# SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL

## CITIZEN SCIENCE COMMITTEE

**DoubleTree by Hilton Atlantic Beach Oceanfront**
**Atlantic Beach, NC**

**December 4, 2017**

## SUMMARY MINUTES

**COMMITTEE MEMBERS**

Mark Brown
Zack Bowen
Dr. Michelle Duval
Charlie Phillips
Ben Hartig
Chester Brewer
Tim Griner

**COUNCIL MEMBERS**

Anna Beckwith
Dr. Wilson Laney
Mel Bell

**COUNCIL STAFF**

Gregg Waugh
John Carmichael
Kimberly Cole
Mike Collins
Dr. Mike Errigo
Kim Iverson
Cameron Rhodes
Christina Wiegand
Dr. Brian Cheuvront
Myra Brouwer
Dr. Chip Collier
Kelsey Dick
John Hadley
Roger Pugliese
Amber Von Harten
Kathleen Howington

**OBSERVERS/PARTICIPANTS**

LCDR Trish Bennett
Monica Smit-Brunello
Tony DiLernia
Jim Estes
Kathy Knowlton
Dr. Marcel Reichert
Dr. Erik Williams
Dr. Jack McGovern
Dr. Bonnie Ponwith
Dale Diaz
Erika Burgess
Nik Mehta
Rick DeVictor
Rick Bonney

Other observers and participants attached.

The Citizen Science Committee of the South Atlantic Fishery Management Council convened at the DoubleTree by Hilton Atlantic Beach Oceanfront, Atlantic Beach, North Carolina, Monday afternoon, December 4, 2017, and was called to order by Mark Brown.

MR. BROWN: I will call the Citizen Science Committee to order. As a reminder, the members of the committee are myself, Ben Hartig, Bob Beal, Zack Bowen, Chester Brewer, Chris Conklin, Michelle Duval, Tim Griner, and Charlie Phillips. I would like to approve the agenda. Are there any modifications to the agenda? Seeing none, the agenda stands approved.

The next item of business is Approval of our June 2017 Committee Minutes. Were there any modifications to the minutes? Seeing none, the minutes stand approved. The first item of business is the review of a policy for adding members to the Citizen Science Advisory Panel Pool, and so, Amber, I will turn it over to you.

MS. VON HARTEN: Thank you, Mr. Chairman. This is just a policy that's actually already in place and being used by our SEDAR AP Pool as well, and it's the policy that allows us to add members to the AP Pool as the expertise is needed for that particular advisory panel. That way, we don't have to have an AP Selection meeting every time we need to appoint somebody, especially to these Action Teams of the Citizen Science AP Pool, because, as the action teams move forward with their work, there is different expertise that needs to be added in between meetings, and so we've actually used this one other time already, and the policy is that, if you can get the Council Chairman, the Chairman of the Citizen Science Committee, and the Executive Director's approval, you can appoint a person to that AP Pool.

This is already in place for the SEDAR AP Pool, and we would like to extend that to the Citizen Science AP Pool, since they also operate in the same way, and so we just wanted to let you know about that policy and get your approval to adopt that policy, and, if we could, it would be great if we could get a motion to get that approved.

MR. BROWN: Would somebody like to make that motion?

DR. DUVAL: **I move to add the Citizen Science AP Pool to the AP appointment policy in the SOPPs.**

MR. BROWN: I see a second from Ben. Is there any discussion? **Seeing none, then that motion is approved.** The second item on the agenda is to provide a progress report on the work of each of the five Citizen Science Action Teams.

MS. VON HARTEN: Okay, and so, as you all remember, back in June was the last time this committee met, and you all moved forward with establishing the Citizen Science Advisory Panel Pool as well as appointing members to each of the five Action Teams, and, just to refresh your memory, that's Data Management, Volunteers, Projects/Topics Management, Communication/Outreach/Education, and Finance & Infrastructure.

We have been meeting monthly with those Action Team members, since August. We had to re-work some meetings in September, due to the hurricanes and the council meeting being rescheduled, but we've been meeting pretty diligently, and we're working on tasks to get through what we feel these Action Teams need to explore and investigate in order to help us develop some

of the operating policies for the Citizen Science Program. Before we go down the path of starting to support a bunch of projects, we want to make sure that we have our foundation in place to move forward and be able to support those projects successfully.

I just want to run through with you all the work that these Action Teams have been working on, and I want to acknowledge that there are several members of our Action Teams in the audience, and I want to thank them so much for the work that they've been putting into this. It's been really phenomenal and really rewarding to see this all coming together.

The first team that I will talk about is the Data Management Action Team, and, if you also remember in June, we presented to you all and you all adopted the terms of reference. Essentially, these terms of reference are just tasks that maybe should be addressed by each of the Action Teams to start to make their recommendations. It's a term that's used in our SEDAR process, and we have used it here, and so the first thing we did was we presented these terms of reference to each of the Action Teams, and we asked them to rank them in the order that they felt we should address them first in the short-term, as we get started.

In this document, you will see these tables here of how each Action Team prioritized these different terms of reference, and so, for the Data Management Team, their first order of priority was to start to work on understanding a little bit better what kind of data management resources we have in the region, whether it's fisheries or other citizen science programs, and develop an inventory of that. That information will then, of course, feed into the second term of reference that was a high priority, which was to develop an overall data management plan for the program.

Then, just recently, they started to dig into this third one of looking at defining minimum data standards that projects must meet in order to be considered or supported or endorsed under our program, and so we've been working on that as well. What we have done to date is, to get at that inventory of data management resources, the team put together a data management resources form that we sent out to, I believe, over sixty agency folks, non-profits, other citizen science projects, to kind of just get a better idea of what kind of capacity we had in the region from all different aspects of data management, and, that form, you can view it. It's still kind of live, and it's at that Google Form link there.

So far, to date, we've had about thirty responses, which was really great, from state and federal agencies as well as other citizen science and non-profits, and we summarized those responses and kind of learned a lot about we have a lot of capacity in our region, which is really exciting, and hopefully lots of opportunities to partner with some of our data management partners as we move forward with the program.

Then one of the things that came out of that was also some follow-up questions that we needed to kind of tease out a little bit further. One of the questions we asked in the form was if they had data standards and policies in place in their different data collection programs, and, if so, would they be willing to share them, and so we're going to be compiling all of the different data standards that some of these agencies and programs have and kind of seeing if there is some lessons learned there, some things that we can draw upon to help guide what we want to see for the council's program, and the team will be doing that collectively.

Also, we, of course, had a question in there about the cost associated with these different data management systems, and we found that, a lot of times, the people that really knew the data management system didn't often know about the costs associated with that, and so we are going to do some follow-up questions to some of the senior staff in those agencies and organizations to find out kind of a better idea of what cost considerations we should consider when developing our program. I will pause after each of these Action Teams to see if there's any questions that folks have about the different A-Teams.

DR. DUVAL: I looked at the survey responses, and that was one of the things that struck me, was really the number of hours that folks are spending doing the QA/QC on data. That was pretty significant, and so I think that was one of the things that seemed like it could be fairly costly, was checking errors. Perhaps, with the scale of a citizen science project, you have so many individual data points that errors or bias are overwhelmed by the sheer sample size that you have, but that's something that we just need to be aware of moving forward.

DR. PONWITH: That's actually a really good observation, and my sense is, and this is why I think it's so important to make sure that, when you establish a project, you have an end user of the results in mind in advance, because, to the extent that that end user's use of those data are sensitive to the QA/QC, you could actually collaborate with that end user to build range-check capabilities and things like that into the collection in the first place, and it really very dramatically reduces the cost of the QA/QC, because you're absolutely right. If you do it at the end, it can be really tough, but, if you're mindful of it at the beginning, it can be mitigated. Those costs can be mitigated.

The other thing that I would bring up on that is why it's so important to have the end user in mind and the end use in mind when you collect the data, and it's not just the QA and QC, but the actual design of the collection in the first place and making sure that that design is purpose-driven can make the difference between those data being highly valued, with people standing there with a catcher's mitt begging for them, versus saying what do I do with these, and so just a couple of points that just that pre-planning is just absolutely crucial.

MS. VON HARTEN: Moving on to the Volunteers Action Team, here is their terms of reference, and the first thing that they started working on was looking at another inventory of methods and approaches on how to engage with volunteers, both from recognizing that the program and projects will have the opportunity to collect data specifically on volunteers, or about volunteers, and not just the project data, and then the second thing that they've been looking at recently is volunteer training and what types of approaches are appropriate for different types of projects.

What they have completed to date is they've got an inventory of volunteer approaches, and they began with some example citizen science projects looking at the types of information collected on volunteers as well as the approaches for doing that, and they're going to be expanding that inventory to focus on four case studies that are kind of fishery related that also span the different types of tools that have been used to collect that data, and that's REEF, which you all have heard about before, the Virginia Gamefish Tagging Program and Angler Tagging Program based up in Virginia, at VIMS, and iAngler and also the California Collaborative Fisheries Research Program.

They are going to be fleshing those out into case studies, just to kind of get a better sense of the specifics on the cost of training, the approaches to training, if there's different tiers of training that are needed, in terms of the initial training to train volunteers as well as continuing education types

of training that might need to happen down the road and then also evaluation. Evaluation is a big component of making sure that the training approaches are appropriate throughout the duration of the project.

This team has also been trying to figure out a way, and this has kind of crossed over into some of the other Action Team work as well, with the Projects/Topics Management Action Team, but, in order to really understand what kind of projects we can support under the program, we kind of need to know what kind of volunteer capacity we have in the region and what people's interests are, what their skills are, what they're willing to collect. What are fishermen willing to go out and collect?

They are going to be working on, or have been working on, what we're calling a volunteer interest form. Everybody has felt that it's really important we have a way for interested volunteers to contact the program initially to kind of find out more, as well as us finding out more about what they have in mind, in terms of their expectations for participating in a project, and so this volunteer interest form would help us collect some of that information and kind of be the first point of contact for engaging interested volunteers, and so getting a better sense of the demographics of the different types of volunteers that might want to participate in projects, how they participate in South Atlantic fisheries, and their existing skills. We also need to recognize that, a lot of times, these folks will have skills to bring to the table.

Also, to identify where there might be some gaps in some skills and where training might be needed to participate in different types of projects, and also their level of commitment to participate. Are they willing to go out and sample weekly, or are they kind of just interested in doing some bi-monthly sampling or something like that? Then any new skills that they might want to learn in order to participate in a project, and all of that will help us guide our training program as well.

Some of these figures that are in this document are some of the figures that we came up with as we started having discussions to kind of help the group wrap their heads around what we were asking them to do, and that's what this figure is here. It's kind of just a flowchart of what we need to know about volunteers for the program and what parts of the program that volunteers will interact with, from a data perspective as well as the project-specific perspective and then what we need to know about volunteers before the start of a project, to ensure that it's successful. That's what this diagram is.

Next up, like I mentioned, the Projects/Topics Management Action Team is also kind of thinking along these same lines, because we're asking them to figure out a way to develop program priorities and issues that we want to address through projects under the program, and, again, they feel like we need more information about the people that are going to actually be participating in the projects, and so they're going to be working with the Volunteers Action Team to include some questions on this volunteer interest form that will target scientists and researchers as well as NGOs that might want to engage with different citizen science projects.

Also, as we move forward with our pilot project in early 2018, we're going to be using that pilot project to kind of test out some of these example policies that we can implement for the program, and so they're going to be taking our pilot project, which is that scamp grouper discard project, and developing a volunteer training plan for that project, which will, of course, help us greatly as

we move forward with the pilot project, and so what kind of training plan we need in place for that project specifically, and they'll be working on that. Any questions on Volunteers?

DR. DUVAL: Not a question really, but just I've tried to listen in on some of the A-Team webinars, as much as possible, and I have just been really impressed with the level of the conversation and how much energy people are bringing to this. The Volunteers group is clearly very energized, and it seems like they have move forward really well in addressing their terms of reference, and so I just -- All the teams have done a great job, but I just wanted to give a shout-out to them. They were one of the most recent folks that I listened in on.

MS. VON HARTEN: Thanks, Michelle. I forgot to mention that each of these Action Teams has appointed co-chairs, or a chair and a vice chair, and that structure has worked really well to be able to coordinate and work with the group for each of these webinar meetings.

The next Action Team is the Projects/Topics Management Action Team, and here is their terms of reference that they ranked, and the first thing that they've been looking at is looking at a process or a mechanism to help the program identify and prioritize fishery issues and research needs that can be addressed through different projects using citizen science and then also looking at project criteria requirements that we want to make sure that projects meet to be considered or endorsed under our program.

The first thing we had some pretty lengthy conversations about, and this is a very process-oriented task for this group, and so trying to identify any existing processes or inputs that we have of how we get our information about what kinds of research needs the council has, and, of course, we have our research and monitoring plan that you all look at twice a year, and, if you recall, this year was the first year that there were items in that research and monitoring plan that were flagged as possibly suitable issues to be addressed through citizen science, and so that's the first time that that's happened, and so that's kind of one of our existing processes that's already in place.

The team wants to make sure that we're also getting broader input from volunteers that may be interested in participating, and the research and monitoring plan is, as you all know, is pretty technical and broad, and so one of the next things we're going to be working on is kind of maybe possibly taking a two-tiered approach, using that volunteer interest form as kind of the initial point of contact to understand more about our volunteers, but also using the research and monitoring plan and calling upon it to develop a separate citizen science research needs document that will be structured differently, and we're still kind of working on that and figuring out what that might look like, but something that will probably be more centered around fishery issues and then specific types of projects that the council would be interested in seeing performed to address that issue.

As we all know, we don't have any money right now, but we want to be able to have something tangible that people can say that this is the type of project that the council is interested in seeing conducted and how can we make that fit into what their program requires and get it endorsed, and then, of course, we hope to pursue projects internally through the program, but also work with partners outside of the program for them to pursue funding through those different types of partnerships. Then the process for how that would be reviewed is something else that this team has been working on and will continue to work on in the next several months.

The same thing, and like the Volunteers A-Team is taking our scamp grouper discard pilot project and using that to develop a training plan, and this group will take the pilot project and come up with a project development plan, and so what kind of plan needs to be in place for this project to be carried out? What kind of team needs to be in place? What kind of standards need to be in place and project resources and how the data may be used? Just like Bonnie said, making sure that there is an end user in sight for these data and that the data is being collected in a way that they can actually use, and so all these different types of plans that need to be in place to carry out a project. That's it for that A-Team. Any questions?

DR. DUVAL: I am just wondering, Amber, if it's been a little bit challenging for folks to maybe focus on addressing some of these terms of reference without having -- Maybe I should rephrase that and say has it helped the teams, do you think, to have this pilot project for scamp discards to really sort of focus on, because I think it can help make the abstract real, perhaps, and has that been useful for the teams to have that to focus on, do you think, in addressing their terms of reference?

MS. VON HARTEN: Most definitely, and it's something we've kind of been holding off until we were sure that that was going to happen, but I think it will be -- Rick is going to talk to us a little bit later about some of the research study that we're going to be partnering with them on, and I think it will be very helpful for moving forward, not just for the program, but also as we move the project forward. We'll actually have some of this in place as we move the project forward. Yes, it's been really helpful.

The next team is the Communication/Outreach/Education Action Team, and this team is almost finished. They kind of jumped right in and were able to look at these terms of reference and kind of have a pretty clear picture of what kind of information they needed to compile and what kind of recommendations they wanted to make for the program, and so they started out, again, looking at other citizen science programs and looking at that types of communication and outreach platforms they used to convey information about their program and their projects, and they did a nice inventory of existing marine-science-related citizen science efforts, to kind of get a framework for the different types of things that need to be included in a communication plan.

Some of the things they've been working on is this inventory, looking at approaches and tools, and they are almost ready to put forward their first set of initial recommendations that will look at a comparison of the different types of citizen science projects and the different types of communication and outreach approaches that may work. They have been looking at discreet projects versus continuous projects that would be over the long term and the different types of outreach that would be needed for both of those different types of projects.

Then they're also looking at how to share project results at this point and how projects promote and recruit volunteers, and so they're doing an inventory of that, and we just got an email today from one of the groups that have been working on that that they made significant progress earlier today on pulling together those recommendations, and so this will be really helpful with figuring out how we need to communicate not just about the program, but specifically about different types of projects.

Also, our last Action Team, the Finance & Infrastructure Action Team, has been toying with the idea of having some type of promotional flyer that can be used to solicit program partners, and

they really wanted to get some feedback from the Communications Team, to make sure that the messaging was appropriate, and so they have reviewed that and provided some input, and we're working on finalizing that as well. Anything about Communications?

MR. DILERNIA: Not directly to Communications, but the projects that they do, the citizen science folks, because we don't have a citizen science program in the Mid, and I find this very interesting. It's very informative to me, but would they do a project say like evaluating the effects of hook size or gear type, like in the recreational fishery? Is that something that your citizen science volunteers would do?

MS. VON HARTEN: The ultimate goal is for us to look at projects that are going to be addressing a direct research need or a data gap, and so, if that was the type of information that we needed for management, or for an assessment, and we felt that it could be designed in a way that citizen science could collect that information, then I would say yes.

MR. DILERNIA: So, if that were the case, who would design it? Would you design the project? Who would evaluate it, and who would peer review it? I ask all these questions because there is lots of discussion and controversy in the Mid regarding hook size and hook type and selectivity and discard rates, all around summer flounder, and we have some folks that are doing their own I guess we'll say research in trying to determine what's the best gear, hook size, style and everything, to recommend on summer flounder.

They're doing quite a bit of it on their own expense, but they're running into the difficulty of will the SSC accept their plan design, their data analysis, their results, and so it's becoming a little frustrating for them, because they want to do the work, and the SSC has some very strict requirements regarding I guess we'll say the legitimacy or the validity of the work that they're doing, and so it's getting a little frustrating, and I was wondering if that issue has developed here with your citizen science people.

DR. PONWITH: What an excellent question. We have spoken at great length about this, and the thing that we desperately want to avoid is a situation where everybody agrees that there are questions around an issue, but people go out and spend money and time to collect data that can't be accepted to address it, and that would be a catastrophe. That would not only be a waste of time, but it would be a waste of trust, and we are trying to set ourselves up -- I am being bold by saying "we", because I was on the steering committee, but so that we never get in that situation.

The way we approach that is by mapping the volunteers to the end users of that information at the onset and reaching agreement on methodologies for gathering those data in partnership, as opposed to -- Here's the deal. The Information Quality Act exists, and it's a double-edged sword. Basically, if you show up and hand a burlap bag of data to me and say, here, this proves that you and the agency are wrong, if you can't demonstrate the provenance of those data and tell me how they were collected, what methods were used, how the study design was, it is not only within my rights, but it is the expectation that I reject those data.

Similarly, if you can address all of those, the burden on me is -- If I don't use those data, I have to explain why, and SEDAR is exactly, in the data step of the SEDAR process, it does exactly that. It looks at the data to make sure those data meet our expectations, and, if they do, then you use

them. The citizen science is being designed so that all the questions we know are going to be asked of those data are addressed at the design phase, so those data can be used.

MR. DILERNIA: So then a citizen science project involving say hook selectivity for summer flounder, would there be a PI at the Center that the citizens would be working under the supervision of? Is that how that would work?

DR. PONWITH: If the Center wanted those data and chose Citizen Science as the vehicle, the Center would work with the group of volunteers who were doing that on the protocols for the data collection, on the protocols for the QA/QC, on the tests to make sure that the data are unbiased and meet the scientific standards, and, yes, there would be a PI that would help, or the PI doesn't have to be from the Science Center. The PI could be an academic, or the PI could be from a state agency. It's just to make sure that those data meet the scientific rigor required for those data to be used.

MR. DILERNIA: Does the Center have anyone who is doing this right now in the South Atlantic? Do you have any PIs that are working with citizen science folks doing this type of work at this time?

DR. PONWITH: We do have people from the Center who are working on these committees, and there is a pilot study being set up to do a proof-of-concept, and certainly we would have someone from the Science Center working to create fertile ground for that to be a productive and positive test of how citizen science would work down here.

Again, the difference is a bunch of fishermen say that we think the agency is wrong and they go out and they gather some data and they toss it at our feet, and that's hard to accept, because, if we can't vouch for how the data are collected, it makes it really difficult to use those data to make meaningful inferences, whereas, if we work on the design and make that design bulletproof and really statistically sound, then those data can be used, and it's really that simple.

MR. DILERNIA: Thank you. This has been very helpful for me. Thank you very much.

MS. VON HARTEN: Just to follow-up, I'm going to go back to what I was talking about with the Projects/Topics Management Team. This project development plan is hopefully going to address just that. It will establish who is the design team that needs to review a project or pull a project together, all the different components that go into designing a project and developing a project. We need to have some kind of criteria to make sure that those things have been met for a project to be endorsed by our program, to ensure everything that Bonnie just described.

Our last, but not least, Action Team is the Finance & Infrastructure Action Team. We have now renamed it that, because it's more about -- It's about more than just money. It's also about the infrastructure for the whole program, and these are their terms of reference. It's looking at different models and different ways of supporting not just the program, but projects, and then also how to establish partnerships has been what they've been focusing on.

We did tackle, early on, kind of a draft operational programmatic budget, and so addressing both sides of the house, operational being the support and operations of the program, and so the Program Manager and all the administrative things that go along with running the program and then having

a programmatic budget that can grow and expand as more and more projects come under the program, and so kind of just a draft line item budget, not with any figures in it necessarily, but just a strawman of exactly what might be needed over time as the program grows.

Then it's also working on, like I mentioned, this promotional flyer and developing some graphics to kind of describe what we're doing with the program to really target partners, and we got some really great feedback. This is the initial draft of our little graphic here, with this group representing scientists and this group representing fishermen and this group here representing managers and coming together to have better data for better management.

As you know, this A-Team was very small. It only has two members at the start, but we have been recruiting, and we hope to add a few more folks to that Action Team. Now that we have this policy in place to do that, we can move forward with that, and we've also been looking at different ways to -- First of all, we went down the route of possibly looking at -- A lot of folks have come to us with the idea of why don't you have a foundation or a friends-of group that can receive donations or funding or apply for grants, because remember the council cannot apply for grant monies or receive grant monies that are external to the agency.

We recognized, kind of early on, that establishing something like that initially was going to take a lot of effort and a lot of management and staffing, and so that's probably not the best option to go down that path right now, but maybe in the future, and so looking at different funding models and funding partnerships that establish memorandums of agreement or understanding with other non-profit groups that have that 501(c)(3) status that can serve as a pass-through for receiving funds and working with the council, hopefully, for a shared mission of what we're trying to accomplish, and so we're still investigating that.

A recent partnership we found out about is with SC DNR and Tall Timbers, which is a timber quail conservation group that established a South Carolina bobwhite quail funding partnership, where Tall Timbers is the recipient of funds and donations, charging no overhead, which is pretty amazing, to support quail conservation efforts in the state that matches both the agency's mission as well as the mission of Tall Timbers, and so we had a great conversation with him last week, and we hope to draw upon some of the lessons learned from that to see if that might be a model that works for us, so we can get some projects moving forward.

Just as a reminder kind of our timeframe, the Action Teams, all five of them, are meeting next week. I encourage you to join in if you have some time, an hour-and-a-half or so, to listen in and want to hear what they are talking about. Then, in January, we're going to have our all-hands Action Team meeting, probably in the latter part of January, and that's to bring all the Action Team members together to kind of share what they've been working on and see where there is any overlap or some other insight that can be provided between the Action Teams and start to prepare and develop the initial recommendations that will come before you all in March.

Then, based on the progress of each A-Team, we will keep working on those terms of reference and moving forward. Then, hopefully by early next year, we'll also have our pilot project in play and we'll get to test out a lot of these recommendations that are coming forward from the Action Teams. With that, that concludes my summary.

DR. DUVAL: I just want to give a huge shout-out to Amber and to John Carmichael for all of their efforts. I mean, if you think about this, we had a kickoff meeting in January of last year, where we brought together a whole bunch of folks to encompass all of the tasks that these A-Teams are doing, and, by the end of last year, we had a blueprint. In June, we appointed members to a Citizen Science AP Pool, and also appointed members to these Action Teams, and so I think the folks on these A-Teams have done a tremendous amount of work in a tremendously short period of time, and so hats off to them, as well as to Amber and John, for continuing to pound the pavement and to move this forward.

I think the Finance & Infrastructure Team probably has one of the most challenging tasks. I mean, it's not as sexy as dealing with how do you communicate with people or what types of projects could we take in, but it is one of the most critical pieces that is going to make this program a success, and so it's really important for us to weigh-in on that, and so, if folks have ideas for that particular A-Team, I would encourage you to talk to Amber about that.

I think one thing that strikes me is that we can also probably, for certain projects, partner with industry groups that might be willing to donate materials, whether it's a descending device, or purchase those on behalf of a particular project, and so that's something that I want to make sure that that team also incorporates in their overall picture, but thank you to you and to the A-Team members, and I know there's a bunch of folks out there, and I really appreciate all of the North Carolina folks. I see Mike Burton and Trish Murphy and Dee Lupton and Scott Smith and Bob Lorenz and Leda Dunmore and Scott Baker, who are all members, and I don't know if I've missed anybody, North Carolina members, of the different A-Teams, and so thank you, guys, for everything that you have been doing. I really appreciate it. (Applause)

MS. VON HARTEN: I can't leave out my wingman, Julia Byrd, because I couldn't do a lot of this without her either. Both she and John have helped tremendously with these Action Team meetings and taking notes and helping me wrap my brain around all the things that we're working on, and so I have to thank her as well.

MR. DILERNIA: Everything that Michelle said, plus. I think this is a wonderful initiative, because you're going to involve fishermen in developing information, and, once your fishermen become part of your process, they are much more cooperative, and let's face it. Any type of regulations or management that we do is dependent upon the cooperation of the fishermen involved, and, the more you can involve the fishermen in developing the science that will help make the decisions regulating them, the more readily they will be willing to accept those decisions and to become your partners rather than your adversaries, and so I think this is a wonderful initiative, and I am paying very close attention, because I think I'm going to try to carry some of this back up north. Thank you.

DR. DUVAL: Just one more thing. I was remiss, and I apologize mightily, but I did forget Kathy Knowlton, who is sitting around the table here, and I have already made Kathy into Doug, since Doug isn't here right now, and so I did not mean to leave out Kathy. Kathy is a member of the Finance & Infrastructure Team.

MR. HARTIG: I will mention some of the things that Chris Oliver said in that address he gave to the Pacific Expo, but one of the things he talked about was the aging of the research fleet around the country and that they're going to be putting together more cooperative research in the future

and maybe not renewing-up the research fleets, and so, although that's cooperative research, there will possibly be some money for citizen science and that as well, and so I'm optimistic on that.

MR. BROWN: The third agenda item, we have Rick Bonney from the Cornell University Lab of Ornithology joining us to talk about developing partnerships and the upcoming pilot project for the council's Citizen Science Program. You all may remember Rick and Jennifer Shirk from Cornell, who were instrumental in helping us plan the 2016 Citizen Science Workshop that we hosted in Charleston, and they have continued to be advisors for the development of our program. With that, I will turn it over to Rick.

MR. BONNEY: Thank you so much for having me come back. It's kind of hard to imagine that all of that has happened in the last two years. It was two years at this meeting that I met some of you for the first time, and then almost two years since we all met in January in Charleston, and I'm just curious. How many people in the room right now were at the workshop in Charleston? Really a lot, and so I can't use any of the jokes that I told there. They are not going to work, but, at the same time, you all appreciate just what Amber and the folks she's working with have accomplished in that amount of time. It's really rather astonishing.

Jennifer and I have continued to work alongside the council with Amber and with Laura Oremland from NOAA Fisheries and with Leda, kind of on the side, and I want to show you a few of the things that we're thinking about in just the next few minutes here. I do want to say -- I want to remind all of you that I am an ornithologist and a supposed expert in citizen science, and I did take a fisheries management class as an undergraduate at Cornell, and that was in 1974, and so it was a long time ago, and it's pretty dated, and so any errors, either in fact or judgment, that I may make in the next few minutes that have to do with the ocean or with fish are mine alone. They are not Jennifer's, Amber's, Laura's, or Leda's.

We've got this clever title of "Sea Change: Using Citizen Science to Inform Fisheries Management", and we're starting with this vast problem, particularly when you think about whether fish are in fact like birds, and, of course, it turns out that they're really not, because, when we're trying to think about gathering data to inform fisheries management, we've got three really big major problems, and they go beyond the South Atlantic Council here.

We've got this vast Economic Exclusionary Zone, hundreds, millions, of square miles that we're trying to figure out how to gather data to inform management in, and, if any of you are fans of *Click&Clack*, and some of us still listen to the darned re-runs, you have heard all about the inky darkness and how the things come out of the inky darkness, but that's what the ocean is, compared to trying to look for birds. You just really can't see very well what's going on down there, and so it's really hard to gather the data, and we have limited resources to gather that information with. There's not enough money, there's not enough staff, and so how the heck can we get the information that we need?

Citizen science is a possible avenue, but notice how we now have a question-mark here, because we're still a very long way from figuring out if citizen science will be a viable and valuable tool to get the kind of data that you all really need at this council and other councils to really make a difference, and so I just wanted to take a step back for a few minutes here, and then Amber will talk about the pilot, and then I will talk about the work that Jennifer and I are continuing to do.

We do know that data can be gathered in the ocean through citizen science, and we know that, and that's because we have many eyes on the water. We don't have bird watchers by the millions, but we do have thousands, tens of thousands, of fishermen out on the water, and fishermen are really knowledgeable observers. They understand the ocean better than probably anybody else, and we also know that fishermen have proven to be eager participants in these data collection projects as long as the fishermen feel like the data are going to be used for something important.

Not only that, but this isn't new in fisheries, because we're building on cooperative research, and I actually should have capitalized "cooperative research", because it is a thing within the fisheries management world. It's been going on for a while, and there is a lot of similarities between cooperative research and citizen science, but we have to think about how useful the citizen science data can be as we think about how to collect it, and it all is coming back to these stock assessments, which I knew nothing about two years ago.

We decided, for purposes of an article that we're writing right now, because we want to publicize all the work that you're doing to the world, we decided not to call this the ABCs, because you've got this thing called acceptable biological catch, and so we renamed it ACBs, but what we know is, if the data are going to be useful, they have to relate back to abundance, or they have to relate to catch, or they have to be relevant biological or related environmental data, or all of the above. Otherwise, in the long run, the data aren't really going to useful for making management decisions.

We also know that there are existing citizen science approaches in the marine world that are collecting some of that kind of information already. There are tagging projects, there are surveys, there are projects that are gathering information on catch, and there are projects that are collecting biological data, and then there's these co-created projects that are truly partnerships with scientists and, in this case, fishermen working together from the beginning to the end of a project, and I'm going to just give you a couple of examples of some of these before Amber talks about the pilot.

When we think about tagging, one of the projects that jumps to the fore is the shark tagging program, and I was astonished to discover that this is over fifty years old. Nearly 300,000 tagged fish and 17,000 recovered sharks, thirty-three of the fifty-two shark species. That is way better than the data that you get from banding birds. It's probably a hundred times better than the data you get from banding birds, and so this is significant information, and there are, of course, other tagging programs on other species as well, but, in some cases, the data on stock composition and movements and abundance and mortality and behavior, in some cases this is the best available information on some species, and there is certainly more that could be done with tagging.

REEF has come up many, many times. Now, REEF is not a project that focuses on fishermen, unless those fishermen also happen to be divers, because most of the data that come from the Reef Environmental Education Foundation Fish Survey are from recreational divers that are looking at where the fish are around some of the world's biggest reefs, and they're doing categorical data collection, and so this is not exact counts. It's really more indices, or estimates, of abundance, but, since 1993, the reef divers have come up with really reliable data for certain populations and have been able to come up with some good growth rate estimates.

We were talking before, and the idea about QA/QC came up before, and Bonnie was starting to talk about the different ways that you can do QA/QC. You can do it before you ever collect data, by making sure that you have a really robust data collection project that will collect data that is

really going to be used by the end user, but you can also make sure that you have some really good statistical experts that can look at that information and do some important modeling with it, and, in the case of the REEF data, and I'm going to get way over my head when I start talking about Mars, but they have been able to do multivariate auto-regressive state-space modeling with REEF data that, once again, have come up with some of the very best population estimates for some species in some locations. Now, whether this information is yet being used for any kind of stock assessments, I actually am not enough of an expert to know, but I suspect it could be, particularly if there was more of it.

When we turn to catch, that starts to get trickier, and, when we started looking around at some of the different ways that fishermen, anglers, are able to provide catch data, iAngler comes up as probably the top example right now out there, but iAngler is in its earliest stages, and it's really untested at this point, except in certain areas, but I think it's pretty clear that, over time, coming up with citizen science programs that will allow fishermen, whether they are commercial or recreational, to be able to put in accurate estimates of catch is going to be absolutely essential, and I do believe that some iAngler data have been used in some snook stock assessments, but, once again, I'm an ornithologist, and I may be wrong about that, but the rumor mill tells me that that's the case.

Here is a project that I found, and I found out about this at Halloween. I just thought, okay, this is really cool, plus one of the jokes that I told you two years ago, I am going to tell you again anyway, because it's one of my favorites. It's a skeleton goes into a bar and orders a beer and a mop. Okay. Half of you got that, and half of you never will.

Anyway, this started off the west coast of Australia, and I do think maybe there are some skeleton projects going on in the U.S. in some places, but, in Australia, there were three species of declining fish that they were really worried about, including one snapper species, and the fishermen started donating their skeletons to study the age structure of these fish.

Now, the data have been used in Australia to inform management, but also this citizen science project had a social aspect to it, and so there were social scientists that were talking with the fishermen and finding out what was this project like for you to engage in? Was it important to you? Why did you do it? They found out a lot of the fishermen were doing it because they really felt that stewardship was important, but they also wanted to set an example for their children, and so some of this citizen science evaluation can get into the social science as well, and we'll get back to that in a couple of minutes.

Environmental monitors on lobster traps is a project that started in New England, and it may be bigger than that now, but, for fifteen years or more, they have had a hundred or more volunteer lobstermen who have collected six-million hourly observations that have clearly demonstrated, over those fifteen years, one-degree Fahrenheit of temperature rise on the ocean floor. One of the cool things about that is that these fishermen -- They are talking to their neighbors about climate change, and their neighbor says, well, you can't trust those scientists, and the fishermen can say, well, you can trust me, and I gathered that information, me and ninety-nine other volunteer lobstermen.

Then, finally, this project has come up many, many times, the California Collaborative Fisheries Research Program, because this is one where the scientists and the fishermen work together from

the very, very beginning to say, okay, we really want to understand more about the effects of marine protected areas, and, in order to do that, we need to survey, but we do need to do statistically set-up randomized surveys, and so we need to work together to figure out where to go out and study the fish and not just where we think the fish are, but where they may not be as well.

At this point, they have got 800 volunteers, and they've got over ten years of rockfish survey data that they're beginning to use to look at the long-term impacts of MPAs, and that Starr et al. paper from 2015 does have some preliminary conclusions suggesting that the MPAs can be important in maintaining some of these fish populations.

There are a lot of ways that citizen science is being used in the marine environment, sometimes with fish, and so there is somewhat of a proof-of-concept. Relating it back to the ACBs of stock assessments is the next thing that's going to have to happen, and, in the meanwhile, there is a pilot project started by the council, and it's your turn for a few minutes to talk about that pilot project.

MS. VON HARTEN: You all have heard about this a lot, and so you're aware that we're going to hopefully start this project in early 2018, focusing on scamp grouper discards and for the upcoming 2019 stock assessment. Just to refresh your memory about why we felt that this might be a good first citizen science project, obviously we've been hearing from fishermen about their want and need to help us collect additional data to reduce this uncertainty that we have in our assessments, and so it's definitely a topic that has been a need identified by both fishermen and scientists.

It's filling this known data gap that we have for discard information, and we feel that information would be fairly easy to collect, using a simple mobile app tool, and not very costly. It doesn't require any kind of specialized skills of the fishermen to collect this information. As long as they can measure a fish and take a picture and enter some numbers on a phone, they can participate in this project, and so it's also scalable. We can include fishermen from across our geographic range that we manage, include fishermen from all sectors, and hopefully get some useful information within a short period of time that can be applied in management and science.

How does this relate back to what the Action Teams are working on? I kind of parsed this out by our five Action Teams, to kind of just show that this is going to be one of the things that hopefully the Action Teams can be working on, is how to actually develop this project as it moves forward, and, again, a lot of this overlaps with what I just described by the work that the Action Teams are doing, and so how to work with volunteers on this project and communicate with them to understand their motivations and expectations for participating and get a better sense of any specialized training that they may need, and also oversight and management of the project design and planning.

That will have to be developed, working with our partners, and QA/QC. Again, this -- Hopefully, we will collect a smaller amount of data that we can manage okay in-house for our first project and not collecting a lot of data initially for this first project. Thank goodness we've had some partners that have come forward with some funding, and we're going to be working with Rick and Jennifer, as well as ACCSP, and Pew as well, to develop what the project will need to be supported and then how to train fishermen and share those project results and make sure that these data are used, and so that's kind of goal for getting started in 2018. There is also another component to this project, which I'm very excited about, which is more of a research study that Dr. Jennifer Shirk is going to be working on with us, and Rick is going to talk about that now.

MR. BONNEY: Right, and so we wanted to see if we could get some funding to do some research around the work that you all are doing here, and we knew that there is a direct relationship, or a correlation, between the length of your title and the amount of money that you can get for a project, and so we came up with this one called "Researching the Role of Program Infrastructure in Guiding Effective Development of a Scamp Discard Citizen Science Project".

Now, some of you, many of you, were at the meeting in January in Charleston, where we kicked a lot of this off, and, at that time, Jennifer and I did some talks, and we presented a framework for development of citizen science projects and the Citizen Science Program. An interesting thing about that was Jennifer and I developed this iteration of the framework with a contract from the U.S. Fish and Wildlife Service, and I'm going to come back to that, and remind me if I forget, because it's kind of cool.

We came up with this idea that there were a bunch of different steps that needed to be engaged in, and we presented that to you all, and out of that came this amazing -- It looks like a Parker Brothers board game, doesn't it? You can move from one to the other and you roll the dice, but out came this amazing program, with the A-Teams and the blueprint, and it was like, holy cow, these folks are really doing this, and they're really taking it seriously, and, if anybody is going to demonstrate the efficacy of citizen science, it's going to be this group.

Jennifer and I continued to be not only astonished, but we also wanted to be part of continuing to work with you to document what was happening and explain to the world a really good way of developing a program, and so the council can't apply for grant money, but Jennifer and I can apply for grant money, and so we did, and I really wish that I was sitting here announcing to you the fact that we had the money in hand. We don't. We think it's almost here.

This is money that's coming from Pew, and we've been working with Amber, and we've been working with Leda, and what we're doing is asking the question of what happens when the framework recommendations that we presented to you all are enacted as a program for citizen science project development, and then how does that program first approach lend itself to a successful project?

Now, just to unpack this, this goes back to those fish hooks in New Jersey, and so, if the fish hooks in New Jersey -- I grew up in New Jersey, and I have nothing against New Jersey. That's not why I picked on the state, but if that turns out to be an important project to fit into the overall guidelines of a program, then it's something that really ought to be supported, but there needs to be a system in place to make those kinds of decisions, and so that's what we're asking here with this second question.

Then, finally, what can we learn from the rollout of what this council is doing that can inform the development of citizen science across councils around the country and management settings around the country, and maybe in different agencies as well, and so the problem was that, in order to do this research, there needed to be a project, and there wasn't any funding for certain parts of the project, and so we set out to convince Pew that they needed to fund parts of the project so that we could study it, and that's working, we think.

The goals of this research are to ground-reference the utility of that framework that we presented to you two years ago to support the refinement of your program, to support evaluation of the project, of the scamp project, to provide evidence to inform program development by other organizations, and also to inform the entire citizen science field about the theory and the practice of doing this kind of work, and that's why Jennifer and I are continuing to do this.

The methods that we will employ are very, very simple. We're going to be observing everything that's going on here, what the program Action Teams are doing, and we'll be participating on the calls, as listeners, and not as saying anything, but just listening and documenting. We will be doing interviews with key partners and with the Action Team leaders, and we'll be reviewing the documents that are produced and the activities that are undertaken along the way, and this is one of the reasons that neither Jennifer nor I asked to be on any of these A-Teams, because, by not being on them, we can be neutral observers, but I also want to tell you that our theory of evaluation is that evaluation is not something that tells you whether a project works or not.

Evaluation is something that you set up in the very beginning of a project to work alongside to make sure it is successful, and so that's the goal that we have by listening in on these things and reading the documents and conferring with Amber and the other leaders to make sure that we're a bridge or a key to, when there are issues coming up, making sure they're being heard.

Then a really important part of a project like this is validity, and so, once we have some findings, we need to go back and we need to talk to all of those key stakeholders, and we need to make sure that what we're hearing and what we're seeing is accurate, in terms of what the stakeholders are trying to say, and so that will definitely help. That will definitely be a part of it. Any time there is any kind of a conflict that arises from interviews or observations or any other sources of data, we will try to sort that out, because we're not looking for a *People Magazine* article here about how this all fell apart. We're hoping to guide it along to make sure that it is absolutely effective when it's done.

We will come up with a conceptual framework, which most of the people here probably don't care about, but, for me and Jennifer to continue to get promotions and in our annual reviews at Cornell University, we need to do things like come up with conceptual frameworks, and, this one, we'll talk about the intentional design that you all are employing here in your citizen science project design, actionable research. You guys are doing research that is going to be put into action.

Critical appreciative inquiry, and I should also say that Jennifer was supposed to be here doing this part of it, but she's in Nairobi, and so, if Jennifer were here, she could tell you what critical appreciative inquiry is, and I'm not even going to try, but, coproduction of knowledge, that is really, really critically important, to get the idea that scientists, managers, and fishermen, recreational fishermen and commercial fishermen, are working together to coproduce something that is needed for everybody.

When we're done, we'll have a conceptual framework that looks something like that, that being an awful slide to end on, and I put this one in instead, which those of you who were with us in January in Charleston will remember this amazing photo that really graced the very end of that program. Imagine what my eyes have seen, and imagine what all the eyes of all the citizen scientists can see and how much data we can collect and how much we can help to inform data management needs. Done.

MS. VON HARTEN: Thanks, Rick.

MR. BROWN: Is there any questions?

DR. DUVAL: Rick, assuming you all are successful in obtaining funding, when do you anticipate sort of kicking off this project?

MR. BONNEY: Well, we've kind of already started kicking off our part of it. One of the things that I forgot to mention was how our independent review of citizen science in the marine world mirrors so much of what that one A-Team came up with, and that was pretty cool, and we're planning to publish a lot of what is going on so far. I am not going to name the journal we're sending the article to, because you never know, do you, but we've really already started putting a lot of this into place, but we're really hoping for funding and an announcement in January sometime, and maybe not the beginning of January, but in January.

MS. VON HARTEN: Did you want to talk about --

MR. BONNEY: Thank you. That's really cool, and so, in the meantime, Jennifer and I -- This is really funny, but we got another contract from the Fish and Wildlife Service to help them put the framework into action, and you know what? All we need to do is watch what you all do and document it and give it back to them and so it's Tom Sawyer. It's the fence. It's citizen science, right? You guys are showing how this is done for us, and I just think this circle is beautiful.

DR. DUVAL: I just want to say thanks to you, Rick, and Jennifer for all of your contributions to our effort. It was really instrumental when the steering committee was meeting, the organizing group, to have the input of people like you and Jennifer, who have so much experience in this field, and I think your input has really helped to position us for success, and fingers crossed, and so thank you very much for everything that you guys have done.

MR. BONNEY: If I haven't said this already, this group has really been just about the most exciting one that I have worked in in thirty-six years of doing this kind of work. I have never seen such a level of professionalism, and also mutual respect, among a bunch of groups that may or may not actually like each other all that much all the time. It's really just been amazing what you all have accomplished, and so it's really rewarding to see that happen.

I also forgot to say that Jennifer says hello to everybody. She really wishes she could be here today. Did I already say where she is? She is in Nairobi, and she's at a U.N. meeting, because the United Nations has gotten interested in trying to do some -- What's the word that I'm looking for here? They're really trying to help the different citizen science associations around the world work together as like an umbrella organization through the U.N., and so that's where she is right now, but she did want me to say hello to everybody.

DR. LANEY: Rick, I am not even quite sure how to couch this question, but it arises from the discussion earlier of QA and QC and Bonnie's noting of how important that it is, and it occurs to me that, in a citizen science program, and depending on what the project is, zeroes can be important things. They tell you where things aren't as well as where things are, but, being a recreational angler myself, I hate to go back home and report a zero, which doesn't mean a whole lot to my

spouse if she is expecting fresh spotted seatrout for dinner, and so is that something that you all have talked about at all?

I know it's going to vary a lot, depending on the program. Obviously, if you're collecting fish racks to get age structure, you don't want any zeroes. You want lots of racks in the freezer, but, on the other hand, if you're trying to estimate catch per unit effort for something, and you're trying to correlate abundance with habitat distribution, you want those zeroes, and so is that something that you all have discussed at all?

MR. BONNEY: That's not something that I have discussed with anybody regarding fisheries work. In the bird world, and particularly with eBIRD, what we do is we ask everybody who submits a checklist to tell us if they have reported every bird species that they have seen or heard, and so, if they say yes, then we can assume that the ones that were not checked that they didn't see or hear. In fact, if you don't say this outside of this room, when people don't check that box, we really don't use those data. I mean, they're on the maps.

If somebody sees a species in an odd area, we're going to put that on our map, so people can find it later and say, oh yeah, there's the flamingo that I saw in Michigan, but, for anything that we would publish or anything that we would give to the Fish and Wildlife Service for management reasons, we don't even use the checklists that don't have that box checked. How that will extend into the fish world is going to depend on what kind of project it is and what kind of survey is designed, but there are all kinds of -- I call them "tricks", in the nice sense of the word, that can be accomplished to do that.

DR. LANEY: I will just say, if you're looking for more projects to put on your list the next time, there is a big tagging program that -- The American Littoral Society runs a huge one, but one of Michelle's colleagues, Charlton Godwin, also runs our cooperative winter tagging cruise volunteer angler program now for tagging striped bass off the coast during the wintertime, and we've been highly successful at getting volunteer anglers, and we don't have very many zeroes. We have a few, but not too many. Our captain is pretty good at finding the fish, as Dr. Duval can attest, because she went and tagged a whole bunch on one particular day, I think, last year, or two years ago, and so that's a couple more examples.

MR. PHILLIPS: I am listening to kind of the total picture, and so, theoretically, we could take our citizen science work with Bonnie's shop and build a program that we could use statistically and we could validate something like MRIP and/or -- We can't do that, or can we, or see what else we need to do? I mean, we've got the people on the water.

DR. PONWITH: We spent a lot of time talking about what's the ideal project, and my advice, my kind of humble advice, for the opening project is to pick something that doesn't result in an immediate opening or an immediate closing of a fishery, because that's a lightning rod. Take, for example, MRIP. It can result in a closing, and it can result in an opening of a fishery, and it is a lightning rod, and so my recommendation was to pick something that deepens our knowledge, but is less decisive in whether you go fishing tomorrow or not, so that you can get away from the politically and emotionally-charged kind of data and yet still collect data that are crucial for us to do a good job of understanding the science and the management of that species.

Use that to test the concept of citizen science before you leap out and say we're going to throw MRIP away and we're going to use our own data this year instead, because that doesn't seem like a good first project, to me. Now, ultimately, as we build a track record in the South Atlantic and build really strong teams of participants in citizen science and a track record of being able to collect data that are actually used in making decisions, we may get to a point where that kind of project could be done, but, at this stage, I would really advise against it.

MR. BROWN: A follow-up?

MR. PHILLIPS: Yes, and I appreciate that, but I also -- I think part of the reason that the fishermen are so enthusiastic about this is they're hoping it will lead to some changes, and even if they're small changes to start with and we build on them, even if we pick one species and work on that. Then it helps both programs. As the old saying goes, iron sharpens iron, and that's what I would like to see it do.

MR. BROWN: All right. Is there any other business to come before the committee? Seeing none, the Citizen Science Committee stands adjourned.

(Whereupon, the meeting adjourned on December 4, 2017.)

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Amanda Thomas
January 5, 2018

SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL

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***(Continued)***

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SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL

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# Attendee Report: SAFMC Council Meeting - Day 1 (Monday 12/4/17)

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Monday Sign-in sheet 12/4/17

| Name | Last | Email | Mailing Address | How do you participate in fisheries in the South Atlantic? | | | | | | If Other, please provide more information: |
|---|---|---|---|---|---|---|---|---|---|---|
| Leda | Cunningha | | | | | | | NGO | | |
| Lora | Clarke | | | | | | | NGO | | |
| Lora | Clarke | | | | | | | NGO | | |
| David | Bush | | | | | | | | Other | NCFA |
| David | Bush | | | | | | | | Other | NCFA |
| Richen | Brame | | | Rec. | | | | NGO | | |
| Mallory | Martin | | | | | | | NGO | | South Atlantic Landscape |
| Dean | Foster | | | | | | | NGO | | |
| Robert | Lorenz | | | Rec. | | | | | | |
| Scott | Baker | | | | | | | | Other | NC Sea Grant |
| Amy | Dukes | | | | | | | | Other | SCDNR |
| Geoff | White | | | | | | | | Other | ACCSP |
| Rusty | Hudson | | | Rec. | Charter/Headboat/For-Hire | Commercial Fisherman | Seafood Dealer/Wholesaler | | Other | Fisheries Consultant |