

**APNEP Scientific and Technical Advisory Committee**

[Ralph Winkworth Forestry Center](#)

2958 Rouse Road Extension, Kinston, NC 28504

**Fall Meeting Notes, November 2, 2010**

**STAC Members Present:** Robin Dennis, Silvia Terziotti, Reide Corbett, William Porter, Dick Hamilton, Wayne Robarge, Jess Whitehead, David Mallinson, Larry Baldwin, Mike Piehler, Tim Spruill, Jud Kenworthy, Don Field, Tom Crawford

**Agency Science & Technology Liaisons:** Bill Swartley (NC-DENR-DFR), Dianne Farrer (NC-DACS), Lindsey Riddick (NC-DOT), Joanne Harcke (NC-DENR-DA)

**Guests & Invited Speakers:** Lindsay Dubbs (UNC-IMS), John Iiames (EPA-ORD), Holly Greening (Tampa Bay Estuary Program)

**Staff Present:** Bill Crowell, Dean Carpenter, Jimmy Johnson, Scott Gentry, Jim Hawhee

**Call to Order:** Tim Spruill welcomed everyone at 10:05 AM. Tim asked if there were any comments or changes to the notes from the summer meeting (August 5). Minutes were approved by consensus with no changes. There were no members of the public present to offer comments.

**APNEP Update: Dean Carpenter**

- The NC [Division of Forest Resources](#) (DFR) provided the facilities for this meeting. Bill Swartley welcomed the STAC.
- Dean thanked the DFR for providing a meeting space. He solicited the STAC for feedback on this facility as an alternative for future meetings.
- APNEP has new “tent card” placards for committee members. These placards were handed out as attendees introduced themselves.
- Jim Hawhee was introduced as APNEP’s newest employee: he started work on Monday, November 1. Jim will be filling the position previously served by Lori Brinn, and his responsibilities will include working with the APNEP [Citizens Advisory Committee](#) (CAC).
- Two STAC members have resigned since the last meeting: Joe Rudek with the Environmental Defense Fund and Laura Taylor at NC State University.
- An election ballot is circulating for two STAC nominees: Erin Fleckenstein with the North Carolina Coastal Federation and Peter Caldwell with the US Forest Service.
- The next STAC meeting (winter) is scheduled for Thursday, January 27 with a location yet to be determined. The spring meeting was recently scheduled for Wednesday, April 27.
- On August 24 APNEP staff Dean Carpenter and Scott Gentry, and STAC Co-Chair Wilson Laney, attended an EPA Ecosystem Services Research Program (ESRP) workshop on a new decision tools software package under development called “Decision Analysis for a Sustainable Environment, Economy, and Society” (DASEES). The workshop was held to solicit stakeholder feedback for development of the software. EPA plans to focus on the Neuse River basin as an early case study for DASEES. Dean and Scott will be working with EPA staff to apply the APNEP region to DASEES in a test run of the software. Tools within DASEES include: decision landscape, a driver-pressure-state-impact-response (DPSIR) model, and a social network analysis.

- On September 15 Dean briefed the Board of the Exotic Pest and Plant Council on candidate indicators for invasive exotic species and sought the Council's input on indicator refinement.
- On October 6 the SAV Partnership met at the DENR regional office in Washington.
- APNEP has contracted with PBS&J to finish the baseline map of SAV for the entire NC coast. This mapping will be based on 2007-2008 flight data that was largely funded by APNEP. On October 15 APNEP staff, NC-DMF staff, and STAC Executive Board member Don Field met with the contractor to discuss mapping would be prepared.
- On October 20 the APNEP ecosystem-based management (EBM) Transition Team discussed and approved the Goals and Outcomes of the draft CCMP.
- Four of the six APNEP Resources Monitoring & Assessment Teams have met since the last STAC meeting: Wetland Resources team met on September 15, the Living Aquatic Resources team on October 12, Water Resources team met on October 14, and the Air Resources Team on October 25. Dean hopes that the Terrestrial Resources and Human Dimensions teams will meet in the coming weeks.
- The APNEP Policy Board met on September 17. Todd Miller, Executive Director of the N.C. Coastal Federation, was elected Vice-Chair.
- Dean reminded members of the recent draft STAC Technical Issue Paper that was prepared as a response to the Policy Board's request to evaluate the most appropriate program boundaries to support EBM. Ideas for future paper topics should be submitted to the STAC's Executive Board.
- There was no public comment to these announcements.

### **National Estuary Program Case Study: Tampa Bay Estuary Program: Holly Greening**

*\*note: presentations can be found in their entirety on the STAC website.*

- Holly is the Director of the [Tampa Bay Estuary Program](#) (TBEP). Her presentation was titled, "CCMP's and EBM: A Case Study from Tampa Bay, Florida".
- Holly provided a background on the TBEP, a National Estuary Program that was initiated in 1991. The remainder of the presentation was centered on efforts to restore seagrass within Tampa Bay.
- The Tampa Bay watershed is characterized as urbanized, approximately 2,400 mi<sup>2</sup> and home to 2.3 million people, who are concentrated around the Bay. The land cover leads to a fast flushing rate. The TBEP has a science-based management plan, and the program was organized as a governmental entity. In 1998 an inter-local agreement was signed, committing annual funding from all partners.
- Seagrass is recognized as a keystone habitat for Tampa Bay. The Bay lost about 50% of its seagrass between 1950 and 1980 due to excess nitrogen associated with stormwater runoff. Tampa Bay was declared "dead" in the 1980s. A goal was set to restore seagrass to levels that were observed in the 1950s.
- An EBM approach has been taken to meet this goal. See handout, "Tampa Bay EBM Approach", for a detailed description of this process. This process is the result of about 15 years of work. Setting the goal was the critical first step.
- Seagrass restoration strategy paradigm: Scientific Basis. TN load > Chlorophyll > Light Attenuation > Seagrass light Requirement > Seagrass growth and Reproduction
- When did monitoring begin? A local county started in mid-1970s. There are about 80 monitoring stations throughout bay that are sampled monthly.
- A STAC member noted the difficulty to translate this to the dispersed population of APNEP region. The need for careful monitoring of the estuary was further emphasized.
- Local counties and cities are a significant TBEP funding source.

- Nitrogen loadings come from distributed sources. Stormwater is the greatest source at 63%, and atmospheric deposition contributes 21%. When compared to the APNEP region, the TBEP watershed is not nearly as dominated by agricultural loadings.
- The Tampa Bay Nitrogen Management Consortium consists of government and regulatory agency participants within the watershed, local phosphate companies, agricultural interests, and utility companies.
- A policy was instituted to ban the use of nitrogen-containing fertilizers during the four “wettest” months of the year. A 10% reduction in nitrogen has been observed during this period.
- As a result of TBEP’s efforts, Total N has been reduced by approximately 5,000 tons annually from the 1970s to the present. As a result Tampa Bay has gained approximately 500 acres of sea grass annually. The bottom-line indicator is seagrass extent biennially.
- Challenges: accepted allocation limits will result in wastewater plants and stormwater permits that are based on loading levels for 2003-2007; how to accommodate new or expanded nitrogen sources associated with development?
- Biennial flights (SAV survey) are funded as a partner contribution from the local water management district. This survey costs approximately \$120,000 per cycle.
- Indicators and metrics: SAV extent is mapped from aerial photographs biennially; light attenuation compared to light requirement; chlorophyll-a concentration compared to segment target levels; annual TN loadings from all sources; nutrient reduction actions and estimated reductions.
- Measurable, worthy goals drive the rest of the process.
- Has a cost-benefit analysis been conducted? EPA-ESRP project is looking at the economic benefit of maintaining SAV. A cost-benefit analysis has not been yet necessary to maintain partner interest. TBEP has not had to put a dollar amount on SAV so far.
- TBEP uses a stoplight graphic (red-yellow-green) for public outreach that has been very effective at raising awareness. A new graphic is released annually.

**Committee Discussion: EPA’s Albemarle-Pamlico Watershed Study Draft Implementation Plan: John Iames** *\*note: presentations can be found in their entirety on the STAC website.*

- John is with the EPA - Office of Research and Development – National Exposure Research Laboratory—Landscape Characterization Branch
- EPA-ESRP is working on the [Albemarle-Pamlico Watershed Study](#) (APWS) Implementation Plan (Brenda Rashleigh and Daryl Keith are Co-Leaders). The estuary will be studied based on six ecosystem services: food-fiber, clean water, stable climate, biodiversity, flood-storm protection, and recreation.
- The study is designed with different research ends to meet different needs, and it is currently scheduled to last through 2014.
- Goal 1: *Methods Development*: develop methods to quantify ecosystem services, as well as drivers and pressures to the system. This will be accomplished through mapping and monitoring projects.
- Goal 2: *Forecasting*: to relate changes in drivers and stressors to changes in ecosystem services, with a focus on nitrogen. This will involve empirical and mechanistic modeling informed by mapping and monitoring and linkages of models within the framework.
- Goal 3 *Decision Support*: ...
- The conceptual model considers drivers, pressures, state, ecosystem services, and watershed decisions.

- Phase 1 of the plan will focus on reactive nitrogen. The early focus of APWS is to provide the information and tools needed to inform management decisions for reactive nitrogen within the Albemarle-Pamlico watershed and understand their consequences on ecosystem processes, functions and services.
- The study will be modeling at three scales: APWS (4-digit HUC), Neuse River Basin (6-digit HUC), and Tidal Wetlands (14-digit HUC). Resolution and complexity increase as the analysis approaches the Tidal Wetland scale.
- The assessment includes air, land, and water characterization and impacts.
- Land cover change is based on 250 m pixel size. At this scale, the model will generally overestimate the area of change. This analysis is repeated annually.
- Dean reminded members about the opportunity to comment on the draft APWS implementation plan (Dean distributed the plan to them on October 13). The EPA sees APNEP as a “main customer”.

### **Proposed Goals-Outcomes-Objectives Hierarchy for APNEP’s new CCMP: Bill Crowell**

*\*note: presentations can be found in their entirety on the STAC website.*

- “APNEP Transition to Ecosystem-Based Management & CCMP Update”
- Bill reminded members of APNEP’s mission: “To identify, restore, and protect the significant resources of the Albemarle-Pamlico Estuarine System.”
- The EBM Transition Team has been meeting monthly. APNEP has contracted with the Virginia Institute of Marine Sciences (VIMS) to help integrate EBM and adaptive management principles into the new CCMP. Five Policy Board members participate on the EBM Transition Team, and the STAC is represented by Kirk Havens and Wilson Laney.
- There have been substantial changes to the format and goals of the draft CCMP since the STAC’s last review. APNEP staff has used the Puget Sound Action Plan as an example for re-structuring the draft CCMP.
- The new CCMP will be built around addressing five questions:  
 Question 1: What is a healthy Albemarle-Pamlico Estuarine System?  
 Question 2: What is the status of Albemarle-Pamlico Estuarine System?  
 Question 3: What are the biggest threats to Albemarle-Pamlico Estuarine System?  
 Question 4: What actions should be taken that will move us from where we are today to a healthy Albemarle-Pamlico Sounds by 2020?  
 Question 5: What and where are the priorities? This question will require further revision as APNEP considers extensive collaboration between natural resource and environmental management agencies, scientists, and local community members who will undertake much of the responsibility for implementation.
- The Strategic Priorities are defined in the draft document as: identify, restore, protect, prevent water pollution, stewardship, and tracking. The stewardship priority still requires some work, and it also includes collaboration, land use planning, and education elements.
- Who’s going to pay for this? Our program funding comes primarily out of the federal grant (includes staff salaries). The program leverages ~ \$10 for every \$1 spent. Working with partners will be a key to success. In many cases, we have been developing the new CCMP with actions and objectives that are aligned with those of our partners. APNEP is also evaluating gaps in implementation.
- The draft CCMP requires further work on assessment, plan, and monitoring strategy. Bill mentioned that staff are considering making this plan “look different” so that it is not confused with other state plans.

- Regarding Question 1, each Desired Outcome will have associated indicators. The STAC will provide input to help set targeted indicators and thresholds.
- Holly Greening commented that at Tampa Bay, their policy board set the original goals. The TAC then proposed the targets to meet these goals.
- Holly added that as APNEP begins to develop strategies, staff might want to look at estuarine nutrient criteria. Considering aquatic life support as the plan is developed may help meet these criteria in the future.
- This plan will address climate change. We are trying to be proactive for NEP legislation on the horizon.
- The new CCMP's most specific level will be the action level (multiple actions support a CCMP objective). Annual work plans will contain more specific tasks.
- Dean commented on STAC's past contributions toward indicator development. In the early phase, he encouraged members to think about policy and management objectives and not to be limited to what is being monitored at present. Now the indicators are being mapped to specific outcomes. Looking at management goals, the STAC should begin thinking about what threshold values should be proposed as targets. Examples that were mentioned include absolute targets such as population size and contaminant concentrations, and relative targets such as detecting significant increasing or decreasing trends.
- A draft document of candidate indicators associated with outcomes was displayed.

**Working Lunch Presentation: Committee Discussion: Author Nominations for APNEP Assessment: Mike Piehler**

- Eleven indicators were discussed, and nominated/recommended authors for technical papers are noted.
  - System based - Climate change: Darin Figurskey (NOAA) & Robin Dennis (EPA)
  - Air quality: Robin Dennis (EPA)
  - Unusual mortalities: Wilson Laney (FWS)
  - Economic productivity: TBD
  - Species diversity: Sarah McRae (FWS)
  - Land based - Land cover: Tom Crawford (ECU) & Sylvia Terziotti (USGS)
  - Population: TBD
  - Water based - Water quality: Mike Piehler (UNC)
  - Extent of living habitat: Mark Brinson (ECU Emeritus) or Scott Chapell (NC-DMF)
  - Fish populations: Wilson Laney (FWS) & TBD
  - Riverine inputs Tim Spruill (USGS Emeritus)
- Dean referenced a copy of the Heinz report on "[The State of the Nation's Ecosystems 2008](#)". This report provides an example of the proposed format for APNEP's indicators: a two to three page assessment, often including one to two figures, and complimented with a technical appendix.
- This exercise will produce a status and trends (condition) assessment. Authors will look at how the indicator has changed in condition from the mid-1990s to present. The reports will serve as a gauge for the current (original) CCMP and serve as a baseline for the new CCMP. The original baseline is the 1991 APES status and trends assessment. It was suggested that a Heinz report example be distributed.
- The reason for following this method is that APNEP does not have the in-house capability to perform a full assessment (contrasted with Chesapeake Bay Program). APNEP is an integrator to pull together working knowledge of the system. It is also

important to define what we cannot assess at present. A gap analysis will help garner resources for the adaptive management process and future updates of the plan. Right now, we are focused on status and trends. In the future, APNEP plans to include diagnosis and forecasting in resource assessments.

- Bill mentioned that at a recent meeting with [Chesapeake Bay Program](#) staff, DENR Assistant Secretary for Natural Resources, David Knight, was impressed with their monitoring capabilities. He is interested in what monitoring strategy the STAC proposes.

### **Ecological Changes in Coastal Plain Lakes: Mike Pehler**

*\*note: presentations can be found in their entirety on the STAC website.*

- Before discussing the Coastal Plain Lakes research, Mike briefed the STAC on preliminary research findings from another study. This research looked at the nitrogen removal effect of different habitats.
- Pehler and Smyth determined habitat-specific rates of denitrification and their values for marsh, oyster reef, SAV, intertidal flat, and subtidal flat habitats. Using a nutrient offset standard for North Carolina, they were able to compare the mean cost of nitrogen removal from these habitats. The point taken from this discussion was that the cost for nitrogen removal was trivial for natural habitats while cost increased by one to two orders of magnitude for stormwater treatment.
- Other points made about the nitrogen removal research were: points core samples were taken; knowing the degree to which these habitats are efficient is important; and N<sub>2</sub>O was not measured as part of this study.
- The Coastal Plain Lakes research focused on Lake Phelps, Pungo Lake, and Lake Mattamuskeet. While these lakes are in relative close proximity to one another, they vary drastically from plant- to algal-dominated stable states.
- The three lakes all look very different. Pungo Lake is very dark, Lake Phelps is clear, and Lake Mattamuskeet varies between algal- and plant- dominated. At some point in the past, all were likely clear like Phelps. All are very shallow.
- Lake Mattamuskeet was algal dominated prior to the bridge across the lake. Following construction of the bridge, the west side stayed algal-dominated while the east side became plant-dominated. Possible reasons for this change include change in hydrology, waterfowl, and wind effects.
- Pungo Lake is dystrophic due to external sources of organic matter. Historic data show that landscape dry-out can lead to a big introduction of organic matter.
- The study attempted to work forward from the past using paleolimnology, which looks at photo pigments within cores.
- Two years worth of phosphate, nitrate, and ammonium data have been collected for: Lake Phelps, Pungo Lake, East Mattamuskeet, and West Mattamuskeet.
- The highest ammonium was recorded in East Mattamuskeet.
- Food webs are based on the conditions of each lake.
- Mike is working on a whole ecosystem paper. Research will continue on modeling nitrogen cycling, food webs, and phytoplankton dynamics.

### **Committee Discussion: STAC Technical Issue Paper Draft on APNEP Boundaries: Tim Spruill**

- The original APNEP boundary, drawn in 1987, *graphically* excludes the upper Roanoke River basin. This missing area is almost 90% of the entire Roanoke River basin and

- approximately 1/3 of the APNEP region. Also, APNEP's eastern boundary runs along the crest of the barrier islands.
- The new CCMP is being developed following the principles of ecosystem-based management (EBM). The success of the EBM approach is very dependent on information obtained from the environment and using feedback from those systems to make decisions.
  - A draft STAC Technical Issue Paper has been circulated to members, which proposes to expand APNEP's boundaries to all significant areas. Three primary reasons are given in the technical paper. A map was shown that extended APNEP'S boundary three miles from the shoreline (boundary of state waters) and included the drainage of the Upper Roanoke Basin.
  - What would the boundary change do to the current ongoing assessment? The Upper Roanoke would not add any new indicators. On the marine side, it is likely some new indicators would need to be included.
  - Other comments:
    - We have little understanding of the marine exchange.
    - Desired outcome would be more work with Virginia and NOAA on the marine side.
    - The STAC would need to prioritize issues to be involved with on marine side.
    - Limited funding could be issue.
    - Beach nourishment might be an issue APNEP would want to avoid.
  - How many miles out should the boundary extend? NRCS has developed a watershed basin delineation line that could be considered. Also, APNEP should look at the National Standard Hydrography Dataset.

**Emissions from Agricultural Feeding Operations in the Albemarle-Pamlico Airshed:  
Wayne Robarge**

*\*note: presentations can be found in their entirety on the STAC website.*

- [National Air Emissions Monitoring Study](#) (NAEMS) – Monitoring occurred across United States and three sites from North Carolina were involved. The study addressed air emissions from large animal feeding operations (AFOs). The result of the study will be an emission factor based on barns (housing) and lagoons.
- NAEMS was initiated following a 2006 agreement between the US EPA and the pork, dairy, egg, and broiler industries. The study set out to address the lack of data cited in National Research Council reports. Financial support to obtain emissions data was provided by pork, chicken, dairy, and egg producers. Wayne noted that this is a registration exercise that does not lead to automatic reduction in emissions.
- Data collected are aerial emissions from swine buildings (24 hours/day, 7 days/week for two years) and measurement of air flow through fans.
- The “finishing” operation is the biggest source of emissions. In this step, hogs feed on-demand, as much as they want and at any time. In contrast, the sow farm receives much less feed daily.
- A variation in emissions from rotation to rotation was observed. Changes are observed as faster growing hogs are shipped out, leaving fewer hogs in the barn. Hydrogen sulfide gas concentration (spikes/drops) was observed during pit drainage and recharge.
- These facilities will be asked to reduce their emissions at some point in the future. NAEMS is being conducted to inform that process. Other valuable ancillary information was obtained, including feed inputs and composition, analyses of pit liquid and pit sludge, animal counts and live weight changes during rotation.

- The farms are also interested in reducing their particular matter profile. The farrowing operation is a potential hazard to pigs and farm workers.
- The presented research pertains only to hog farms. Other investigators are looking at chicken farms. Chicken farms are required to have a nutrient management plan. A STAC member commented that, according to USDA policy, if there are fewer than three operators in a county, no farm-specific data can be released.
- Looking ahead, covering lagoons could become a big strategy to reduce emissions if cap-and-trade policies are instituted. NAEMS could play heavily into that strategy.

**Action Items:**

- Mike Piehler will send a notice of indicator paper authors to Dean Carpenter. Dean will contact each author to formally request and confirm their participation.
- Members comment on EPA's draft APWS implementation plan.

\* Reminder: The next STAC meetings are currently scheduled for January 27, 2011 (winter) and April 27, 2011 (spring).

**The meeting adjourned at 3:00 PM.**