Submerged Aquatic Vegetation (SAV) Team Meeting

Albemarle-Pamlico National Estuary Partnership
10:00 AM - 4:00 PM
June 4, 2018

Conference Room, NCDEQ Regional Office
943 Washington Square Mall
Highway 17
Washington, NC 27889

http://www.apnep.org/web/apnep/sav

Meeting Notes*

*Notes recorded by Wilson Laney, Tim Ellis, and Abigail Brewer
*Compilation and editing by Tim Ellis and Dean Carpenter

In attendance: Brian Boutin (TNC), Anjali Boyd (NOAA), Abigail Brewer (APNEP), Dean Carpenter (APNEP), Anne Deaton (NCDMF), Maria Dunn (NCWRC), Tim Ellis (APNEP), Don Field (NOAA), Patrick Gillam (NCDMF), Kathy Herring (NCDOT), Jessie Jarvis (UNCW), Jimmy Johnson (APNEP), Jud Kenworthy (NOAA - ret.), Wilson Laney (USFWS), Joe Luczkovich (ECU), Trish Murphey (APNEP), Ken Riley (NOAA), Mike Sanderson (NCDOT), Jon Sherman (ECU), Tyler Stanton (NCDOT), Shane Staples (NCDCM), Curt Weychert (NCDCM)

Unable to attend: Michael Durako (UNCW), Matthew Duvall (NRCS), Rob Emens (NCDWR), Jill Paxon (NCDWR), Brandon Puckett (NERR)

Summary of Action Items: (based on information in red found throughout the document)

- Hold a WebEx session to discuss further the use of drones in SAV monitoring
- Form various subgroups to work on specific tasks in greater detail
    - Subgroup to catalog remote sensing data (Dean, Don, Anne, Kathy)
    - Subgroup to analyze NCDMF species comp data (Anne, Patrick, Jud, Tim, Jessie)
    - Subgroup to develop protocol for collecting species comp data (Jud, Anne, Kathy, Jessie, Don)
    - Subgroup to review SAV policies (Tim, Anne, Wilson, Jimmy)
- Dean, Don, and Jud work together to update the SAV section of the APNEP Ecosystem Assessment
- Tim and Dean will work with Anne to investigate further if the incorrect 2013-2014 SAV maps were released and if so, the extent of their use and current availability
- Jessie will send Dean and Tim a list of questions she has regarding available data that can be used to construct an SAV model for NC. Dean and Tim will also coordinate communication between Jessie and Michelle Moorman, team lead for the APNEP Water Resources Monitoring and Assessment Team
- In absence of a subgroup, APNEP will continue to explore ways to promote the ecological and economic value of SAV
- Jud and Anne will lead the development of a proposal that can be used as a basis for acquiring state funding to support comprehensive routine SAV monitoring

Welcome and introductions / Review agenda and meeting goals

Dean convened the meeting. This is the first in-person meeting of the recombined Action Team and Monitoring & Assessment Team. APNEP decided to bring these two teams together largely because there was so much membership overlap. The merger requires a long agenda and thus the team must stick to the timeline to address all the topics. There will be opportunity for additional discussion during lunch and the team will be forming sub-groups to tackle certain actions more effectively. Dean asked everyone to do introductions.

Dean noted that he and Tim are the APNEP facilitators, but each team has a technical lead, and for this team that is Jud Kenworthy. Jud will lead the agenda and moderate the meeting.

Monitoring & Assessment Topics

AUV applications for SAV monitoring

Jud noted that he, Don, and others (e.g., National Park Service) had gotten together with David Johnston of Duke, with respect to doing some work with drones (unmanned aerial vehicles or UAVs) on SAV and barrier Islands. Jud had recently discovered the work done by Shuyue Li, a Duke MEM student (Dean emailed a PDF of this thesis to all team members prior to today's meeting). Duke has some very sophisticated equipment. The student was looking at prop scars, most of which Jud perceives were associated with waterfowl hunting. Jud projected some of the figures from the thesis and reviewed the capabilities of the methodology. They used Object Based Image Analysis, which is a high-resolution image analysis software. Jud had found of interest in the thesis that once they trained the software, the analysis has very good capabilities. Jud noted that they didn't ground-truth the species. They used their imagery to ground-truth their interpretation, which is one of the drawbacks with the thesis. A major source of interference would have been macroalgae, which he thought was not very abundant at the site. Jud suggested that the team should consider the use of drones for monitoring high-salinity SAV sentinel sites.

Jessie noted that her research team had used drones to fly three sentinel sites. They are getting 6-cm resolution and are ground-truthing because they do have macroalgae. They are trying to remove any variability from that source. They anticipate estimating change in meadow area.

Jud noted that the ground-truthing he and Jessie are doing for UAV footage is much greater than what was done in this thesis.

Wilson asked a question about Figure 6 that showed prop scars and bare patches…are bare patches also caused by props?

Joe mentioned it could be cownose rays. He asked about the type drone they are using.

The Duke study used a fixed-wing drone, but Jessie clarified that they are using copter drones and finding better resolution.

Jud stated that David Johnston is interested in continuing to work with Jud, Don, and this team.

Trish informed the team of a conference call she organized with NC Space Grant and NCDMF. One outcome was the need for research questions to include in RFPs, including technology questions. Trish is putting together a list, which she hopes to complete by mid-June, and asked members of this team to send her ideas that she can pass along to NC Space Grant.

Anne suggested that one question would be, "What are the best ways to classify and process drone data? A member of NCDMF's IT staff had been able to classify some imagery they obtained, very quickly.

Jud noted that there is a lot of software available. The biggest challenge is training the software, and the cost of the software, for object-based image identification.

Don noted that there is freeware available as well. Some of the technologies have been acquired by larger companies. People are getting invested in open source software. Dense beds are not really a problem for processing. You can do that quickly with a lot of things. Don said that we should really get excited about this. We will have to call it semi-automated if we are interpreting deeper areas, because the software will never be able to distinguish the edge accurately.

Dean noted that we have this thesis, and we will have Jessie's work. Perhaps this will be raised in the high-salinity protocol discussion. The team could possibly work with David Johnston and determine how AUVs fit into the 2019 monitoring work.

Jud noted that the sites Duke has done could be considered for sentinel sites.

Ken noted that after the APNEP conference, he had some discussion with the U.S. Marine Corps about using their drones for NPS work to survey Cape Lookout and Core Sound, because the Marine drones have a lot higher resolution. He has initiated that conversation and would be willing to continue it.

Jud noted that there is a lot of restricted air space in North Carolina, and if working with the Marines would help us to get past that issue, that would be great. Don agreed.

Ken suggested that the Marines might be a good partner in being able to cover the entire sound, since they could go into the restricted air space.

Tim suggested continuing this discussion further through a short WebEx. We could invite David Johnston to give a short presentation and then have time for Q&A and general discussion. Tim indicated we should keep the webinar option in mind for any of today's agenda topics that may need significant further discussion.

Available remote sensing data for SAV / Form subgroup

Dean noted that this action item was initiated in 2017. The idea is to have a catalog of existing remote imagery, within a spreadsheet format. That is still ongoing. Dean worked with Don, using Scott Chappell's original work. The goal is to populate the spreadsheet with remotely-sensed data.

Don is the technical lead on this and noted that as you begin to accumulate data, the question arises of what to do with it. Don noted that NCDOT has been doing this for a good while. The first time they did this, with a contractor, there wasn't very good data regarding what was done, and that exercise took

three years. When NCDOT did the 2013 survey, there are thousands of frames of the area surveyed. Don noted that they have the ability to import images to ArcGIS. He doesn't have the ability like NCDOT to put the images all together in a mosaic. Don doesn't have the software that provides for compression. Because some of the poor metadata tracking, it is going to take a while to document everything.

Dean indicated that anyone interested in this subgroup should contact him. Scott Chappell had done a lot of compilation early on for the imagery, but Dean is interested as well in creating a catalog of SAV field data.

Anne asked if he meant just "field data" as opposed to mapping per se and expressed concerns about quality control.

Dean said yes, any sort of data.

Jessie noted that it would possibly be a pretty big ask and also shared concerns about quality control.

Tim noted that APNEP doesn't necessarily want to get into the data management business, but creating at least a catalog of all the available data would be very useful.

Anne noted that there is a difference between the imagery, and maps. It is good to keep the information separate if possible. Dates on the photos in the mosaic should be documented.

Wilson noted that he would be very interested in seeing a database of SAV field studies that included the composition of the fauna using SAV beds.

Anne indicated that NCDMF does try to pull out the most important and relevant information. This is done to some degree through the CHPP. She thinks keeping the metadata on this would be very helpful.

Jud asked about just maps and asked if those are available.

Don indicated that is possible, he thought, right now. Scott Chappell had put together a huge dataset which goes back a good ways.

Anne noted that NCDWR had surveyed the rivers, and that information is included in Scott's database.

Jud stated in principle, we could produce a map of known maximum extent.

Ken asked if NCDOT has ever put together a map of all of its SAV surveys.

Kathy said they haven't but could.

Anne indicated that NCDMF has talked to NCDOT about the inlet SAV mapping.

Kathy indicated that they can share the files of the areas they do regularly, which includes the areas between Rodanthe and Oregon Inlet, as well as Harker's Island, and the area around Oregon Inlet. That area will be flown annually by drones.

Tim asked if anyone besides Dean and Don wanted to be a member of this subgroup - Anne and Kathy expressed some interest.

Update on and letter of support for NRCS subaqueous soil survey

Dean noted that Matt Duval of NRCS could not be with us today. The survey was scheduled to begin this year, but NRCS staff have been having issues getting equipment, particularly boats, together. They intend to conduct surveys on both the Atlantic and Gulf coasts. Their original effort was in Barnegat Bay, New Jersey, and now they are scaling up and coming to Albemarle and Pamlico Sounds. Dean worked last Friday to draft a support letter for the program. Dean hopes it will happen and the work will begin before the end of the year. They will be starting in the area of Lake Mattamuskeet and Swanquarter/Rose Bay. They have algorithms they apply to be efficient when establishing sampling sites. Dean noted that if this team eventually develops an SAV model, soils would be part of that model. Also, while NRCS teams are sampling, there is an opportunity to gather other data as well. They take 2-m soil cores.

Wilson asked if Dean went to the workshop in Savannah.

He did, and confirmed that someone from the USFWS I&M Program did attend.

Wilson wondered if the USFWS presence might have stimulated the selection of Lake Mattamuskeet and Swanquarter Bay as the initial sites in North Carolina.

Dean provided a brief review of early discussions between he, Jud, and NRCS to select a location. They had suggested a belt transect across Pamlico Sound but this wasn't logistically feasible for NRCS. Later discussions resulted in the selection of Swanquarter Bay area to begin this survey. Further details on the NRCS survey are available in the meeting notes from 5/8/17 and 2/7/18 that are available on the team's webpage.

Sentinel sites for low-salinity zones

Jud provided background for this agenda topic. Remote-sensing is more difficult in the low-salinity zones. The work that Joe has done has been facilitated by the participation of volunteers, some of who are in the room.

Joe noted that turbidity is quite high in many of the low-salinity zones. Turbidity is evident if you snorkel or use other methods. His team is using sonar and underwater video as a verification tool. There is a problem with cypress stumps causing false positives in some areas.

Joe's team did some initial work in 2012, using single-beam downward-looking Lowrance SONAR and BioSonics DTX SONAR coupled with underwater video verification. They are currently doing accuracy estimates, change analysis, and comparing SONAR with other techniques.

Joe showed photos of the high and low-salinity species. He pointed out several of the most common ones, *Vallisneria* and *Ruppia*. Joe showed a graph of the spectrum of salinity tolerance for SAV species in the region. *Vallisneria* was the least salinity-tolerant species shown.

Joe showed a map of historical SAV extent. Green dots were in some of the low-salinity areas. He noted that Dean came up with the term "invisible grass" because it is invisible to most remote sensing devices. Joe has done some kriging of the historical map, to define areas of low salinity that might support SAV.

Joe noted that they have used SONAR to detect SAV in those areas of higher turbidity where the SAV is not easily observed. He explained how the data are processed using software that comes with the equipment. SAV has bubbles in their leaves which create a different sound and enable detection by SONAR.

Dean noted that Joe had already presented some of the information in a previous webinar on 2/23/18 and those notes are available on the team's webpage. Joe concurred but wanted to have everyone in the room up to speed on the methodology, before he explained the new work.

Joe showed an example of a false positive from a cypress stump. Joe also showed a rapid assessment transect near Colington Island. They are using sidescan, and single-scan SONAR as well, and can now estimate area coverage of the areas where the SAV actually occurs. They do 100 random points along the transects for visual confirmation. They also characterize as absent, present, or sparse.

Joe showed us some examples from past work, where the agreement was 79%. With the Lowrance the agreement was 82%, so similar.

Joe's team did a rapid assessment survey of Albemarle Sound in 2014. They surveyed again in fall 2015 and were able to do change analysis. The beds are pretty dynamic, even if you sample at the same time of the year. Joe showed us an example from Kitty Hawk Bay. The change analysis shows both losses and gains. They can get some idea of the deep edges. The Biosonics SONAR may be more sensitive to things on the bottom in deeper water.

Joe reviewed the sentinel sites for the Pamlico River, and then the Neuse River. He displayed the maps for Sentinel Site 1 on the Neuse River, which was generally devoid of SAV. They found a lot of SAV in the Trent River, but there were some false positives, and true negatives, which they found by doing quadrat samples. They found generally good agreement, with both the quadrats and underwater video. The SAV was very patchy in the low-salinity areas.

Dean noted two team tasks. The first is to develop a manuscript that documents an established protocol.

Joe indicated that he and Jud have discussed an article for the journal Bioscience. The CRFL protocols are not yet submitted to a journal but that is on the SONAR.

Dean also asked about annual visits to the established sentinel sites.

Joe noted that it would be a lot for his team to do all 27 sites, annually. He would love to see the sites surveyed annually but it isn't possible for his team. It will take partners.

Dean asked what Joe's team was planning to do in 2018. Joe said that the APNEP/NFWF/ECU contract is not yet established, but he and his team plan to go out and survey some of the sites (ten in the Neuse River and four in western Albemarle Sound), so they can do change analysis. Joe noted that the Kitty Hawk Bay site was done last year, as a favor to APNEP.

Dean confirmed that they are going to do the western Albemarle sites this year. Joe indicated that they are planning to try to do the Kitty Hawk Bay site this year as well. They don't have the funding to do some of the other sites, like Currituck Sound and the other six sites in Albemarle Sound.

Shane Staples asked about the timing of their survey for the tributaries of the Pamlico River. Shane noted that South Creek, Goose Creek, and North Creek all typically have SAV.

Joe noted that it would be great to do all of these sites in May and June, but that just isn't feasible without additional support.

Jud noted that we have come to a "come to whoever" moment. We have the methodology. There are two things we face. One is how to rotate the sites appropriately in the future, and the other questions is who will pay for the work.

Tim noted we have that on the agenda for discussion after lunch.

Joe noted that they would love to have partners to assist with the monitoring.

Dean noted that perhaps APNEP partners can assist with the monitoring.

Joe noted that Bo Dame (Chowan University, APNEP-STAC member) is interested in partnering to monitoring the sites. Joe noted that Bo is closer to the Albemarle sites, and ECU is closer to the Pamlico and Neuse sites.

Joe noted that he forgot to mention that Tom Allen (Old Dominion University, APNEP Leadership Council member) now has a HyDrone, a water-based drone which he would like to use in NC. Joe had lunch with Tom on Tuesday, and he would like to do some work this summer.

Update on 2012-2014 map and change detection

Don provided an update on change detection. He reminded the team that the 2006-2008 interpretations were already available on NC OneMap. Don and Marygrace Rowe (APNEP special projects associate) have been interpreting the 2013-2014 imagery. They just finished the 2013 data for change detection. The last interpretation piece he is getting from Marygrace, is for the true seagrasses from Bogue Inlet to the bridge at Manteo. They divided the area into three pieces. From Ophelia Inlet to Cape Lookout, they had cloud issues with the 2013 images. In the big area, from the Manteo bridge to Hatteras Inlet, there was a loss of 5.9%. That has much to do with deepwater edge loss and patchy areas. There was much more of the dense seagrass category in 2007 than there was in 2013. Looking at change detection over a five-year period, a 10% change would be deemed considerable, based on a paper by Jud. So, 5.9% is below that threshold. From Hatteras Inlet to Ophelia Inlet, there was a 2.7% loss between 2007 and 2013. From Bogue Inlet to Barden's Inlet, it was down 7.9%. That area is problematic because of turbidity. There are many areas over there (and Don has snorkeled a lot of them) where *Zostera* comes in from seed and creates more variability. So, the overall change was -4.8%. The only thing they are missing right now, are the "from-to" data (for the remote-sensing world), for patchy versus dense categories. They are just finishing up the "from-to" data for the last segment and

then all will be ready to go. As soon as they conjoin those, the files will be ready for public release on NC OneMap.

Tim asked what the time frame is for completion.

Don noted that he won't be here for most of the rest of the month, but he is hoping that Marygrace will continue the work and finish within a month.

Jud asked if anything in the data jumps out at him. Don noted that the persistent turbidity areas do jump out. He will have to study the deepwater edge more, but it appears to be further out, deeper, in the 2007 data. There is definitely loss of dense beds, where the SAV is more fragmented. There are several areas where that is the case.

Jessie asked if the imagery was flown in May.

Don indicated that the imagery was flown in May for both areas.

Dean noted that in the 2012 assessment, APNEP used the 2006-2008 imagery to assess SAV. That is where the 139,000-acre figure was derived. Now with the new data, we can begin some trend detection. He proposed that he, Don, and Jud work together to update the assessment, and include the low-salinity areas as well. He noted that the assessments target managers and will be only five to seven pages in length. He would like to work with Don and Jud on this task this summer. Also, he envisions that assessment as the pilot for all of the additional assessments.

Tim noted that when the maps are ready, APNEP would like to do a press release.

Ann asked how that would be done, since the 2014 maps are out and already being used.

Don noted that if that was the case, then someone had provided them without his knowledge. He hoped that the old maps are not the ones being used.

Anne noted that consultants had asked them for the maps, and NCDMF had provided them. Anne suggested that a press release be done, to specify that these new maps replace the old ones.

Jud asked who provided the maps. Anne stated that they send people back to the originator, which in this case is APNEP.

Anne noted that there was a gap of almost a year before Don indicated that he wanted to re-do the maps. Tim checked NC OneMap, and the date showing is 2008. Anne stated that in the CHPP, the dates are later.

Tim and Dean will work with Anne to investigate further if the incorrect 2013-2014 maps were released and if so, the extent of their use and current availability.

Sentinel sites for high-salinity zones

Jud noted this could be somewhat redundant with the last discussion. He noted that right now they have a CRFL grant to look at three sites, including one near Topsail and one at New River. He and Jessie are working together on this project, considering the use of drones to do smaller sites. Other than that work, they have done no standardized selection procedure. That can be opened up to a team discussion right now. They are nowhere near as far as they are in the low-salinity sites. Jud noted that we are about to produce a map of the whole extent, but we still have a ways to go in the high-salinity sites, and that doesn't even include the areas outside the APNEP geography.

Dean noted it was always the intent to establish sentinel sites in the high-salinity zones, to examine remotely at least every five years, and also to examine species composition. The question he sees is what can be done in 2018 in terms of establishing the sites.

Jud suggested using the CRFL project to help in developing the protocols. That is one thing. The other thing is to definitely look into the possibility of using drones to compliment the monitoring.

Jessie noted that she isn't sure what is meant by "sentinel sites."

Dean noted that he was thinking something similar to what we are doing in the low-salinity sites, visiting them at least once a year, using the protocol once developed.

Joe noted that the team had discussed previously using the high-salinity sentinel sites similar to the way we are using the low-salinity sites. Monthly sampling is logistically more complicated and expensive.

Jessie indicated they are combining their work with water quality metrics. She always wants to do everything! But, she wants to go through the process first of determining what the protocol is for the high-salinity sites. They can place HOBOs for the light and temperature, but the conductivity ones, Joe noted, are more expensive.

Jud suggested that we look at the big picture, before we go to the details. The change data suggest that the high-salinity areas are in pretty good shape. He noted that we don't have any error measurement, so that average 4.8% change could easily be within error. What will be more interesting is to see the "from-to" data. If we are going from dense or patchy, to sparse, that would be important. The urgency for establishing sentinel sites in the high-salinity sites, in Jud's opinion, is not nearly as urgent as establishing them in the low-salinity sites, which he noted are much more dynamic. He suggested that we have more time on the high-salinity sites, in terms of developing tools, so we don't need to rush to judgement.

Jud asked from where the funding source to establish any high-salinity sentinel sites will come. Also, there is no information about species composition, and we have more to learn about that as well.

Jud noted however that there is one big sentinel site, which is the entire extent over several years.

Dean would like to see 20 sentinel sites established within that overall high-salinity footprint. He noted that the overall mapping takes a five-year census approach, whereas the sentinel sites are looking at interannual variability. Given that Jud had said they would know more after they complete the ongoing work this year, Dean asked if there would be any benefit to establishing another site farther north.

Anne indicated that ideally you would want some more sites further north, in view of the work that is going on to the south.

Jessie noted the characteristics of the three sites they are monitoring. She indicated that she would love to add another site, but another partner would have to do the work.

Dean asked, how much utility would it add to the study?

Jud noted that until they have drilled more deeply into the species composition data, he couldn't say where to locate any sentinel site, because he wouldn't know which species might be present at the site.

Dean concluded that by fall or winter we would have more insight, so we shouldn't rush. Anne noted that the work they are doing is far more that what would normally be done in a sentinel site, so it would be good to wait.

Sampling protocol for high-salinity zones / Form subgroup

Dean asked if they would be able to recommend a high-salinity protocol in 2019.

Jud indicated that the protocols are nationally recognized, and he could provide a protocol now. There is no need to wait on that task. Much more difficult is determining where to place the sites.

Don noted that as far as the "from-to" data, the northern zone is the one of most concern. One area went from 36,000 acres to 21,000 acres. Some of that might be just seasonal change. The 2007 imagery was flown in October and had much more area classified as "dense". There needs to be some further discussion with respect to that fact.

A subgroup was determined not to be needed at this time.

SAV model (water quality / hydrodynamic) / Form subgroup
**Note: this discussion was moved ahead from later in the original agenda.*

Jessie noted that she has done some similar work in Barnegat Bay. She would be interested in determining if the seagrass component of that model could be applied here. Jessie indicated that she needs some additional information about available resources - where are the water quality stations? She also suggested that we look at what has been done in Chesapeake Bay as well, to see if a SAV model from there might work better here.

Dean asked her to send a list of the questions she has, so that APNEP can assist with addressing them.

Tim noted that Michelle Moorman (USFWS, APNEP-STAC) is the team lead for the APNEP Water Resources Monitoring and Assessment Team, and she has recently formed a "eutrophication" subgroup to examine several water quality parameters in the estuary from a SAV suitability standpoint. Tim suggested that these SAV analysis efforts by both teams presents a great opportunity for further collaboration.

Jessie committed to send the questions to Dean and Tim.

Tim will share that information with Michelle and her group.

Joe asked if they were going to consider low-salinity in their criteria. Jessie indicated they would.

A subgroup was not formed at this time.

Lunch

Dean and Tim asked members to break for lunch (11:45 AM) and return to the conference room at 12:30 PM. They suggested that members bring their lunch with them so we could continue work.

Review data on species composition / Form subgroup

Anne noted that NCDMF Program 637 has the data from the ground-truthing for SAV. They really haven't done anything since the last meeting, but they will get together and work on it.

Jud indicated he had a few questions. He asked if the map (which he showed to Anne on his laptop) is all years combined. Patrick indicated that he thought it included all of the data. Anne indicated that she thought she had sent a spreadsheet of the data to Jud.

Because no one else could currently see what Jud what was displayed on Jud's laptop, Anne would review the other programs first.

Tim suggested that Anne can just do a cursory review of the available data here, but do a deeper dive in a smaller workgroup.

Anne noted that she had done a query, back in 2008, to pull up data from any of their sampling programs, to look at the bottom composition data, which is a mandatory field for most of their sampling programs. They made some maps that showed positive occurrences of SAV. Also in 2008, they met with their Habitat Subcommittee, and considered how to ramp up their data. That is when they added the requirement to record the species of SAV. There may be some data from prior to 2008, but she doubts that is the case.

Anne projected a map that showed the NCDMF Program 100 sites (seining and trawling for juveniles) which does record the SAV species. Joe asked how they get SAV in the trawl. It is swept off the bottom, but they still record.

NCDMF Program 120 also records SAV species. They don't record any south of New River, since they don't trawl over SAV, because they are typically trawling in deeper water. Anne indicated in the south the SAV is typically in the shallower waters.

Tim noted that historically there was a disconnect between the location of trawling, and where the SAV was growing. He helped analyze some of these survey data in 2007 during the Region 1 (Albemarle Sound) SHA-selection process to establish predictive relationships between finfish abundance and diversity versus various physical habitat and abiotic parameters. In many cases, the data suggested that SAV presence was not associated with higher juvenile fish abundance or diversity, but this was determined to be a likely artifact of not actually sampling in SAV.

Joe noted that anything in the trawl could have been just drifting vegetation. Anne thought they didn't identify it to species unless it had roots attached.

NCDMF Program 915, the fishery independent gillnet survey, also may have some SAV information. The estuarine gill net sampling is another big one because it covers a lot of area, both shallow and deep, and is done year-round except in winter. Shane said "shallow" is perpendicular to shore and "deep" is over six feet. The SAV is picked up from the samples attached to the anchors.

NCDMF Program 135 is in Albemarle Sound and Anne believes is also gill net. NCDMF Program 195 is done in Pamlico Sound, in May and September, but the trawling is in deeper water. Program 915 gill-netting along with the other programs covers everything.

There is a scallop survey done quarterly, January, April, July and September. It doesn't go everywhere. That is the Bay Scallop survey. Hard clams are surveyed in the summer in Core Sound. Trish indicated that is done with tongs. The scallop survey is done with a dredge. There is also an estuarine bottom mapping program that is conducted year-round. That data set is included in the mosaic Scott Chappell put together. It uses quadrats and patent tongs to estimate percent cover and some species composition. The last one is the SAV ground-truthing program. Anne indicated that they can use the programs to pull out stations where there was a positive encounter with SAV.

Jud asked if they could pool all the data from all of the programs.

Patrick stated it could be done but it would take some time to compile it all.

Joe asked if it was in shape files.

Anne indicated that they would have to pull the data from the database.

Trish felt that you could pull up SAV, or bottom composition. She suggested a staff person who could pull the data.

Anne indicated that one could specify the gears, the months that you wanted. You could eliminate the trawl programs if you didn't want to use the trawl samples. You could use the SAV species codes to pull the data.

Joe felt that it would be useful to mine these data, for species composition, especially for the Albemarle and the Neuse River. It would be useful to have a comprehensive map, since there are places these programs sample, that ECU will not.

Anne noted that you could get positive encounters, but you wouldn't benefit from any absence of SAV.

Joe agreed it would be a data-mining exercise, but he felt it would be worthwhile.

Trish said that all of the variables should be the same. You will also have other data on turbidity and other metrics as well.

Anne noted that at a recent meeting they discussed whether to delete some of the metrics.

Joe noted that it would be very nice to have the species identifications. He had submitted a proposal to NSF to use all of the data collected along the coast and assemble them together. That didn't get funded. It would be good to have someone do that task.

Ken Riley asked if Anne felt that the NCDMF staff were qualified to identify SAV species.

Anne indicated that they had provided the training, and they all have field guides. Ken noted that when he did his doctoral research, he found that some NCDMF staff could not properly identify SAV. Anne noted that Trish was the manager for that program, so she should be able to say.

Shane noted that it varies. He noted that with respect to the rivers, there were not many species in the rivers, so it wasn't that complicated.

The point was made if they couldn't identify it in the field, they were to bag it, tag it and bring it back.

Joe asked how many of the NCDMF vessels have units that can map their routes and also observe the bottom. Shane indicated that most all the boats have Garman units. Joe noted that they can see the SAV on the units and asked how much trouble it would be to collect those data.

Tim noted that the best thing to do now he felt is to form a subgroup. Jud is going to talk to us next about the coastwide needs. He noted that the NCDMF staff would definitely be on the subgroup and asked if anyone else wanted to participate. They could consider other potential projects as well. Jessie volunteered to help with the subgroup.

Potential coastwide survey of species composition

Jud noted that he will be speaking only about high-salinity zones. APNEP will attempt to re-map the high-salinity zone in 2019. It is fairly well known that there are mostly three species of seagrass in the region: *Ruppia* which is cosmopolitan; *Zostera* which is high-salinity and at its southern range; and *Halodule* at its northern range. Jud asked Joe to edit one of the salinity tables he had displayed. Joe said he would do so. Jud noted that if APNEP will use data for adaptive management then APNEP needs to know spatially and temporally the system dynamics; and to know seagrass composition. Thus there is a need to complete a stratified random sampling of all red zones south of Oregon Inlet through Bogue Sound. The northern area could be sampled in several weeks using a live-aboard vessel switching out crews. A probabilistic survey with stratified random sampling should be designed.

Jessie asked about timing.

Jud said ideally it should be done all at once. He wondered how to fund it.

Jud clarified that this would be all “in-water” work. No rakes. Monitoring teams will enter the water and examine the grass, probably in June. June would get the overlap of species.

Anne stated that it would be the same stratified random sampling as is already done, only the new method would be done.

Jud stated that he would prefer to do all the work from the live-aboard vessel.

Jessie asked if he had any ideas for funding. Jud said not really.

Jud noted that there are many gaps, based on the Excel file he had examined. Anne noted that needs to be examined by a subgroup.

Jud asked for thoughts.

Tim stated that acquiring a large enough boat and crew would take funding, but wondered if some pilot work could be done in the interim.

Jud stated that APNEP could monitor from Atlantic to Bogue Inlet via boat ramps, but with people getting in the water. We could put whatever funding we could find into an eastern Pamlico Sound survey.

Don Field noted that would take a lot of snorkeling. He asked Anne if that would be problematic.

Anne didn’t think that would be an issue.

Jud thought that the big cost would be the live-aboard vessel.

Anne noted that when NCDMF has done the ground-truthing, they based the assignments on where the staff was located. The more intense the sampling, the more staff would be required.

Ken asked if the work could be done with volunteers. Jud noted that is the case, but you would have to manage all of these people.

Jud clarified that Anne was saying that it would be difficult to find enough staff to do the work, in areas where they have many other projects underway. Anne noted that transitioning to in-water, from having used rakes previously, would be problematic. NCDMF are having issues maintaining what they have now. She felt that they could do about the same amount of work they did for APNEP during 2013-2014, with the staff they have now.

Anne noted that APNEP staff had helped in the north during 2013-2014. Jessie noted that she could marshal student volunteers in the south.

Joe asked if Jud had to have a live-aboard.

Jud stated it would just be a lot easier with a live-aboard.

Anne stated that you may want to compare the costs of the live-aboard to the costs of staying in hotels.

Tim asked about the liability issues.

Jud noted that APNEP would be chartering a boat.

Jessie stated that UNC-W volunteers would be covered under her program.

Jud was not sure that state employees would be allowed to work off a live-aboard. Anne noted that they have a research vessel. Shane noted that it can carry only four people and two of them must be under six feet tall.

Jud asked if it would be even possible to use that vessel. Shane indicated for various reasons it would be difficult: rope ladders must be used to get on and off the vessel. Jud noted ideally that you would have to get off and on the boat into small vessels. Jud noted that some members in the room have done this sort of sampling for years.

Joe noted that ECU has a dive boat, which sleeps four. The boat could operate conceivably from Manteo and use the dorm facility there for field crews. You could shuttle people in and out. The vessel is kept in Morehead City, behind NCDMF's office. It is called the "Cutting Edge" and you can examine it on your way home today.

Patrick noted that in his experience, the charter fees are pretty expensive.

Joe said it is $625.00 daily. That is a possibility.

Shane stated with the exception of the Outer Banks, there is a ramp within five miles of anywhere you would need to go. NCDCM use 20-foot sampling boats every day.

Jud noted that he has done boats his entire career and would prefer to use a live-aboard.

Jessie asked staff if there might be some way to fund this from USEPA.

Tim said that there is nothing that would fully fund it.

Jessie indicated that the NEPs aren't all of USEPA, so what about other divisions?

Tim noted that the team will discuss opportunities for funding later on today when we get to that part of the agenda.

Jessie noted that the effort really needs to happen, when the flying is done, optimally.

Tim thought it would be worthwhile to develop a proposal.

Ken suggested Jud apply to be a National Geographic Explorer-in-Residence, go for a large pot of funding, and make it into an IMAX movie. He noted that he was totally serious. You talk about it being the largest expanse of seagrass, etc.

Joe noted that the area has also become a nursery ground for bull sharks, which is another angle of public interest.

Jud noted that other resource issues could be addressed during a cruise which was addressing SAV. If someone else has a project for which they need data in Pamlico Sound, at that same time of year, APNEP could possibly leverage some things.

Tim felt it would be worthwhile to put it all down on paper. We could work toward the larger, better funding goal, by getting small grants here and there.

Dean asked how many ground-control points we applied for both cycles.

Don noted that he didn't have a break out for high-salinity, versus low-salinity. Don thought it was about 400 in total. Anne noted that it wouldn't include Currituck the next cycle.

Tim wanted to ensure that this topic was thoroughly covered. Many wanted to have species composition before doing another aerial survey, and he doesn't want the team to come up short again come this December when the need to start planning for the next SAV flights arrives.

Anne suggested that we give ourselves a deadline of August for holding a subcommittee meeting. Jud noted that would include the high-salinity sampling protocol.

Dean noted that the plan would be to target April-May 2019 for the flight period. The atmosphere is problematic for aerial surveys by June.

Don agreed that there are more better days in May than in June. He has tried working in June, and there are rare days, but he has never been able to access a plane in June.

Jessie noted that in her sentinel sites, species composition changes a lot during May. Anne agreed.

Don stated that he should be included in the planning. He found a lot of seagrass in October, so that should be taken into consideration.

Kathy noted agreement that NCDOT finds a lot of SAV in October from Rodanthe north.

Anne noted that in August there is a lot of dead grass drifting.

Kathy noted that NCDOT sample the area regularly and have a lot of drone and ground-truthing data to share; they map and they take species composition.

Shane said that they do snorkel and use a hand-held counter to track species composition.

Ken noted that he has reviewed many projects in the vicinity of Harker's Island which included species composition.

Kathy noted that their survey areas are fairly small. They do species composition and ground-truthing in a 300-foot wide corridor. NCDOT also works in Currituck Sound for species composition and sonar.

Tim asked if anyone wanted to sign up now. Kathy, Jessie, Don, Jud, Anne to join subcommittee.

Dean asked about any other topics.

Joe asked about citizen science as a method for doing survey work. He noted that in inland freshwaters, citizens are being asked to survey transects using their SONAR gear. Folks living on a dock could also be asked. It could entail monitoring and outreach.

Dean noted that when designing APNEP monitoring strategies for indicators, the role of citizen science must be addressed. There would have to be a section in any protocol which sets forth what role citizens could play.

Joe felt that the SONAR aspect could be added. Citizens could be given training, and they might be willing to assist, especially if they are compensated for their fuel.

Ken suggested that commercial fishermen could also be used.

Shane suggested that Coast Guard Auxiliary volunteers could also be used.

Joe noted that he thought that there would be a lot of folks who live around the Sound would be willing to help.

Tim noted that fishing guides also would likely be willing to help.

Joe stated that perhaps we could seek CRFL funding or Sea Grant to underwrite some of this.

Tim agreed that was a good segue to the next topic. The team needs to document all of these good ideas in the form of a strategy that can be implemented.

Policy & Outreach Topics

Updated ASMFC policy on SAV / Form subgroup

Wilson and Jimmy reviewed the revised Atlantic States Marine Fisheries Commission policy. Jimmy noted that the policy was pretty much left as is; goals remained same but updated with new research and monitoring. The information is organized by state for ease of review.

Wilson was asked to address some of the other SAV policies. Wilson noted that the South Atlantic Fisheries Management Council (SAFMC) has a policy as well, and he briefly reviewed it via his laptop display.

Tim noted the need for having a policy review subgroup to put together a strategy.

Anne thought that the SAV Partnership had done this in the past. NCMFC had a policy. Also, NCDENR had compiled a lot of good guidance, which included information about dock elevation and so forth. That is a good background document. She asked if the policy would be APNEP or North Carolina.

Tim noted that during a recent team webinar there was a lot of discussion about Kitty Hawk Bay, where the Town of Kill Devil Hills wants the State to spray invasive SAV (Eurasian watermilfoil) around private docks to improve navigation (further details on this are available in the meeting notes from 3/23/18 that are available on the team's webpage.). NCDEQ has elements of SAV management that both control (in the case of invasive species) and protect (native species). To Tim it appears very fuzzy with respect to who has authority, especially when native and non-native SAV species coexist in an area. For example, the NCDCM has guidance about how to build docks, etc. for the purposes of minimizing negative impacts to SAV, while NCDWR is able in certain circumstances to spray herbicide on SAV around docks. There are competing interests and there is a need to reach some understanding.

Joe asked what has happened in Kitty Hawk Bay.

Anne stated that Rob had indicated to her that he has never heard from the town, so things are still pending.

Tim noted that Eurasian watermilfoil is on the Aquatic Weed Control list, and is present in Kitty Hawk Bay, but not in a monotypic stand. Also, providing control for private docks would be setting a bad precedent.

Anne noted that there has been an agreement that Aquatic Weed Control would come to NCDMF any time they were planning to spray in coastal areas. There is an act which permits them to do the spraying. Anne noted a policy at the legislative level would probably be needed, because multiple state divisions are involved.

Ken suggested that the team could come up with a plan.

Tim noted that there is a big issue with nutrient loading in the Kitty Hawk Bay system, and that high SAV growth will likely occur regardless of the amount of spraying. There are still conflicting policies regarding what can be done.

Anne felt that it would take NCWRC and NCDEQ working together on that issue.

Maria indicated that Rob Emens was the person that spearheaded the Aquatic Weed Control program.

Tim confirmed that was correct and reminded the team that Rob is a member of the team, having rejoined following our March 2018 team webinar on Kitty Hawk Bay.

Anne stated that Corrin Flora was the NCDMF person assigned to the Aquatic Weed Control program.

Shane indicated when Rob presented the Kitty Hawk Bay plan earlier to the NC Aquatic Weed Control Council, it was just the usual public boat ramp area that was proposed. Tim indicated that this team's meeting with Rob was very helpful, as it helped Rob better understand the complexity of the situation and the concerns of all involved.

Anne noted that there isn't any rule right now that protects native species.

Tim noted that many changes are happening right now in regards to policies and legislation impacting aquatic habitats. He felt that the time is here for us to champion SAV resources.

Jimmy asked if the guidance document that the team had worked through is online anywhere. Anne didn't think it was, but she thought she had circulated it.

Jud noted that California has a no net loss policy for SAV.

Anne read aloud some guidance for policy development. Joe noted that one guideline is to use best available science.

Ken noted that NMFS is preparing an SAV policy for the Southeastern US, and it would be great for North Carolina to lead that.

Tim asked who would like to be part of this subgroup. Anne and Wilson volunteered to help with the subgroup.

STAC to review ecosystem impacts of mariculture / Potential questions pertaining to SAV

Wilson informed the team that at APNEP's Leadership Council meeting on April 30, the APNEP Science and Technical Advisory Committee (STAC) was given the charge of developing questions to be addressed in a white paper on the potential impacts of an expanding mariculture industry on the ecosystem services provided by the Albemarle-Pamlico estuary. Wilson had begun working on a draft list of questions and he mentioned several areas where he thought the STAC could start their discussions, including a review of the types of mariculture operations that are presently authorized in North Carolina or likely to be authorized in the near future, an identification of the ecosystem services provided by North Carolina estuaries are likely to be affected by mariculture operations, and a query of other states that have already undergone mariculture expansion to determine their experiences, particularly regarding regulation successes and failures. Wilson further reviewed his draft list of more specific questions and asked that today this team discuss potential questions for the STAC to consider that pertain mariculture impacts on SAV.

Jessie noted that UNC-W is doing a study to identify potential interactions between rack and cage shellfish culture and adjacent critical SAV habitat. Those researchers have worked with stakeholders on interaction of SAV and mariculture; when is it SAV and when is it not.

Ken stated that he and James Morris (NOAA) direct the nations aquaculture program and are working on siting tools and procedures for aquaculture, as well as interactions. At 16 staff, their lab will soon be the largest research group at the NOAA Beaufort Lab. They are currently working on a site analysis for Bogue Sound, looking into how "shellfish enterprise zones" would help North Carolina. Their mission is to provide science to inform policy, primarily to coastal managers. Ken and Jud have a forthcoming publication on shellfish aquaculture interactions with seagrass that they would be pleased to share.

Anne noted that Joel Fodrie (UNC-CH IMS) is heading up a study on this as well. The Fodrie study, and the UNC-W one, will be the only two North Carolina-specific studies.

Ken noted that we have not had the landscape-level approach that has been taken in the Pacific Northwest. In Chesapeake Bay, there has been a huge increase in SAV which is coincident with the increase in shellfish. Ken stated that his group is concerned about some of the language in the ASMFC

SAV policy document. Paul Doremus will be talking to ASMFC about that also. They are meeting with Louis Daniel about this as well.

Jessie noted that a lot of the SAV improvements in Chesapeake Bay probably have to do more with water quality improvements than with shellfish mariculture.

Brian Boutin pointed out that from a business model standpoint, no mariculturist is going to put an operation in an area which didn't have good water quality. Brian noted also that there is a difference between finfish mariculture and shellfish mariculture.

Ken Riley noted that some of the state legislation has changed the rules with respect to SAV.

Anne noted that from a NCDMF perspective, the public trust issue is of more concern than the ecosystem services issue.

Tim noted that it is a large and complex issue with much uncertainty, which is one reason that APNEP felt the STAC should engage.

Anne noted that North Carolina has had mariculture for a long time, but the change now is one of scale.

Tim noted that a current version of pending legislation would allow shellfish leases of up to 300 acres, as well as additional "shellfish enterprise zones."

Anne noted that the enterprise zones are going to require a lot of discussion and that ultimately, the NCDMF would put them in areas where they would be least problematic.

Anne and Patrick noted that the acreage was still limited. Patrick indicated that there was language that would preclude anyone having 300 acres.

Anne noted that there is also a stakeholder group which has been charged with developing a mariculture plan. There are many moving parts, so it would be informative for the STAC to hear about all of this.

Tim noted that this mariculture plan under development has no ecosystem impact aspect.

Anne agreed it was focused on the mariculture aspect.

Tim noted that the STAC effort would not be a position paper; rather it would be for the purposes of providing information to address important questions regarding ecosystem impact.

Anne suggested that a symposium would be good. She noted that the university researchers would be able to say what is allowable, or not.

Ken noted that the North Carolina Coastal Federation's Oyster Steering Committee is really expanding right now, and there are open seats. Senator Bill Cook in his proposed legislation didn't want to change the residency requirements, or the 300-acre provision. They did try to enhance the ability for NCDMF to clean up failed aquaculture operations. There was an operation in North Carolina that failed and required 19 dump-truck loads to clean it.

Joe asked why it failed.

Ken said it was probably economics. The debris that was removed included sandbags used to weight down the cages, and the mesh bags and pilings.

Joe asked if there is any requirement to cleanup operations once they fail. Anne indicated that there isn't at present. She thinks that a bond requirement would probably ultimately be part of the requirements.

Joe noted if operations go bankrupt, there is no funding for cleanup.

Jud asked what the trajectory for this legislation is.

Anne stated that they are having discussions this week and next. She thought that there is a fair amount of opposition.

Jud stated if the bill passes this week, what good will STAC input have?

Tim noted that this has been a concern of STAC members for a long time, including by Jud and others on this SAV Team. The original state legislation concerning mariculture expansion and interaction with SAV passed three years ago, but the STAC has yet to engage on this issue. Tim thinks that given the rapid pace at which decisions are being made now on this issue, including the scaling-up of allowable operations, there is a greater sense of urgency for the STAC to engage.

Anne noted that things can change in a year's time; a different legislature may pass different laws.

Ken noted that there are many measures that did get incorporated into the legislation quickly.

Brian asked if there is a spatial plan associated with the mariculture plan. Ken said no.

Brian felt that with the information coming from the mariculture plan, the STAC should be able to guide development. The STAC could help drive where things get sited. He felt that there is a lack of information on the use side. That might be one thing that the STAC could do.

Anne noted that NOAA is showing the state how to do a pilot study, using Bogue Sound.

Patrick noted that the public trust is always a gray area, and that usually results in lawsuits for them.

Anne indicated it will take political support for transitioning to a spatial planning concept. There will typically be limits, and someone no doubt will be unable to put a lease where they would like to put it. It would be useful for APNEP to be involved.

Brian noted that net pens take larger areas.

Tim noted that many of those present wear multiple hats. As the SAV Team, in charge of championing SAV conservation, the STAC needs particular questions directed at SAV. While those questions need not be created now, they are needed. The questions will be forwarded to the Leadership Council, who will

work with the STAC to ensure that researching those questions will adequately address stakeholder concerns on this issue.

Jud asked whether the Leadership Council has discussed having a one-day symposium to address the issue.

Wilson and Tim noted that they may not have raised that prospect at the Leadership Council, but Dean, Tim, and Wilson have talked about that possibility.

Jud felt that we shouldn't hit the STAC cold with the topic. We should plan to bring them up to speed on the topic prior to assigning them the task.

Tim noted that it would most likely be a sub-group of the STAC that would address the issue.

Wilson noted that we don't have to wait until the STAC's September meeting to task the STAC, assemble a sub-group, and get moving with putting together information. Does STAC have the funding in the budget to call a STAC, or sub-group meeting, before September?

Tim asked Brian as the new STAC co-chair what he thought. Brian supports the STAC engagement, likely through the form of a sub-group. He also liked the idea having a symposium on the topic for the STAC.

Tim and Wilson both solicited questions for the STAC. No specific questions were posed by the team during the meeting.

"SAV Initiative" or other ways to promote ecological/economic value of SAV / Form subgroup

Tim made some suggestions to include goals for education and outreach. The team had talked earlier about citizen monitoring, but first there is a need to have citizen awareness of the value of SAV so that would work its way up to the policy-makers. There is a clear need for this work, and this body should be responsible for developing a way to promote the ecological/economic value of SAV. He asked for volunteers to join a subgroup to tackle this issue.

Dean noted that Tim had mentioned earlier about the involvement of the APNEP Water Resources Monitoring and Assessment Team that could assist with SAV modeling needs, but also there is an APNEP Engagement and Stewardship Action Team that can assist this team in this regard.

Tim agreed and noted that he didn't want this to be a back-burner issue. Monitoring is important, but the team also should be able to make some progress on this as well. The SAV Partnership had made progress on this, but not much new has been done for several years.

Brian noted that part of the issue is the awareness of many folks moving to the coast, and their lack of understanding, especially in the lower-salinity areas where SAV can form dense beds close to shore. If the team is successful in facilitating the restoration of SAV, there may be more conflicts, so there is a need to proactive so there aren't any more Kitty Hawks on the horizon who want to spray everything. A plan is needed.

Anne noted that the SAV Partnership's outreach sub-group had talked about doing a one-pager for legislators. Joe was also on that sub-group. Joe noted that they came up with a sign that could be

posted at launching ramps. Neither the issue of control as in Kitty Hawk Bay, or the navigation issue which boaters may bring up ,wasn't really addressed.

Joe noted that there are mechanical ways to harvest excess SAV. Anne noted that she was not in favor of those techniques, at least the ones she has seen. Joe noted that it is no good to avoid the issues that people are upset about.

Anne asked Joe whether it was better to educate the public or the legislators. Someone said the legislators.

Brian noted that we need to know who is doing the complaining. Also, the commercial community can be good allies. Brian noted that the Kitty Hawk Bay issue wound down once they had a manatee there for about a month and a half, eating the SAV.

Joe noted that he was in favor of considering mechanical control, in order to maintain navigation.

Jud noted that no one of this team has this educational/outreach specialty. Someone from outside the team would have to be recruited. Jud noted that he was in a Core Sound Waterfowl Museum video, and people come up to him all the time and say they saw him somewhere, and it was in that video, but he knows nothing about how to do one.

Tim agreed that we need to work with others. The point he was making is that the team needs to establish the message that needs to be conveyed.

Jessie noted that the message varies, depending on the legislator. It can be fish, or carbon, or water quality - the message will vary regionally and politically.

Tim agreed with Jessie, noting the need of outside funding and support, to get the state to protect this great resource. We must have a campaign in place to help get the necessary funding.

Jud noted if you study the places in the country who have great outreach, you will see what they have are Congressional champions. The Chesapeake Bay Program funding comes from Congress.

Tim noted that a plan is needed to get there.

Anne noted that state agencies can't lobby.

Tim noted that he wasn't talking about federal dollars. He was talking about state dollars.

Brian asked, what is the issue? Do we have a rapid decline of SAV? Regardless of whether we are doing outreach or education, what is the hook? It is hard to sell further protection, if people are seeing the SAV becoming a problem.

Ken Riley suggested a political action plan. Identify some stakeholders who have a vested interest in the outcome. He provided an example. Camp Lejeune had a need for training, so they are a constituent whose activities would be affected. You need folks who will stand up and speak up for you.

Jud felt that there are two logical constituents: commercial and recreational fishermen. Brian urged us not to forget the waterfowl hunters.

Ken noted that it is better for APNEP to have constituents or stakeholders speaking on their behalf. It is even better if economic interests can be linked. Also of benefit are events where legislators are present and their stakeholders advocate.

Anne noted that almost all of the team are state or federal employees, so what we need is a NGO, like the North Carolina Wildlife Federation. They may be a good partner.

Tim noted that APNEP has had this discussion a lot, even recently following APNEP's program review by the USEPA in May. APNEP staff can't lobby, but they can engage partner organizations and citizens who can.

Jessie noted that there are limitations on her, as a faculty member.

Joe noted that the CCA would be a good possibility. Their members are purchasing Lowrance SONAR equipment, in part so they can map the bottom.

Jud noted that the team must develop a strategy. You can't soften stakeholders by saying that there is a crisis. He asked how this team can get people interested in the resource, without a crisis.

Anne suggested the option of making a connection with water quality, and the team's attempt to be proactive.

Tim noted the discussion about restoration not being the team's focus, because of low success rates. Being in a much better position now from the lack of SAV loss, there is a need to be proactive as Anne suggests, in order for ongoing efforts in SAV conservation to be successful in the long term.

Jud noted that he is simply saying that the team must think about things carefully, in the absence of a crisis.

Tim noted that he would like to continue this discussion in a sub-group. We have to take ownership of this issue and need. There were no volunteers to form a sub-group; APNEP will continue to work on this topic.

General Topics

Updated MOU or other options for improving/sustaining collaboration / Long-term plan to support team's activities

Tim noted that this topic was discussed in 2017 and many on the team didn't believe it was needed then. He wanted to have some discussion about a long-term plan for supporting the team's activities. At some point the protocols will be developed, sentinel sites established, and the composition will be determined, so long-term support for the necessary routine monitoring will be needed. Jud had noted in his presentation to the USEPA during APNEP's recent program review, that the support for SAV monitoring must be a focus. The likelihood is that APNEP needs to find a way to get to the level of support that Chesapeake Bay Program has.

Kathy noted that NCDOT spend a lot of funding mitigating seagrass, and they never get input. She would like to have some input on that policy from this team. Ken suggested she send Shane an e-mail, since he was out of the room. NCDOT has a plan for mitigation near Rodanthe, and in the vicinity of Oregon Inlet. There is a long-term plan which entails a third bridge, which would require a lot of mitigation.

Jud noted that when looking around the country at SAV conservation programs, he can't think of any that aren't partnerships already. If they aren't really full partnerships, they are partitioning the needs. The pendulum can swing back again rapidly.

Anne noted that at the state agency level there is a better environment, at least at the Secretarial level. The current administration is very supportive of habitat efforts.

Tim agreed, noting that there is a large amount of funding with CRFL. He referenced a new paper which just came out in Conservation Letters, which observed that society gains great value from the ecosystem services provided by SAV, but relatively little funding goes towards protecting SAV. There is a need for funding everywhere, but the habitat side of fishery management would benefit greatly from more resources.

Brian noted that it isn't likely to happen on the federal side. All of the taxes are based on firearms, and other equipment.

Anne noted that NCDMF does have Wallop-Breaux funding. Wilson noted that pays for the striped bass tagging.

Tim asked if some of the CRFL revenue could possibly pay for some of the monitoring.

Anne indicated that the RFP for CRFL is being re-done right now. When asked for input, she put SAV monitoring on the list and hopes that the RFP is out by July.

Tim asked if it could be more of a line item under CRFL for recurring spending, much like other survey programs.

Anne indicated that it is possible.

Tim noted it is a large amount of funding, and if we are looking for funding from a logical source, that could be one.

Anne noted that there is a portion of the CRFL funding which is bundled into five-year plan, to cover administrative costs and other costs. Jud was wondering if SAV monitoring could be factored into that plan.

Anne noted that aside from the five-year plan, there is a large amount of funding available.

Tim asked what the average annual revenue from CRFL was. No one was certain.

Jud felt it was reasonable.

Anne noted that there are others who believe it is just as reasonable to put it all into striped bass research.

Tim noted that the biological connection between SAV and fisheries production is direct and significant. Monitoring to conserve SAV is important for nearly all aspects of successful fisheries management in North Carolina. APNEP needs that message to resonate so that the use of fishing license money to pay for SAV monitoring costs seems reasonable to all.

Trish and Anne had some discussion regarding changes in the use/amount of CRFL funding.

Anne suggested that we develop a comprehensive proposal to do the SAV monitoring. That cannot be done until a plan is in place.

Jud felt that he and Joe could put together a mapping and monitoring plan in two days.

Anne suggested that they put in the proposal what they need.

Jud noted that the socio-political aspects must be addressed as well.

Ken felt that the NCWF and CCA would support this strongly.

Tim was thinking maybe those two groups would also contribute additional funding.

Jud noted that he thinks Tim's idea is good to get on top of the CRFL proposal.

Anne indicated it would take more discussions at the director level.

Tim noted that he is pushing the team in terms of implementation to consider five years out. Currently there is no funding to support any kind of long-term routine monitoring. He appreciated all of the excellent work that is being done.

Other topics from team members

Jessie noted that a lot of ground was covered today. She requested that future in-person meetings allow the team to spend more time in depth on fewer issues. She suggested having more webinars to reduce the amount of material that needs to be discussed in person.

Tim noted that this team has had two WebEx meetings since the last in-person meeting in February. Forming sub-groups will enable use of WebEx meetings to facilitate more discussion.

Jessie indicated that she likes the sub-groups, she just felt that there was too much to cover today.

Tim noted that we had covered a lot and it was a daunting agenda. Some of the policy stuff had been postponed for awhile, and thus there was an intent to make some progress on the policy front. He suggested that perhaps the next in-person meeting could focus primarily on just one or two sub-group topics and just have a small amount of time devoted to other topics.

Review new action items and plans for next workshop/teleconference

(A summary of all new action items is given at the beginning of this document)

Jud noted that in terms of action items, there are a number of sub-groups. Tim indicated he would send those out and make sure that everyone has an opportunity to participate.

Tim reminded the team that APNEP can put together WebEx sessions on any topics from today that need further discussion.

The question was asked who oversees the APNEP Instagram. Tim and Dean noted that Kelsey Ellis and Stacey Feken handle APNEP's social media activities.

Joe noted that the younger generation has switched from Facebook, to Instagram and Snapchat.

Tim noted that if partners want to get messages out about projects they are working on in the A-P region, they should feel free contact APNEP about sharing the information across APNEP's social media accounts.

Tim informed the team that a master of fine arts student from Wake Forest University is interested in doing a short documentary project on North Carolina estuaries. APNEP has steered that person towards potentially highlighting the value of and challenges facing SAV and the research being done by this team. Tim will update the team as this potential project moves forward and will likely be reaching out to team members for assistance.

Dean thanked everyone for coming to the meeting, noting APNEP's desire to bridge science and policy. He and Tim are going to be more proactive about touching base and making sure things are going well.

The meeting adjourned at 3:33 PM.