![Albemarle-Pamlico National Estuary Partnership logo]

Submerged Aquatic Vegetation (SAV) Team
Summer Meeting
1:00 – 4:00 PM
August 13, 2020

Virtual meeting via WebEx

https://apnep.nc.gov/about-apnep/committees/action-teams/submerged-aquatic-vegetation-team

MEETING HIGHLIGHTS

Team members in attendance:
Brian Boutin (TNC; APNEP STAC)
Chad Boyce (VDWR)
Reide Corbett (ECU; APNEP STAC)
Anne Deaton (NCDMF)
Rob Emens (NCDWR)
Don Field (NOAA; APNEP STAC)
Joel Fodrie (UNC-IMS; APNEP STAC)
Jessie Jarvis (UNC-W)
Jud Kenworthy (NOAA - ret.; APNEP STAC)
Wilson Laney (USFWS - ret.; APNEP STAC)
Joe Luczkovich (ECU)
Brandon Puckett (NERRS)
Kelly Somers (USEPA - Region 3)
Tyler Stanton (NCDOT)

APNEP staff in attendance:
Dean Carpenter
Tim Ellis
Stacey Feken
Heather Jennings
Jimmy Johnson
Trish Murphey

Guests in attendance:
Jessica Carlton (NCDMF)
Leda Cunningham (Pew)
Kelly Garvy (Pew)
Kathy Herring (RK&K)
Casey Knight (NCDMF)
Todd Miller (NCCF; APNEP Leadership Council)
Michelle Moorman (USFWS; APNEP STAC)

Highlights:

- The meeting objectives were (1) to receive relevant updates on monitoring and research activities, (2) discuss the status of metric reports, and (3) discuss proposed SAV goals and actions for the 2021 NC Coastal Habitat Protection Plan (CHPP).
- Tim Ellis provided a brief recap of the team's November 2019 meeting. The highlights for this meeting and past meetings are available via the [team's webpage](#).
- Dean Carpenter gave an update on the Spring 2020 flights. Imagery was acquired in May for high-salinity waters extending from the Hwy. 64 bridge in Manteo to Bogue Inlet. NCDOT has just finished processing the image files and delivered them to APNEP. Imagery interpretation will begin soon.
- Jessie Jarvis gave an update on research for high-salinity sentinel sites and protocol development. Sampling was completed in 2019 but COVID restrictions caused some delays in data analysis. Samples from 2017-2019 are showing relatively stable seagrass biomass and cover, so little interannual variation. Transect and drone image data show a strong seasonal decline in eelgrass between July and September; meadows recover from large losses by April of the following year. Preliminary analysis suggests that carbon and nitrogen ratios in eelgrass aboveground biomass may be an indicator of temperature stress; this could be a future metric to consider. Drone imagery has been collected for several years. This year, drone sampling occurred during the same week as the mapping flights, so there is opportunity to compare data from the two imagery sources for a sentinel site. The drone work will continue under a new Coastal Recreational Fishing License (CRFL) grant. The researchers are also looking into historical data for Middle Marsh from across five decades.
- Jud Kenworthy noted that another option to consider besides the sentinel-site approach for a high-salinity SAV monitoring plan is the "synoptic approach". This approach has been adopted by the National Park Service and is used in Texas. The approach entails using aerial maps to determine the sampling universe for a stratified random sampling approach. In a multi-tiered, multi-method approach, the synoptic sampling would provide Tier-2 data and sentinel sites would be used for diagnostic information (Tier 3).
- Dean provided a brief recap of APNEP's monitoring design focus. He noted that APNEP will facilitate two monitoring subcommittees in parallel over the next two to three months, one focused on high-salinity SAV monitoring protocols and the other on low-salinity SAV monitoring protocols. Dean will send an email out to the team seeking member engagement on one or both of these monitoring subcommittees, as well as those interested in being a technical lead/co-lead.
- Wilson Laney noted that Aaron Kornbluth (Pew) has been working with the ASMFC Habitat Committee to standardize SAV monitoring protocols on the Atlantic coast and in the Gulf of Mexico. Jud has been representing the APNEP SAV Team in discussions with Aaron and he noted that the idea of a "Community of Practice" has a lot of interest right now and may become more organized in the future.
- Joel Fodrie provided a brief overview of his lab's work on SAV, noting he is focused primarily on SAV function and services. Since 2010, his lab has sampled the faunal community of seagrass beds in Core and Back Sounds monthly in spring, summer, and fall. Joel thinks it would be good to think more about how we're defining the continuous and patchy cover-class categories, noting that function and resiliency to different disturbances varies by cover class. It is also important to learn more about SAV seasonality. Wilson asked Joel if there were any publications on his lab's SAV data and Joel stated he would be happy to share the data.

- Jessica Carlton provided an update on her SAV imagery interpretations. She has delineated 2019 SAV cover behind Ocracoke and Hatteras and is starting on 2020 data now. She will begin with 2020 Bogue Sound imagery, starting with the southernmost coverage (Bogue Inlet to Emerald Isle).
- Dean and Don provided a brief update on the draft APNEP high-salinity SAV extent metric report, which was sent to team for feedback. There was some open discussion about SAV decline in Bogue Sound and if it was energy related (storms) and/or water quality. Lots of runoff post Hurricane Florence that drained into Bogue Sound from September to December. Lower salinity, in addition to poor water quality from nutrient enrichment and sedimentation, may have contributed to SAV loss in the region. Jud noted that we are close to having a long database to begin looking at causes of SAV trends. Don noted that he is excited about the Topobathy Lidar mapping for the whole coast that NOAA is currently undertaking. Reide Corbett suggested moving the title for Figure 1 so that it doesn't cover an area of Roanoke Sound where SAV mapping is shown. Joel revisited a concern about the patchy cover class, noting that it is not all seagrass. He asked if there was an attempt to delineate patchy SAV cover with more detail than the current range of 5-70%. Don stated that no attempt was made for this assessment but recognized that Chesapeake Bay assessments break the patchy SAV cover into more classes. Jessie Jarvis noted that Tampa Bay assessors compared hand delineations and automated delineations; more information available from TBEP on this work. Jud noted that object-based software is expensive and requires training, but it's not out of the picture for future considerations.
- Don provided a few slides on his work to assess the 1959-2020 deep-water edge regression of the continuous seagrass areas of the Outer Banks. Anne Deaton asked if there were other areas Don was looking at and he thinks he should be able to assess from Ocracoke to Bogue Inlet. Anne noted that we need to have a subgroup discussion on relating marsh edge to seagrass beds and modeling sediment trapping of SAV that supports marsh resiliency.
- Jud led a discussion on SAV species composition. Jessica compiled information from all of the ground-truth effort to date, which is about 3,200 data points and is the best record available. Jud has evaluated this information and thinks it has good spatial coverage. He has asked Jessie to analyze these data over space and time. Jessica also noted that she will be adding the density data to her GIS layer for the ground-truth effort. Also, the NCDMF SAV mosaic is now published on the NCDEQ GIS data portal and includes metadata with a table of details on each layer.
- Joe Luczkovich was delayed in joining the meeting, so Dean gave a brief review of the three low-salinity SAV metrics for which Joe is doing an assessment. They include: 1) an SAV presence along Rapid Assessment transects comparison of historical (1980s) and current SAV (2014-2016) to assess change; 2) SAV area coverage in approximately 50-ha Sentinel Sites using SONAR and underwater video samples from 2015-2019; and 3) SAV percent cover on transects at Sentinel Sites in shallow water (<1 m) using quadrat and core samples (Biomass and species composition of SAV). Comparisons using these three metrics were done with water depth, Secchi depth, and salinity as predictors in a zero-inflated generalized linear model (GLM).
- Matt Duval was unable to attend the meeting, so Dean provided a brief update on Matt's behalf regarding the USDA Natural Resource Conservation Service's (NRCS) Subaqueous Soil Survey. This survey has begun in Albemarle and Pamlico Sounds. Greg Taylor (National Director of the Coastal Zone and Subaqueous Soil Survey Program, and APNEP STAC member) worked for years to design and acquire boats for this type of work. North Carolina now has a boat designed specifically for vibracore extraction of soil cores. Dean Shields is the lead NRCS soil scientist for these surveys in Albemarle, Pamlico, and Currituck Sounds. Additionally, Greg collaborated this summer with Matt Ricker (NCSU) on a dual-purpose study of both saltwater intrusion and coastal blue carbon in Albemarle and Pamlico Sounds. The inventory points covered Albemarle Sound up into Chowan

River and Pamlico Sound along the Dare and Hyde County shorelines, and up Tar River. Next spring, they will begin sampling marshes along the backside of the Outer Banks. Information on subaqueous landforms and typical soil series will create foundation for deliberate subaqueous soil survey and mapping across the sounds.

- Bo Dame was unable to join the meeting, so Dean also provided an update on Bo's behalf regarding a pilot study of Currituck Sound SAV to determine seasonal community composition. With funding from USFWS, Chowan University studied SAV during the summer growing season of 2020 at both high- and low-energy sites, measuring taxa presence/absence, percent cover, stem length, and reproductive state. Another study objective is to evaluate the effectiveness of using USFWS methods for long-term monitoring in Currituck Sound. The USFWS is interested in the potential for applying methods used at Lake Mattamuskeet to other North Carolina refuges. These USFWS protocols involve using rakes from kayaks and small boats at pre-selected points. This study will test the effectiveness of rake surveys versus a variation of the classic quadrat surveys used by APNEP in low-salinity waters at depths less than 1 m. These findings would also help guide decisions about the potential use of citizen scientists for long-term SAV monitoring.
- Reide provided a summary of research findings by his lab team for NCDOT to determine what is limiting SAV growth in Currituck Sound and if there is suitable habitat for mitigation in Currituck Sound. The three objectives of this study were to: 1) identify historical and modern spatial patterns in SAV distribution and quantify the maximum depth of SAV colonization; 2) assess the extent that SAV distribution is affected by bed-sediment composition and light availability; and 3) integrate the primary parameters and processed driving SAV distribution to develop a preliminary model to guide future management decisions. There methods included the use of hydroacoustic surveys, quadrat surveys, and a light attenuation model. The peak-depth limit ranged from 1.1-1.2 m, with a max depth of SAV ranging from 1.6-1.8 m for October 2017 to May 2019. There was no clear relationship between SAV percent cover and sediment grain size or organic content. There is possibly more SAV percent cover in the southern study area and along the eastern shore; possibly more sand in the southern study area as well. The top three SAV species were Widgeon Grass, Wild Celery, and Eurasian Watermilfoil. These dominant species were the same in 1990 based on historical data. Based on the light attenuation model, seasonal light requirements in Currituck Sound are similar to those found for oligohaline regions of Chesapeake Bay, which are about 13.7 percent light through the water column at 1-m depth and 2.8% at 1.8-m depth. Overall, the study's findings suggest that light availability is the likely primary driver of SAV distribution in Currituck Sound and is a function of depth. Maps of potential sites for SAV mitigation were developed.
- Chad Boyce gave a brief update on SAV-related activities in Back Bay, Virginia. He noted that the research Reide just presented is relevant to ongoing research and management issues in Back Bay. Back Bay has had an annual SAV monitoring survey since the 1970s using standardized sampling with oyster rakes at different sites for species composition. Flooding in the southern portion of Virginia Beach has the city interested in restoring SAV for flood mitigation services. Chad also noted that Sara Sweeten (Virginia Tech) demonstrated successful transplanting of Wild Celery in Back Bay this summer. Her transplants from 2019 are also performing well. This work is showing promise for future restoration of Wild Celery to Back Bay.
- Nathan Hall (UNC Institute of Marine Science) was unable to attend the meeting, so his update of the progress made on a chlorophyll-*a* standards study for SAV contracted by APNEP will come at a later team meeting.
- Rob Emens gave an update on the NC Aquatic Weed Control activity in Kitty Hawk Bay. Recently, state politicians requested a meeting with NCDEQ and NCWRC staff to discuss treating Eurasian Watermilfoil. There has been an ongoing problem with this aquatic nuisance species in this area for years, which state managers have been working to control through herbicide treatments. Rob's

program treated around the public boat ramp again this year, as well as conducted hydroacoustic surveys of the region to map the extent of SAV cover and milfoil prevalence. Rob shared a few photos depicting the extent of the problem.

- Given the absence of some partners from today's meeting and the need for more time to discuss further the information presented today, Dean and Tim will schedule a follow-up meeting for the team to focus solely on low-salinity research, monitoring, and assessment.
- Prior to today's meeting, the team was sent a draft SAV issue paper prepared for the NC Coastal Habitat Protection Plan (CHPP). Trish Murphey (APNEP) gave a presentation on the background of the CHPP and the purpose of issue papers. Casey Knight (NCDMF) provided a brief overview of the recommendations of this issue paper, which have been approved by the CHPP Steering Committee. Some edits to the wording of the recommendations remain, but their intent will not change.
  - o Jessie asked where total suspended sediment (TSS) fits into these recommendations, to which Jud responded that the bio-optical model Nathan is working with to evaluate chlorophyll-*a* standards for SAV will incorporate both TSS and colored dissolved organic matter (CDOM). Reide noted that CDOM appears to be a key parameter for light attenuation in Currituck Sound over longer timescales (days to week), while TSS is important only during the storm events.
  - o Anne noted that this issue paper will go to the full DEQ commissions in November, but they are open to taking feedback on what is currently there, rather than adding to it. Team members can send comments to Anne, Casey, or Trish, or wait for the public comment period.
  - o There was some additional open discussion by the team about the synoptic sampling approach vs. sentinel sites. Jud clarified that earlier, he was not recommending abandoning the sentinel sites for low salinity, to which Jessie added that the synoptic approach in high salinity can be better for capturing trends.
  - o Tim suggested that the recommendation regarding funding, which is critical to the implementation of many of the other recommendations, could be revised to better meet the SMART (Specific, Measurable, Achievable, Relevant, Time-oriented) approach discussed during the presentations. Anne noted that NCDEQ has limited funding and the agency must be careful how they seek state money to support such work. Other team members agreed that it is important to develop funding strategies that support management actions in addition to research and monitoring needs.
- Public comment: Leda Cunningham (Pew) introduced herself and that she is working with Kelly Garvy (consultant) and the NC Coastal Federation on outreach for the CHPP, particularly for SAV and wetlands. Kelly also introduced herself.