, but we might reference that more specifically; and there may be some other lessons coming out of that as those studies go on that would relate here.

MR. GEER: Any other comments for Roger at this point?

DR. LANEY: Well, Pace brought up Brunswick Steam Electric Plant, and that brings to mind the 316B regulations, which apply more broadly I guess to intakes in general; but do we need to cross-reference that in cases where we have energy intakes? I can't remember whether we addressed that in the flow policy or not. That is something we maybe should just take a look at to see if we have fully considered what those new requirements are. I guess they are still under implementation right now by EPA. Just as a reminder to us, Alice may want to comment on that.

MS. LAWRENCE: I'm just thinking off the top of my head from the in-stream flow policy. I think we did include recommendations in there in terms of impingement and entrainment recommendations.

DR. LANEY: For Brunswick, I haven't visited it in quite a few years. I know they did make some changes to the way that intake is, first of all, screened off from the estuary at the head of the intake canal and then also the way they backwashed the screens and route organisms back to the estuary. There may be some useful things we can pick up on there in terms of mitigation features that we would like to see should any new energy intakes be proposed in any sort of estuary or riverine setting. I don't know, just a thought.

MR. GEER: Thank you Wilson. Moving on; the next item on the agenda.

MR. PUGLIESE: This is the discussion today. With us transferring the artificial reefs to November, I think the focus today was going to be energy, the policy and where we are. The opportunity to have any general discussions on what we've heard from this morning to where we are now, we could take a little bit of time as kind of a wrap-up on that.

MR. GEER: One of those action items was to put our support and maybe send a letter to BOEM for support for continued mapping in the southeast. I think, Clark, you brought that up. I don't think anybody is going to be opposed to that. We can draft a memo to them in that regard. Is there any other discussion on that, because we had talked about that a little bit yesterday and we all just went, yes, that sounds like a great idea?

DR. ALEXANDER: I just wanted to reiterate that a mapping exercise is already in their environmental studies plan. It is just that it needs to have some squeaky wheels behind it saying this is a priority, because every year they re-prioritize all the studies; and it depends on who has got people saying that theirs is more important. This would be a way to help prioritize work in the southeast.

MR. GEER: Would it be the type of thing that we would send a letter of endorsement when the RFP is open?

DR. ALEXANDER: Well, as I say, every year the program managers go before the BOEM administration and say these are the things that are most important. The program managers propose what are most important to the upper administration and the upper administration decides which ones are going to get funded is the way I understand it. We're already in their plan of study; it is just when will they get to it?

MR. GEER: Okay, so preparing a letter sooner than later, then probably. There is no date on that; we should just get it done.

DR. ALEXANDER: Right, we should do it as soon as possible, because it has been pushed back for two years now for basically more work in Alaska.

DR. ROSS: I would like to second what Clark said; but that is a specific example related to shelf-depth mapping and that does need to be done and it has been on the table for a while. I think at the same time or perhaps separately we should encourage MMS and NOAA to continue multibeam mapping or to encourage any of these other outside agencies or entities that are going to do multibeam mapping at their cost and make sure those data are available to us. That is one of the most important missing pieces of information I think that we could get relatively easy.

MR. GEER: That was on my list, too.

DR. HALPIN: Roger, I just wanted to point out maybe you want to talk a little bit about the bottom habitat mapping group, which has very similar interests and which there is a good synergy here with that.

MR. PUGLIESE: Yes; and I think that is what I was going to just touch on is that in conjunction with the last council meeting we had a SEAMAP bottom mapping and species characterization workgroup. One of the tasks was to look at how we've been trying to compile existing information for the entire region on mapping and characterization to set the stage for a mapping strategy so that we can understand a prioritized level of what needs to be done in kind of the front end, complete mapping within managed areas, map priority habitats between these different areas and really kind of setting the stage for the connection between the mapping needs, habitats and the managed species.

That definitely fits directly; and I was talking to some of the BOEM partners and especially their fish expert about getting directly involved in some of those discussions. There seems to be a willingness to raise that at a priority level within BOEM, so that they can also contribute to that. I think that was an excellent opportunity to really reengage and look at everything in context and take advantage of vessels of opportunity.

We were really looking outside the box of how far we can go. If there is an opportunity to get some technology on a vessel that may be able to do that, relook at any NOAA vessels that may be doing ongoing activity, any other partner efforts. One of the more recent collaborations was our opportunity with Oceanus Explorer; and that came from just outright deliberations on other side of the discussions about we really need to do this.

One of the largest mapping efforts in the Deep Coral HAPC Stetson-Miami came from a transit mapping effort in that area north of the existing golden crab area is that very large area they just recently mapped that is presented came from that collaboration. I think we are positioned very well to continue to bring to the table any other activities and other partners that will constitute what is known and then where we go from this as part of this mapping strategy effort.

Clark is directly involved and Pat, so I think we've got a lot of players to make sure that this happens; and now with BOEM potentially being able to contribute some of these newer things, both from the renewable energy and also anything that may come from OCS side.

MR. GEER: This is the third time I've seen some of the presentations on the G&G activities, and it is the third time that folks have come up and said, "Boy, it would be really nice if we could have that bathymetry data. We don't give a hoot what is going on underneath the surface; we want to know what is happening right on the surface."

It is an opportunity to get that information for a lot of agencies. I've heard that all the way from the top levels of NOAA down and how that would be useful information. I think with our partners at BOEM, and I think you had mentioned a couple of other agencies getting together and just expressing our interest in that information.

I guess some of it; proprietary is what they're saying it might be, but that is not what their purpose out there is, really. Their purpose is looking beneath the surface for the most part for the G&G. I don't see harm in us getting that information, I hope. I might be naïve, but I'm optimistic.

MR. GEIGER: Yes, just a process question. Again, knowing how agencies work; are you going to send it directly to BOEM or do you want to send it to the Secretary of Interior, who will control correspond it down to BOEM, and cc it to Secretary of Commerce? I would think of the process, how you want to do it. I don't know how your relationships are with that. But I know if it goes to Secretary of Interior, they will control it down to BOEM, and you will get a response. If you send it to BOEM, you may not get a response.

MR. GEER: We would have to have the council send that for us.

MR. GEIGER: Just a suggestion.

MR. GEER: That is beyond our pay grade.

MR. PUGLIESE: These recommendations will come up through the council and I think what we'll do is look at what the most expedient way to ensure – and to a great degree if it is coming from the council, we are going to get a response from whoever we send on these types of issues especially. I don't think it is going to lie – and with this commitment from the group, I am hoping that is something that they really are going to stand by; and I think they are.

We've been probably collaborating longer with the renewable energy. Brian has been at the table for a long time on this. We may see more direct response with our AP itself. I think, yes, we'll definitely pursue the best way to get a response, to ensure that they understand how important this is for the council and for our advisors that are making that recommendation.

DR. ALEXANDER: I do think there are a lot of federal agencies that could come to the table. Even if this offshore bathymetry data is acquired as a proprietary data set; I am sure the USGS would want to be involved and NOAA and maybe DoD. I think there are a lot of different agencies.

MR. PUGLIESE: This is where the collaboration and partnerships that we've been building with some of these other groups, like the LCC and whatever; we have some of those direct lines to fairly high ends within USGS, within Park Service, a lot of other avenues that might really make this so we can kind of build from where we have already started to ensure that that message gets into there. I think that is where the real beauty of having some of these connections built already was going to help us.

DR. WHITTLE: Who are they doing the multibeams for right now? He said there was one permit for the multibeam, and that wasn't BOEM who is doing it, right?

MR. PUGLIESE: It would be a contractor. It would be one of the nine potential contractors that were in that footprint, all overlapped.

DR. WHITTLE: But who is paying for it?

MR. PUGLIESE: BOEM.

DR. WHITTLE: BOEM, so they are?

MR. PUGLIESE: No, no, no, they are not paying. Sorry, I wish they were paying.

DR. WHITTLE: Does anyone know who the private company is who is paying for it?

DR. ROSS: T.D.I. Brooks.

DR. WHITTLE: But they are the contractor.

DR. ALEXANDER: They are collecting it on spec. Just like all these geophysics companies; they all do it on spec and then they sell the data to the oil companies.

DR. WHITTLE: Okay, so they're doing it on spec.

MR. GEER: The other one I kind of had, but I think Roger kind of addressed it in the policy statement, was the concerns with larval fish. I think you kind of addressed it in the policy statement. I am not sure if we need to go much further. If we're putting it into a policy statement; do we need to address that anywhere further?

MR. PUGLIESE: I'm not sure we need to have some type of a statement directly to them. If we are successful in getting this in the statement, then it becomes a priority to collect this information; just refining the identification of some of these newer potential impacts on settlement, different things that we didn't elaborate before in there, and the need to get that type of information; species specific.

They were even talking about species-specific vulnerabilities for these types of things. I think there are a number of things that we can begin to pursue that ultimately if they can fund subsequent research, that is going to really provide it. But we have the opportunity to really elaborate and then have a very strong statement that almost forces the issue to be a priority for them.

MR. GEER: The other action item I had – and I think we all agreed on this – was to the council to express concerns with the transfer of species management to the states and the loss of EFH designation for these species. We talked about that yesterday. I don't mind taking the lead on trying to get that done.

I'll work on that and see what we can come up with. I think it makes sense that we move forward with something like that. We don't want to lose the information we have on EFH on some of these species. I don't know if we want to put recommendations in or what, but just so it is aware and we can move forward.

Are there any comments on that one at all? We talked about it at length yesterday. It seems like a pretty straightforward one. The only other one I had on here was – and I think I got it from everybody already. I haven't had a chance to put it together – was the prioritization list for each state for habitat threats. I'll put that together. Thanks everybody who gave it. I got the information so I will put it together and I'll send it out as an e-mail later this week. I think that covers the action items we were really talking about unless anybody had any other ones.

DR. ALEXANDER: Well, I was just sitting here wondering, as we had gone through Roger's presentation, whether there was a list of priority research questions that this group needs answered to better manage habitat and better make these kinds of determinations. There is always all kinds of people looking for research areas that will be useful and that can actually be put in place. I just wondered if there was some sort of document like that that said these are what we really need to know.

MR. PUGLIESE: I think we have it in a number of different aspects, whether it be priorities for oceanographic type of information we need to have collected, species-specific information. A lot of some of these research needs may be either connected and I'm almost sure we have an entire section. We do have a research and monitoring section for the FEP right now that was going species-specific, habitat-specific type of things.

However, I think refining that and going further with it is something that we can very specifically do at the November meeting. That was another aspect that we were going to have a research and monitoring section, because right now we're going to be working on a SEAMAP five-year plan that covers a lot of the fishery-independent survey connections.

We are going to have an entire session on research in conjunction with that November meeting. That would be something that might be one of those other types of consolidated products that can come out of that discussion for that meeting, and it will feed into the FEP, as well as being something that as these come to species, habitat or other type of specific need can be picked up and referenced fairly readily.

DR. ALEXANDER: Yes, I would agree. When you were going over the FEP yesterday, it seemed very clear that was the kind of document – every section you read was like, oh, well, someone should be looking at that. There's a gap and it seemed like that would be a good approach.

MR. GEER: I agree. Anything else right now? Are there any other actions that we were considering, any other remarks at this time? All right I will open the floor for other business then, and, Bill, you want to talk a little bit about lionfish?

MR. KELLY: Yes, I do. We had an opportunity to discuss this especially in our breakaway sessions yesterday. Lionfish, as we all know, are becoming very problematic in our coastal waters. And to give you some indication of the magnitude of the problem we're facing in the Keys; one of our highline fishermen, Gary Nichols, who is the spiny lobster fisherman and fishes by trap in deep water – by deep-water I am talking 120 to 300 feet of water – his first encounter with lionfish was in 2009 when he had 49 pounds as bycatch in his spiny lobster traps.

Without any directed fishery for them whatsoever, he has now transitioned in six years to 13,000 pounds of lionfish that have nearly doubled in size every single year since 2009. He started out with fish that were about a third of a pound piece, now frequently catching fish that are a pound and a half, up to three pounds.

It is a monumental problem. We have been creating demand for them, consumer demand, which already exceeds supply. That is the good thing, but, unfortunately, Mr. Nichols' catch history is going up instead of down. Currently our association is working on developing and finalizing a grant for a trap-testing program.

We've seen some limited efforts at that with one or two traps here and there. Possibly some of you have seen the ones with the clear plastic cylinders and so forth that have been developed in the Bahamas; and they do have some limited success in shallow water areas. But what we see in shallow waters pales in comparison to what is actually out deep, in as deep as 600 feet of water.

Based on that, we've developed this grant program, and we would like to test a series of five different containment devices or traps, if you will, including a standard Florida lobster trap, 20 of each on a hundred trap string, as they call it, that would have five trap designs, all of which are either approved by NOAA or by Fish and Wildlife Commission, Florida's Fish and Wildlife Commission or used by NOAA research, like a standard chevron trap, for example. The program would include observers, bycatch always being the issue.

But with the experience that people like Mr. Nichols has, he now knows that he can almost catch lionfish exclusively. Because of his experience, he knows where and when to fish for them. In that regard, we have Gulf and South Atlantic Fisheries Foundation based in Tampa developing and writing the grant for us.

It would include three other organizations, Southeastern Fisheries Association, the Council for Sustainable Fisheries, which is based in Murrells Inlet, South Carolina, and the Southern Offshore Fishing Association in Tampa. We would like to prioritize this, and I would like to make a motion for the committee's consideration here; and that is to lend importance to what is going on; and the motion would read as follows.

Based on current and imminent threats to marine resources posed by the ongoing intrusion of invasive lionfish and their proliferation in coastal waters, we recommend the South Atlantic Council prioritize the approval of lionfish trap-testing programs as a major step in evaluating and establishing a long-term containment strategy. I am open for questions.

MR. GEER: Any questions? One thing I would say right away; not the South Atlantic Council, the South Atlantic Council's Habitat AP. You are giving us more authority than we have. I guess, Bill, one of the questions I have is who do you think the funding source is going to be?

MR. KELLY: At this time we have three private nonprofit organizations that are interested in funding this based on the merits of the grant application. Reluctantly I prefer not to name them at this time because we don't have a commitment. Gulf and South Atlantic Fisheries Foundation has been in existence for well over 20 years. They are well known throughout the industry.

They've carried on numerous research projects for NOAA and are fully accountable. Our association as well and all of the others, as a matter of fact, have carried on research programs for NOAA and for the independent states in which they operate. Mel Bell also would be participating on behalf of South Carolina's Department of Natural Resources. We have commitments from the Florida Fish and Wildlife Commission as well.

MR. GEER: You have endorsements from both South Carolina DNR and FWC?

MR. KELLY: That is correct.

DR. WHITTLE: But not funding commitment.

MR. GEER: But not funding.

DR. WHITTLE: This is what I had asked you in our breakout was long term what is your plan of who is going to fund this containment of a completely out-of-control invasion? You said that you were hoping to get sort of state or federal funding from our invasive species pots of money that we mainly control plants with at this point.

MR. KELLY: Right; we have three nonprofits and they are national – international actually nonprofits that are interested in funding this. The next step and the potential for continuing funding would be state mitigation funds. For example, every state has a mitigation fund for invasive species.

Florida's fluctuates from year to year, 50 to 80 million dollars, somewhere in that range, where they take care of hydrilla in canals and so forth. They go after pythons, the walking catfish, and other problematic invasives. If we can prove the viability of this, then we would approach the individual states and their invasive species mitigation funds there for possible funding.

Part of the program that we would do would involve a limited tagging program, although they seem to have a rather high rate of site fidelity; but they have managed to make it all the way from Florida to Long Island and all the way around the Gulf of Mexico. There is some, obviously, spillover there.

We think that the states, considering the problem it is presenting, would be very receptive to that. We've also seen them now establishing themselves, like in the mouth of the Loxahatchee River, a semi-freshwater environment and so forth. One tagged fish remained in the same spot for 90 days in a row that he was checked each and every one of those days. Just imagine if we would have these fish get into an area like Lake Okeechobee; we would have considerable problems.

DR. WHITTLE: I will repeat for the group the two suggestions that I had. The first one was to try and get FWC and the other agencies involved right from the beginning, so that they would have buy-in before even the pilot studies started, so they would have buy-in if you really want long-term funding from that.

That money that we have for invasive species, we put hardly any towards animals, we don't put any towards marine animals, and, of course, it is never enough. It is already a very hard hit fund; so just trying to get with those invasive species people, who are probably not who run that pot of money or probably not who you are talking to now, because they are almost completely land-based.

Then the second one is just philosophically we just had a big presentation from USGS about the four different stages of invasion and lionfish are way beyond containment. They are way beyond control, they are completely out of control. FWC has had summits on it and now we have open hunting on them. You can do anything to lionfish at any depth with any gear. They are still completely out of control; and I along with USGS don't think there is any hope whatsoever for controlling them. I don't know where to go with that.

MR. GEER: If you were going to begin a fishery for them. It is kind of like an oxymoron, we're trying to control these, but then you can't develop a management plan for something that you are almost trying to eradicate. But if it is a harvestable product that is desired, would that help knock numbers down or are the numbers just going to continue to explode even though they are harvesting these things as a bycatch?

DR. WHITTLE: I have no idea; but I think a marketing campaign of trying – I mean, it has been happening in the Keys. They have cookbooks out; they sell them in the restaurants. I don't know.

DR. ROSS: We all are aware especially in the council about how commercial fisheries can knock back a population; and that is true. I think the problem with lionfish is that knocking them back in one area is not going to solve the problem. It has got to be more widespread. I think you could reduce local populations to a certain extent; but you would never be able to stop that effort,

because they are distributed now from Venezuela through the Caribbean, the Bahamas, the whole Gulf of Mexico, and up to Cape Hatteras, and the larvae go further north. They are also in deeper water in the Atlantic than they even occur in the Pacific, down to 120 meters at least. The eradication or the control has to be pretty widespread.

MR. KELLY: Elimination or eradication is not conceivable.

DR. ROSS: That is not going to happen; it is control.

MR. KELLY: But containment is very much a viable option. Bermuda and the Turks and Caicos and a few other places have seen some success in trapping these animals in deeper water. As I mentioned, the demand already exceeds the supply. Obviously, you want to fish them down, you don't have any bag limits, any size limits and so forth.

Creating that market value, which we've already done, is the impetus for fishermen to be successful at what they do. Considering that The Bahamas and some areas have seen reductions in their indigenous reef species, yellowtail snapper, grouper, mutton snapper, by as much as 65 percent; we should be compelled to take this dilemma head on here and do everything that we can to see if we have a viable option.

Dr. James Morris sounded the alarm 25 years ago, but could never peak anybody's interest to get an aggressive campaign going. If we can do this and demonstrate that these fish are trappable and containable, that is what we need to find out. But a limited testing programs where we have two or three traps here or there really isn't going to serve up sufficient data to see if the impact containment effort is a viable option.

DR. ALEXANDER: Well, the only comment I wanted to make is that I think as has been expressed here already; it is really a non-starter to try to push this sort of an agenda and this sort of an effort as an eradication or control measure and that your approach to developing a fishery that there is demand for now is really the way to go with this. I would support approaching it that way. But trying to do it as an eradication measure, I think people that are aware of the situation just don't think it is realistic.

DR. WHITTLE: Or with long-term government funding. I think if you go for the fishery, you will be more likely to be successful than trying to get long-term government funding to control the population.

DR. ALEXANDER: That is what I understood him to be saying; they wanted to just understand how to trap these things most effectively.

DR. WHITTLE: The long term that we had talked about previously in our breakout session was that the government would use some of their invasive species 50 to 80 million dollar pot to pay for it, and I'm just saying that is probably a long shot.

DR. ELKINS: I agree with the previous comment; but to refocus is your reason not to support this? It is just a letter. Can anybody tell me why we shouldn't support that to help to develop a fishery for lionfish?

MR. GEER: If I can speak to that just from my own experience; I think it is a great idea to do this to see the viability of the fishery and promote a fishery for this. However, my personal viewpoint is I will not send a letter of endorsement for anything until I see a full proposal, for the simple fact that too many times I've sent a proposal – someone talks to me on the phone and says, "Hey, can you send me" – and I send a letter of endorsement and then the proposal comes out that is a little bit different.

If we were going to send an endorsement from this group, I would like to see a full proposal sent to everybody in our group and let us look it over and say, "Hey, this is something that may be worthwhile." It is nothing against you. It is just in general it is like coming to this committee and saying I want to put this motion forward is great but we have not seen that proposal. We don't know the nuts and bolts of it yet.

Maybe what I would suggest is send us that proposal and we can discuss it for a little bit at the next meeting. Yes, we could throw our weight behind this. We could throw an endorsement on it; and the FWC and the South Carolina DNR endorsing it; that is great as well. I am glad Clark agreed with me, because we don't always agree on everything. It is like I think your ultimate goal should be developing a fishery for this and how are we going to do that with these pots?

DR. ELKINS: Well, I'm okay with that, too, but I just want to point out that I believe lionfish has been indicated in some of the other funding agencies, MARFIN, I believe, as well as a potential source.

MR. GEER: And CRP as well; it is a perfect CRP grant.

DR. ELKINS: I don't know what size funding you're looking for; but if we had the grant, I think some people could also tune in and suggest other funding for it. I'm often not in favor of certain funding of industry proposals, but this is one I think I am definitely in favor of the concept, anyway.

MR. WATTERSON: I just had a quick question. Obviously, everybody knows when establishing a new fishery is the question is going to come up, well, what is your bycatch, what is the level of bycatch, what types of bycatch are there, and what is going to be the ultimate fate of that bycatch.

MR. KELLY: The primary bycatch in deeper water is porgies, all of which are released alive for the most part. The lionfish themselves are very susceptible to barotrauma when they are hauled on a winch hauler. They void themselves of stomach and intestinal contents, and it is not even necessary to gut them.

We're selling them whole at this point. They are going for about $6.25 a pound in the Florida Keys. There is a huge demand. We supply a lot to South Carolina here, the coastal restaurants. I believe that the spear fishermen that are encountering them up in this area are getting about $5.25 a pound.

Other bycatch, mostly minimal. We've done some work with reef.org that has – I don't have the statistics in front of me; but you get a lionfish in there, lobsters don't want to go in there. There are a variety of fish that will, but there is also a variety of fish that will not. Those that will

primarily are grunts and porgies, though, but generally porgies are the immediate fish. They handle the speed of the trap haul quite well. They are not near as susceptible to barotrauma. As I mentioned, almost all of them are released alive. Those few that perish are used as bait in traps.

MR. GEER: I think you have a wonderful opportunity to do a cooperative research grant through NOAA. That is one source that I am very familiar with, and it is the industry working with the partners at NOAA and the states. I think you could probably get – I say this off the cuff, but a lot more money than you could probably get from a private company.

The research being done will be done at a level that is doing these bycatch things, will be looking at the barotrauma, will be looking at all these issues. I think there is a lot of potential here. With that said, what I would recommend to everybody is we get your proposal and we take a look at it.

MR. KELLY: Mr. Chairman, I certainly appreciate your perspective on it, and I respect that point of view. Based on what you have said and the concerns regarding the meat of the matter, the content of that grant application, I'll withdraw the motion; and when we have that grant finalized, that application, I will present it to the committee for review. Thank you.

MR. GEER: Thank you very much, Bill that was great. I look forward to seeing that, because I think it will be really interesting. Is there any other business from anybody?

MR. WATTERSON: Just real quick, going back to one of the things that we touched on before that Pace had brought up about removing certain species and trying to maintain that habitat protection; it is interesting to me – I mean the South Atlantic is one of the few councils that never originally, particularly for certain fisheries like snapper grouper, designated essential fish habitat by species and life stage; and so a lot of that is missing.

A lot of times a lot of these species that are being removed, well, what is their specific habitat requirements? I think in a lot of cases, particularly for the snapper grouper species, we don't know. Is there going to be an effort at some point to try to nail that down on an individual species or life stage basis?

MR. PUGLIESE: I think, yes, as part of the process we're moving forward on addressing the five-year EFH review. The intent was to look as much as we can on the detailed information that may exist for those. We do have some species where we have, like more recently tilefish, identified at least areas, designated areas and more refined to the species.

There are some other individual – wreckfish, individual species; but as a whole the snapper grouper complex still is kind of connected together. With more recent fishery-independent survey, work, I think we are getting more specific species, more stock assessments, getting more species-specific information on the biology.

To what degree we have that connected directly to the habitat utilization is kind of in that same play of the mapping and then ultimately the characterization and then the species use patterns, and that still is lagging in that area. It is resources. Where possible, we can do more. Some of the refined stuff you have is probably for some of the habitat use areas, or whatever, is probably some of the most refined there is. Yes, it would be nice to get further.

I think the idea is to try to get more of that, because that was the directive in the different tiers for the species under EFH mandates. The realistic view is that we can get further I think in this next round. I don't think, unless we get additional resources funneled there, that we're going to get – and it is going to be probably through our partners.

One of the things that is intended to advance this further, because the idea is to take it to other sources, is some of the work that we had done to build the ecospecies online species information system that is getting life history, habitat, even management, and has the opportunity to add a whole lot of other things.

It was intended to be something that is more live species type of thing, where in some of the other regions they've done an individual profile, gone it, put it aside, and that is where it lay. This is an opportunity to make something live. There were some very specific recommendations. We had discussion on that again at the habitat bottom mapping and species characterization workgroup about the opportunity to figure out a way to have something that highlights – if you are doing research within this area or have done research that you could potentially contribute.

Some of this gray literature, other activities that states, individual PhD efforts or masters efforts; there may be an opportunity to tap in on some of that so that some of that information – and create an actual area where people could identify that is an area of interest that they may have something to contribute and then literally engage them on that.

That may be another way to at least get to some of the other things that have already been done. We're trying to attack it on an almost more real-time type of a capability versus just a static document that doesn't get us any further than we were. I mean, we did kind of do what we could in some of the tabling within the last iteration of the FEP, but a lot of that is just a call you're making on some of that. I think we need to go a lot further.

The intent is there; some of it is going to get further along. We have an online or a living tool that may be able to get us further. The more we can do that, some of these types of situations may be less likely to occur; because then we have that kind of detail that we can say, oh, yes, this is a unique habitat that is lost in this kind of a delivery.

MR. GEER: Anything else? Do you have any closing comments?

MR. PUGLIESE: Well, I guess my most important comment is I appreciate everybody's efforts and contributions in this meeting. I think we've had the entire scope of issues to cover here; but I would like to reiterate the importance that the council sees this group. The idea that the merging of habitat and ecosystem at the committee level was important, because it does reiterate that the habitat group, which is now the Habitat and Ecosystem-Based Management Advisory Panel, really is contributing and providing the council guidance not only on habitat issues on this evolution toward ecosystem-based management.

The role you're playing on really advancing the policies, advancing the ecosystem plan development, the connections between our groups, getting at high priority things such as mapping and characterization, information on activities that may be impacting these things is critical to what the council is working on.

It is a two-way street, I think. Hopefully, as these all work, it is going to help your individual organization, our state partners, our federal partners; the fishermen better understand what is going on that is just going to make our effort actually be more successful in the next rounds and where we go from here.

I would like to again just thank everybody and hold on for November. A lot is going to have to happen between now and then, so it is going to be an interesting but I already see it as being a very productive meeting to move this even further along.

MR. GEER: What are the dates; do you know the dates for it? Just a reminder, since we pushed up the artificial reef work to that meeting; I am probably going to contact your state artificial reef leads and get whatever information we can from them. I know at the meeting Florida will be presenting their artificial reef stuff since they couldn't do it today.

We can start making some good progress on that policy statement. We probably also will have something on lionfish at the next meeting as well. Hopefully, we'll see a proposal and we can have some discussion on that and any other issues we talked about. What are the dates?

MR. PUGLIESE: November 17th and 18th, and maybe a half day if we can actually get it. It may be problematic at this point. We'll be meeting at FWI, and I think we actually have secured the Hilton, which is right next door, the one we can walk to. Every time we try to go there, it just seems like it is buried and impossible to get to. I think Cindy was actually successful getting that. St. Petersburg, 17th and 18th and potentially a half day one way or the other, if we can actually get it, but I've got to clear that. I think we already have a contract written.

MR. GEER: Commission members, when is that meeting, the 4th? Who is on the Commission with me, anybody in this room? I think that is the first week in November, so it is not back-to-back weeks, which is a joint meeting between the Atlantic and Gulf. I think it is the first week of November. All right, nothing else? All right, thank you very much for everybody's participation, and drive safely, and we'll see everybody in November.

(Whereupon, the meeting was adjourned on April 8, 2015.)

Certified By: _____ Date: _____

Transcribed By:
Graham Transcriptions, Inc.
April 22, 2015

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# PLEASE SIGN IN

*In order to have a record of your attendance at each meeting and your name included in the minutes, we ask that you sign this sheet for the meeting shown below.*

## South Atlantic Fishery Management Council

## *Habitat & Environmental Protection Advisory Panel:*

**Wednesday, April 8, 2015**

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## *Habitat & Environmental Protection Advisory Panel:*

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HABITAT AP N. CHAS APRIL 2015

| Last Name | First Name | Email Address | Time In Session | City | State/Province | |
|---|---|---|---|---|---|---|
| Havel | Lisa | lhavel@asmfc.org | 7 hours 5 minutes | Arlington | Virginia | NGO/other |
| Hopkins | Hunter | hopkinshr@api.org | 4 hours 38 minutes | Atlanta | Georgia | NGO |
| Lederhouse | Terra | Terra.lederhouse@noaa.gov | 3 hours 3 minutes | | | |
| Mahood | Bob | robert.mahood@safmc.net | 1 hour 22 minutes | North Charleston | South Carolina | I longline for carp |
| Mehta | Nikhil | nikhil.mehta@noaa.gov | 5 hours 54 minutes | | | |
| Mueller | Mark | mark.mueller@boem.gov | 7 hours 33 minutes | New Orleans | Louisiana | Federal Government |
| Radford | Andy | radforda@api.org | 10 minutes | Washington | District of Columbia | Other |