SAV Workshop
Albemarle-Pamlico National Estuary Partnership
10:00 am - 4:30 pm
February 7, 2018
NERR First Floor Classroom, Beaufort, NC

*Notes by Tim Ellis and Trish Murphey; Edited by Tim Ellis

Welcome and Introductions

JK - Welcomed everyone. Large agenda and a lot of high priority items that we need to discuss. New items and some evolution of the team. This is a continuing exercise and we should leave here with action items/marching orders for next time. Most important today is the development of monitoring and assessment metrics for EPA.

Introductions:
- Jud Kenworthy (NOAA-retired and co-chair of APNEP STAC)
- Kathy Herring (NCDOT biological surveys)
- Tyler Stanton (NCDOT biological surveys)
- Shane Staples (NCDCM)
- Jessie Jarvis (UNCW)
- Brandon Puckett (NERRS/NCCR)
- Anne Deaton (NCDMF)
- Patrick Gillam (NCDMF)
- Matt Duvall (USDA/NRCS)
- Don Field (NOAA)
- Dean Carpenter (APNEP)
- Trish Murphey (APNEP)
- Tim Ellis (APNEP)
- Jimmy Johnson (APNEP)

DC - we will take a 30-minute break around lunch. TM will leave at 11:30 to get the food.

JK - we had 8 action items from the last meeting that we need to revisit today

Team Objectives for 2018

DC - Brought up that we will discussing the combining of teams. Thanks to BP for allowing us to use this facility. Objectives for the year - last year was a kickoff for our MAT. This team has been going for a while but it is up to each team to determine how fast they move and what they accomplish. DC anticipates 2018 to be more active. APNEP will be scheduling bimonthly webinars to keep the team moving. Still plan to have two in-person meetings a year.

DC - APNEP was featured in the Coastal Review Online about our new MOU with VA. SAV was mentioned in that MOU, including invasive species.

JK - Several APNEP folks contributed to an SAV article in the ASMFC newsletter…Dean, Jimmy, etc. Wilson Laney (USFWS) and Jimmy led that effort. Send these articles to all team members if this was not already done.

APNEP SAV Survey Results

TE - Gave a presentation on the results of a survey of both SAV AT and MAT members. This survey was designed to be a systematic way to solicit and evaluate feedback on the format and focus of team efforts going forward. All members of both groups were invited to take the survey. Fifty-nine percent (10) participated with 10% (1) from the AT, 30% (3) from the MAT and 60% (6) from both teams. Presentation slides are available via the team's page on the APNEP website; please review these slides for specific details on the survey results. To summarize, the main strength of the previous "SAV Partnership" was identified as monitoring and mapping. Priorities of the APNEP SAV teams today continue to be monitoring and assessment activities. The majority of survey participants preferred combining the two teams, with a preference to meet in person every six months along with conference calls in between. There were mixed feelings on updating an MOU for SAV, and there was 100% preference for CCMP Action B2.2 (protection) over C3.3 (restoration).

MD - Doesn't want to make an MOU obligatory, as this will likely limit his organization's ability to participate

JK - Thanked APNEP staff for its efforts in administering the survey and noted that there was much value in the information provided. Asked the group for further discussion on what was just presented.

DC - Notes that some team members, primarily from the Action Team, are not present today and some team members did not take the survey. He suggested that the group receive feedback on the survey results from these folks, particularly with regards to combining the team. He reviewed his reasoning for creating separate teams and invited further discussion.

AD - Working on policy is difficult, as there are numerous policies out there that we must consider in our efforts. She prefers having just one SAV team because developing and implementing policy requires data collected through monitoring and assessment activities.

JJ - She prefers having one team with subcommittees if needed and notes that having one voice is helpful.

DC - Thinks it would be helpful for this group to gauge where we are on policy. He notes that other APNEP workgroups tackle both policy/management/outreach and monitoring/assessment.

MD - Asks why representatives from USFWS aren't here, as many of the refuges have ongoing monitoring programs.

DC - Notes that Wilson Laney is on this team and that during the SAV Partnership years, John Gallegos (USFWS - Back Bay) was an active member. Dean is still trying to coordinate a new representative for the refuges.

SS - He thinks it's a good idea to combine the teams because it's helpful to know what is going on with policy when discussing monitoring/assessment activities. He notes that policy/outreach can be a subset on the agenda.

JK - He notes that the NC CHHP is a combined document with regards to monitoring/assessment and policy development, and thinks it is helpful to have everyone in the same room when identifying status/trends and policies.

DC - He notes that the last MOU was a heavy lift for all signatories, and that Brian Boutin (TNC) expressed concerns at the last meeting of the Action Team over having multiple MOUs for different habitat types. Dean suggested considering an MOU for "aquatic habitat".

AD - She notes that the Oyster Steering Committee (facilitated by the NC Coastal Federation) has a "shellfish initiative" to increase awareness. She suggests that this could be a possible model for this group to follow in regard to SAV.

DC - Thinks the MOU was helpful in forming an SAV network that could be used to increase awareness.

JK - Asks for any other immediate thoughts on the survey results. There were none.

DC - Asks for any objections to combining the teams, noting again that several members are not present today and did not take the survey. No one objected.

TE - Reminded the group that all team members were invited to take the survey. He also reaffirmed that APNEP staff had determined through internal review and survey feedback, that combining the teams would lead to more efficient and effective facilitation.

JK - Sounds good. Let's move on.

<u>Evaluation & Selection of Candidate Indicators/Metrics</u>

JK - This is a priority for this team today. APNEP needs this for its upcoming EPA review. We've talked about this a lot in the past and most of these are in development. We can consider these metrics in a two-tier system. Tier 1 are metrics we are confident it and can be detected. Tier 2 are metrics we are less certain about and require more work to determine if/how we can collect data on them. We don't want to get hung up in Tier-2 discussion. Today we want to decide definitively on Tier-1 metrics.

DC - Dean reviews the Phase II guidance document that he sent to the team in October. Elements of adaptive and ecosystem-based management require metrics to track CCMP progress and assess the health of the ecosystem. Through our STAC and MATs, we are seeking expert help on developing our indicators. Our indicator list that we sent to all of our teams links our indicators to an ecosystem outcome. APNEP had a program review in 2013 and the next one is this spring. In the last review, EPA gave us a letter of challenges. One of those challenges was indicator development. DC said capacity issues limited the indicator development process but in the last year we have made some progress.

JK - Notes that for SAV, lots of progress was made by the partners (e.g., CRFL funding).

DC - Acknowledged this is true and that he was referring to all of our MATs as a whole. SAV has certainly moved forward at a much faster pace than the other teams. For APNEP, the implementation phase has been delayed for various reasons, but we made good progress in 2017 and expect that things will move forward more quickly in 2018.

DC - As we discuss an SAV monitoring strategy, we can change these metrics as needed, but for now we need to establish some priorities and determine which ones we would like to focus on right away.

JK - We have a long history of doing research and monitoring at all different scales. Some fall into Tier 2 but others we have a lot of experience in. I will just go down the list and maybe look at Don for immediate input. We can add others if needed.

DF - As far as areal extent, we have two surveys done. Due to some complications, we are still working out some of the issues with the change detection analysis. We'll talk about that more later. There are some issues with water clarity in western Bogue Sound but otherwise he considers this to be a good metric. He is concerned that the deepwater edge behind OBX is moving and we are losing it. There are always limitations with remote sensing but for deepwater edge, we've seen that line regress around Core Banks about 150 meters. He can go back to data sets from 60s and 70s and verify that we are losing that deepwater edge.

AD - Can deepwater edge be done with sidescan?

DF - Thinks it would be tough.

JK - Notes that he just read a study from Texas that used sidescan in very shallow water. It would be nice to know if we had a bathymetric profile that wasn't changing along that deepwater edge transect. So, we will always have to have some information on bathymetry to determine where the shoreline is. Our indicator doesn't have to be shore normal distance.

JJ - Notes that it is harder to do this when SAV is patchy but for dense beds it works well.

JK - Regardless of dense or patchy, having bathymetry is a must…but we're starting to dive into a Tier-2 discussion.

AD - I thought there were indicators in the 2012 assessment.

DC - We did but we need to add and refine because the 2012 assessment was not a final list for SAV or the larger ecosystem.

TM - What about light attenuation?

JK - This isn't about how we will measure or linking it to stressors…just what we will measure. But yes, that is important, and the deepwater edge was a large part of my thesis.

Group is fine with the first two metrics (1. Areal extent of SAV by density class, 2. Shore normal distance to deepwater edge of SAV dense beds).

JK - The next metric is species composition, which is one I'm very interested in. However, I don't think we have enough information to move forward with this.

AD - What about the ground truth data which has species information?

JK and DF - We have only looked on screen at some of those data and it was hard to determine species composition from it.

AD - We need to iron this out because species composition is a part of those data and something DMF makes a concerted effort to record.

JK - I think it's one of the most important metrics we can have, but I've tried to get this information from the ground truthing data for a long time and haven't been able to do it. Need to be certain about what we put in a polygon. I know what species we have and generally where they are, but we can't say anything about relative abundance over space and time.

AD - Program 637 has all the 2012(?) ground truthing data. I can sit down with Don and anyone else to go through it.

JK - It would be great to have a spatially articulated species composition layer, if we do have this information for 2012 (?) to show the EPA.

DC - To clarify, the EPA doesn't dictate what our indicators are and how we monitor them. But we must have them linked to a particular ecosystem outcome, which we have done for all of these SAV indicators.

JK - So, we agree on these three as Tier 1…are there any others we want as Tier 1? No further discussion.

DC - Moving on to the invasive species indicators, Eurasian watermilfoil and *Hydrilla* are the two most discussed in these forums.

BP - We need to have Rob Emens (NCDWR) on our team.

DC - Yes, Rob was involved with the SAV Partnership and we will be invited to join here. I realize this team hasn't done invasive issues in the past but we are now.

BP - Are these being measured? What is being done by Rob and other groups?

AD - Isn't there a group doing *Hydrilla* monitoring in Albemarle Sound?

DC - Yes, around the Edenton area.

SS - There was some stuff led several years ago by Gloria Putnam and Sea Grant.

TE - Asks if this group feels comfortable with talking about invasive species, as much of the discussion thus far has centered on finding out who is doing what and where. He also notes that APNEP has an

Invasive Action Team with members who are involved in monitoring and control programs, including for these two invasive SAV species being considered today.

AD - The monitoring likely overlaps but sending this to the Invasive Action Team to discuss seems like a good idea.

JK - It would be safe to offer the possibility that our SAV monitoring network can detect invasive species but we need to have other experts at the table to discuss this. I agree with Tim. Our first three indicators are limited to the visible high-salinity areas, but the network for our SAV monitoring isn't established yet and the possibility is there to monitor this with Sentinel Sites, which is still under development.

DC - Lunch is here, so I suggest that the first three are Tier 1 and the invasive ones be moved to Tier 2 for further discussion.

JK - We are hoping that Joe Luczkovich will arrive to discuss the low-salinity indicators but Dean presented some of this recently, and I think we will have a low-salinity metric come out of this (change in percent cover).

12:00 PM - Broke for lunch

12:32 PM - Reconvened

DF - During lunch, he looked back at the species composition information from 2007 and 2012, and saw that there are some specie codes listed for each point. He thinks a spatial representation of species composition could be done.

JK - Can this be done as an action item?

DF - I can do it and am best set up to do it.

<u>SAV stressors and modeling</u>

DC - Dean reviewed his EBM-DPSER conceptual model from the guidance document. We are asking this group to help us fill in the components of this model for SAV. A lot of stressors are likely monitored by the Water Resources MAT, therefore it's important that whatever this group discusses is brought up to the water group and vice versa. So, we may need to form a modeling subgroup as part of this team.

JJ - I've worked on a model for *Zostera* and pairing with a hydrodynamic model in Barnegat Bay. We can look at that for initial discussion.

DC - That would be great. I'm not interested in reinventing the wheel but we need this model for SAV to express our needs to the other MATs.

JK - My initial thought is for us to go out and look at what models are being used and see if there is something we can fit for our purposes.

MD - The subaqueous soil survey has been done in Barnegat Bay.

SAV Sentinel Network Activities (2017) and Plans (2018)

JJ - Gave a presentation on Sentinel Site monitoring. Trying to look for a measure linked to SAV stress through transect-based sampling. They have three sampling locations (see presentation slides for further detail). Use PAR sensors to measure light intensity at the sites, as well as HOBO loggers for temperature, and YSI for a suite of other parameters. Her presentation presented preliminary results for measured parameters. Hard to separate *Halodule* and *Ruppia* in the field visually…group them together. In her figure, blue is *Hal./Rup.* and orange is *Zostera*. There are issues to resolve with using drones and seagrass mapping due to camera differences and technology limitations. Transect data is not good for ground truthing of aerial surveys.

JK - So we are getting species composition information in the biomass sampling but it is too time consuming to do that in quadrats along the transects. Want to get as much information as possible while being nondestructive…but that is a challenge.

JK - Let's talk about drone work a little bit since this was an action item from last time. Has Don heard anything back on this?…no. JK and BP looked at NPS drone data and it looked good but we don't have further information on this project. There is another drone project going on as well, but Jud has had a very difficult time with contacting David Johnston (Duke University), which makes it difficult for us to evaluate if this is something we should pursue as a team.

JJ - We need to find a site where we can fly drones and do sidescan to compare results. Thinking about doing this in the New River.

DF - In a multiresolution approach, we will see areas of potential change…this may highlight areas where we want to do more detailed sampling to resolve what is going on there.

JK - Once we have the change detection information, we will want to think about questions regarding where and what we want to monitor more closely.

JK - For any sentinel site, we need really good bathymetry data. Every site needs this. Do this in conjunction with the sidescan sampling.

MD - We must have bathymetry to do the soil mapping, which will start soon I hope. Our mapping may be coarser than what Jud has in mind but we will be mapping bathymetry nonetheless. Subaqueous soil survey is particularly challenging with regards to logistics (boat modifying and core samples). We are starting a collaborative project in Swan Quarter with USFWS, including Lake Mattamuskeet, and working our way to other areas in the APNEP region.

DC - Updates the group on the NRCS meeting he attended in Savannah. At the meeting, Reide Corbett (ECU) and Dean suggested doing the Swan Quarter region, as well as areas north and south of Swan Quarter but also within the APNEP region (Bogue and Currituck Sounds ?).

MD - Provides a few more details on NRCS status in federal government and expanding to subaqueous sampling. Limited capacity and shrinking budgets mean those areas that move forward are the ones that have partners to provide resources to get it done. It's imperative that NRCS work closely with groups like this SAV team to pull resources together to get the survey done.

DF - USACE has a joint lidar…group that mainly do the coast for bathymetry. A price for Core Sound flights is really expensive…they fly very low.

JK - Joe L. emailed that he was sick, so we will have to move further discussion on the low salinity sentinel site research until next time. Jud reviewed the rest of the actions from the last meeting and what has/hasn't been done.

AD - Confirmed that DMF staff met with JL and Hilde Speight (ECU) to train on their protocol. Issue is that many of the leasing sites are too shallow to use the sidescan method.

PG - Discussed the camera options…using GoPro. Leasing at DMF needs to make in-field decisions and no post processing. JL's method isn't conducive to this for various reasons. Main issue is shallow water and having sediment cloud the sidescan image. They are still in early stages of evaluating it, but it is one of many things that the leasing staff are doing. They prefer not to do quadrats or out-of-boat sampling. They do use tongs for shellfish sampling.

JK - So, is the limitation here the amount of time in the field?

PG - Yes and trying to minimize damage to the site. Trying to limit time at a site to just one day because leasing applications are increasing and staff time is limited.

JK - Moving on…there has been a lot of work done by JL and HS on the sentinel site. The group needs to hear about it and we can have APNEP organize a webinar. Maybe do it in a week or two.

AD - It would be helpful to see maps and stats on what they are doing. I'm having trouble understanding how we can compare what they are doing with what is being done in the high-salinity areas.

JK - Albemarle Sound sites are established and have been sampled twice. This group needs to see that information. We also need to see how the methodology/tool works and if it can be done elsewhere. Can APNEP help set that up?

TE - Yes, we can do that and record the presentation in case others can't make the webinar.

DC - I will do a Doodle poll for this webinar meeting.

<u>SAV Aerial Survey Planning (2018)</u>

DC - Reviews what was done in the past. It is time to do this survey again. APNEP has allocated some of its resources to do these flights for the A-P region. He suggests not doing Currituck Sound again because it is just too turbid. We also have a ground truthing component. APNEP is in contract discussions with NCDOT to do the survey. We need to discuss the ground truth component today. The challenge is that there is a very narrow window for when to do the flights. Also need to discuss if we want to fly all at once or subset the flights and ground truthing on an annual basis.

DF - Will this funding be there for the long-term to do the monitoring over the next 1-3 years?

DC - We have allotted $55K for this year's work plan to do the aerial survey. Our funding is a year behind the federal budget.

TE - Notes that if APNEP does lose funding, it would impact the ability to fund this survey if we split up the flights over multiple years.

JK - We need to discuss if we want to map again without trying to articulate the species composition. He thinks we shouldn't and offered numerous reasons based on species-specific responses to environmental changes.
BP - Attached to the flights is the ground truthing data, which are our best information on species composition. That won't happen without the flights, right?

AD - Yes, ground truthing is tied to the flights.

JK - But you said earlier that there are other data available (e.g., 2007).

AD - There are and I gave it to Dean…DF said he has it.

DF - What is the right season to fly?…gave example of flying in October in 2007 and there was more coverage. Talked with JK on what is going on seasonally.

JK - An idea I've had is that if we agree that species composition is important, instead of flying this year we conduct a statistically valid on-ground survey across the extent of the flight path to get at species composition. This is not unprecedented, as it is done in Florida and Chesapeake Bay. Our footprint is 130K acres and we do this over a two-year period. I argued to DC that getting ground truth resources for aerial survey this year will be tough…JJ and BP said they are already booked with their work.

DC - Suggests that we need aerial surveys every five years to pick up trends, so he proposes to do a "probability" analysis by determining the number of stations that need ground truthing from the White Oak River to the Hwy. 64 bridge. He envisions doing this on an annual basis for the high-salinity areas like what is being done in low-salinity area. This is the time to determine how many and where we need sentinel sites based on the area we fly.

JK - This is more than I was suggesting. I am suggesting just a ground truth exercise for species composition like what was done in Florida Keys and Florida Bay. I propose to start here at this smaller scale and then expand it later to Dean's idea depending on how well it works.

AD - Expressed concerns about randomization in the ground truth sampling, such as placing quadrats in areas with no SAV while clearly seeing SAV in other areas of the sampling site.

JK - Explains what EMAP (Environmental Monitoring & Assessment Program) was and its methodology (e.g., tessellated hexagons).

DC - EMAP is what NCCA (National Coastal Condition Assessment) methodology follows…so, we can ask what level of certainty do we want with this survey.

JK - And that would be defined by the ~130K acres that we already have mapped.

MD - Brought up a 2017 webinar on Chesapeake Bay SAV monitoring, which showed that spatially, SAV changes from year to year…important to consider with trend analysis.

DC - The desire to fly every five years is to establish what the visible coverage is over time, which is needed to develop the Sentinel Site program fully. JL has a protocol for the "invisible" area, but what is our annual protocol for the visible area, which would be ground truthing for the years when we fly?

JJ - That is what we are trying to figure out now with our UNCW and NERR work.

DC - But for species composition, what protocol will we follow…Florida, Barnegat Bay, etc.? Can we establish this now?

JK - Notes that his discussion with Dean last week seems to have now expanded to further breaking the A-P zone into multiple regions to do one each year.

JJ - Expressed concern again on how this approach differs from what she is working on right now.

DC - Is May still the optimal period for flying?

DF - I'm not confident that is the best time.

KH - August is best time for DOT sampling in OBX.

JJ - Species vary throughout the year, so we are dealing with a temperate meadow vs. tropical grass community depending on the time of year.

BP - Looking at our data, you don't pick up some species until September. If species composition is a goal then we may need multiple surveys (spring and fall) at a station.

AD - In June/July, you get the best mix but you can't fly during this time.

BP - Doing sentinel sites twice a year with drones and ground sampling gives you the best mix of what is going on throughout the year.

JK - This is a great discussion…but to go back to the original question, do we fly this year?

BP - If the money is there then I hate to not do it.

DF - The last two aerial surveys were done on Memorial Day weekend, so we should do this year the same time to be comparable.

JK - Are there ground truthing resources available for this year and in short order?…I'm personally occupied.

JJ - Between drones and transects on our project, we are tapped out for this summer.

AD - DMF staff can probably do what they did in the past but maybe a little less for the GIS staff.

MD - I can volunteer on other people's boats but I'm not sure at this point what NRCS can offer.

JK - So, is it absolutely necessary to get it this year?…what will we lose?

JJ - If we don't do it this year, we can't wait longer than one more year, just so its comparable to the time scale for when the other two surveys were taken.

JK - It is not my intention to hijack this discussion but it's important that we think about how to add value to the basic aerial mapping we've been doing.

DC - So, mapping would be done in May to early June, and ground truthing is typically done two weeks later. We will assign a subset of sites to folks to sample.

MD - Does ground truthing protocol need to be very rigorous?

DF - For an experienced interpreter, dense SAV is easy to decipher but the ground truth data are helpful for patchy areas.

AD - The protocol has us recording ambient water quality parameters in addition to percent coverage and species composition.

BP - Why collect those point measurements?…not useful…can we drop those to streamline the protocol?

TE - Asks Dean to confirm for the group that APNEP staff will also participate in ground truthing effort as has been done in years past.

SAV Assessment Plans

DC - Don will be doing the change detection analysis. We would like to update the SAV assessment and roll out an assessment of any of these other metrics. If we have recent and historical data for specific areas, then we can just focus on that as the spatial scale of the assessment. Don, Jud, and Dean did the 2012 assessment. Looking for volunteers to assist and lead assessments on other parameters. More to come on this later. The assessment is also touched upon in the guidance document that was provided to the team.

Additional Team Member Requests

TE - Provided a brief notice to the team of an email from Rob that was sent to some SAV team members regarding new eradication/control measures for Eurasian watermilfoil in Kitty Hawk Bay, which is near a Sentinel Site. Rob is also interested in partnering with this team on our monitoring efforts. Suggests sending a synopsis of this issue to all SAV team members and getting feedback as to if a webinar is needed to discuss this matter in greater detail.

BP - Rob Emens should be here if we are going to discuss invasive species.

JK - So, should we invite him?

DC - We will invite him and he can be a full member or maybe serve as a liaison for our invasive issues.

Action Items/Course Map Discussion

JK - reviewed action items from the last monitoring and assessment team meeting (please see minutes from last meeting for the details of numbered action items):

1) Completed
2) Under development and we were going to hear more about it today.
3) Not done but JL gave talk at ERF on this and we should ask him about it.
4) Completed.
5) Still working on this (?).
6) In progress (see today's discussion).
7) In progress (see today's discussion).
8) No update or progress.

New action items from today (based in part on text highlighted in red above):

- Anne Deaton will work on species composition data for 2007-2012 ground truthing; Don Field will update his shapefiles to include species information.
- APNEP will invite Rob Emens to join the team, and will send a synopsis of the Kitty Hawk Bay issue to the team for future discussion and potentially a webinar.
- Jud Kenworthy will contact Joe Luczkovich about giving a webinar on the invisible site protocol.
- Form a subcommittee on model development for SAV - Jessie Jarvis will help Dean Carpenter and Tim Ellis as being technical leads on this.
- Dean Carpenter and Don Field will plan flight for this spring; Dean Carpenter and Anne Deaton will plan ground truth sampling. (AD noted that given staff constraints, DMF can do sampling in the southern portion of the region better than in the northern region).
- APNEP will send a link to the team for the 2017 Annual Issue of the ASMFC Habitat Hotline, which spotlights SAV and features articles by Jud Kenworthy, Dean Carpenter, and Jimmy Johnson. (http://www.asmfc.org/uploads/file//5a340f932017HabitatHotlineAtlantic.pdf)

DC - Requests that this team revisit the last action team meeting to see if there are any policy actions to bring back up for discussion next time.

3:20 PM - Adjourned