

# **APNEP Scientific and Technical Advisory Committee Summer Meeting Notes July 26, 2011**

Auditorium, Pitt County Office Complex, 403 Government Circle  
Greenville, North Carolina 27834

**STAC Members Present:** Larry Baldwin (NRF), Brian Boutin (TNC), Maurice Crawford (ECSU), Tom Crawford (ECU), Kirk Havens (CWM-VIMS), John Hefner (Atkins), Peter Kalla (USEPA), Andrew Keeler (UNC-CSI), David Kimmel (ECU), Wilson Laney (FWS), Robert Miller (UW Retired), Michael Piehler (UNC-IMS), Tim Spruill (USGS Retired), Don Stanley (ECU Retired), Toddi Steelman (NCSU), Dorsey Worthy (USEPA)

**Agency Science & Technology Liaisons Present:** Bill Swartley (NC-DFR), Dianne Farrer (NC-DACS), Jon Blanchard (NC-DPR)

**Staff Present:** Dean Carpenter, Bill Crowell, Jimmy Johnson

**Guests & Invited Speakers:** Rua Mordecai (SALCC), Jay O'Dell (TNC-Virginia), Lindsay Dubbs (UNC-CH-IMS)

## **Call to Order**

STAC Co-Chair, Wilson Laney, briefly reviewed the agenda. The distribution of the spring meeting notes were delayed and will be distributed for review next week. Hence their approval will be deferred until next meeting.

## **APNEP Update**

APNEP Program Scientist, Dean Carpenter, welcomed everyone to the summer meeting. He confirmed that he would be distributing the spring meeting notes next week. He also noted that the state agency liaisons are outpacing the STAC members in terms of providing new items for the quarterly news updates. Jim Hawhee will be compiling those for our review and use. Dean thanked [Pitt County Cooperative Extension](#) for allowing APNEP to use their facility. He noted that this is the STAC's primary meeting venue. Dean recognized APNEP's state agency liaisons for attending and informed new members that in order to maintain independence these science & technology liaisons are not officially part of the Committee. Dean thanked Wilson for providing van transportation from Raleigh. He noted again that STAC has three new members, Bill Miller, Maurice Crawford, and John Hefner, and that four members (Joe Fridgen, William Porter, Enrique Reyes, Wayne Robarge) rotated off the STAC on June 30. The fall STAC meeting will be in New Bern, and will be an all-hands conference. STAC members will soon be getting requests for applying to make presentations at the conference, held November 17 at the New Bern Convention Center.

Dean updated STAC members on science and/or technology activities he has attended since the spring meeting. In late April, Bill Crowell and he briefed RTI staff Ken Reckhow (domestic water resources research portfolio), George Van Houtven (natural resource economist) and Marian Deerhake (member

of the North Carolina Environmental Management Commission) on APNEP progress. In mid-May staff met with Virginia Department of Conservation and Recreation staff regarding the Healthy Waters Project in the Chowan River watershed. The concept here is a focus on keeping healthy waters healthy, rather than the traditional focus of restoring degraded waters. Bill and he also met with Ecosystem Based Management Team consultants from the Virginia Institute of Marine Science (VIMS), including Dr. Carl Hershner, to discuss APNEP progress. In late May the STAC Executive Board held their quarterly teleconference, the Submerged Aquatic Vegetation (SAV) Partnership held their spring meeting, and the APNEP Ecosystem Based Management Team convened to discuss the Comprehensive Conservation Management Plan (CCMP) targets. In mid-June Bill and he briefed Chuck Peoples and Dr. Brian Van Eerden of The Nature Conservancy (TNC) on CCMP development. In late June staff met with Jay Sauber, Environmental Sciences Section Chief of the NC Division of Water Quality. In mid-July APNEP's Integrated Monitoring Team held their inaugural meeting. Staff also met with consultant (and new STAC member) John Hefner to receive the final product resulting from APNEP's SAV mapping project. There is a synoptic map of coastal SAV: It has taken quite an effort from many people including a lot of volunteers. The aerial imagery (baseline for future monitoring) will be accompanied by an anticipated field monitoring effort whose protocols are being developed in another APNEP project whose research team includes STAC members Jud Kenworthy and Don Field.

The last item was that the North Carolina Governor's veto was overridden, regarding the Regulatory Reform Act of 2011: 76-42, "An agency authorized to implement and enforce State and federal environmental laws may not adopt a rule for the protection of the environment or natural resources that imposes a more restrictive standard, limitation, or requirement than those imposed by federal law or rule, if a federal law or rule pertaining to the same subject matter has been adopted." Dean noted that this was an FYI. This will impose a limitation on future generations, unless things change. Don Stanley noted that this could change, as soon as next year.

Toddi asked if the law was retroactive. Mike Piehler and Bill Crowell indicated that it is not retroactive. Bill noted that a review is also required. Dean noted that what he only read to the STAC was the summary statement.

Bill noted that the Policy Board met in early June and reviewed some of the proposed CCMP actions. The Citizens Advisory Committee also met and reviewed the proposed CCMP actions.

Bob Miller asked about the proposed sulfur smelting facility at the Morehead City port and asked if there has been any action on that item. Bill noted that he had read about it in the local news. Bob noted that Clean County.com is establishing a web site. Bill noted that there are some organizations that are getting involved.

Dean asked for other comments. There were none.

Wilson briefed the STAC on the Policy Board's decision on the proposed letter(s) to the North Carolina Division of Water Quality, regarding the adoption of proposed water quality standards. A draft letter will be prepared for the STAC's consideration, and Wilson will work with Policy Board Chair, Tony Reevy, to draft a letter for the Policy Board to send.

### **The Nature Conservancy's Mid-Atlantic Ecoregional Assessment**

Wilson introduced his colleague, Jay O'Dell from the Virginia TNC chapter based in Richmond, to discuss

TNC's Ecoregional Marine Assessments and Conservation Action Plans. Jay gave the background for the TNC planning process. He provided members with an overview of his presentation.

TNC's process for identifying the most important places was data driven, i.e., species location; scoring and locking the data; using two standard deviations above the means as a criterion; and weighted persistence, along with co-occurrence. Their spatial resolution of analysis was ten-minute squares.

Jay showed some map products generated for wolffish. Such maps were produced for about 50 different species. They looked at coastal, seafloor and migratory (water column) layers.

Their Coastal Theme evaluated the coast from a "marine perspective." TNC tried to look at the coastal habitats in more of a marine perspective by using 62 Coastal Shoreline Units (CSUs). Jay showed us a "zoom-in" from a closer perspective. They wanted to move from diversity to ecological functions. To get the marine perspective they used eight different features, total seagrass, total saltmarsh, estuarine fish, and five others. A strength of the assessment is that they did have a robust seagrass data layer. Jay showed us an example for the Cape Cod Bay CSU, which looked at seagrass, tidal marsh, estuarine fish, diadromous fish, sea birds, sea turtles, and condition.

A displayed spreadsheet revealed all the metrics for each of the 62 CSUs. The Albemarle-Pamlico area comes out ranked very high for seagrass.

Kirk Havens asked how they developed the minimum 1,000-acre criterion for SAV. Jay indicated that it was subjective, but they were influenced by natural break points in the data. He reviewed the ranking levels and explained their thinking for the importance classes.

Jay showed an example of how estuarine species were analyzed, using the fish species spot. They analyzed the correlation of SAV and salt marsh extent with the nearshore abundance of estuarine-dependent species. Each CSU was ranked with regard to strength of correlation.

Tom Crawford asked how they linked the vegetation to the species. Jay and colleagues used a radial correlation technique. Wilson noted that the basic concept is that the nutrients and/or other benefits derived from the vegetation is benefitting the estuarine-dependent species. Jay confirmed Wilson's interpretation. The A-P region scored the highest of any other CSU for estuarine-dependent fishes.

With regard to condition, the Virginia Coast Reserve and the A-P Region including the Outer Banks scored in relatively great condition. Peter Kalla asked for an explanation of waters intactness. Jay thought that a fragmentation metric and some other measures which were included in that one.

Jay moved to the seafloor framework datasets, which included bathymetry, sediments, and one other. Here they looked at Ecological Marine Units, analyzing associated data. There was an error in the NOAA data which resulted in a large rectangular area where analysis was not possible.

Jay presented a benthic habitat model example. A habitat model was constructed, stratified by three subregions, and there is a list of characteristic species they would expect to occur in a given area. Corroborating points were used to tease out important areas. These included fish trawl survey points, benthic grab samples, hard bottom points, and corals. The seafloor had six criteria, persistence of demersal fish species, diverse demersal fish communities, corals and canyons, hard bottoms, and two others.

They used 32 species of demersal fish, and other parameters. They looked for under-represented habitat types and added more data for those. The final seafloor portfolio shows the key areas for benthic diversity. Jay noted that the edges come out as really important, along with the nearshore areas.

The migratory frame used marine mammals, 17 species of whales and dolphins, and selected areas where the numbers of observations were way above average. Jay noted that it would appear that baleen whales magically teleport from Georgia, to the Gulf of Maine, but this is reflective of gaps in the data. The toothed whales and dolphins were concentrated along the shelf break.

Don Stanley asked if there is a problem with effort with this kind of data. Jay said there was an issue, so they rejected any data which weren't effort-corrected. With the SEAMAP database some datasets are effort-corrected and some not, so they must pay attention to that factor.

Sea turtles and large pelagic species were displayed. These data came from NOAA, from the TNC observer program and other data sets. One of the surprising things is how important the area off the New York Bight is for juveniles of some of these species. This was true even though the water quality in those areas is not so good.

Toddi asked why there was an asterisk beside the greater hammerhead. Jay wasn't sure but thought that had to do with the fact that they had insufficient data to light up any squares.

When all the highly migratory species, including large pelagics, baleen whales, toothed whales, sea turtles, and small pelagics, it is comforting to see that the species do in fact use different areas. Obtaining and using the state data were problematic for various reasons, so all the estuaries are grayed out. They are currently working to improve the information for several areas.

The final integrated portfolio map does have some white areas meaning that either they may in fact not be as important, or perhaps the data are lacking.

Within the seafloor plus migratory portfolio there seems to be some correlation between them.

Jay gave us an example for the Gulf of Maine. Because the scale of the data, with 100-mile blocks, is rather coarse, they are looking for ways to use the data of finer scales.

They have met with staff of US DOI's new [Bureau of Ocean Energy Management, Regulation, and Enforcement](#) (BOEMRE) several times, and they are using the data in BOEMRE's "Smart from the Start" approach. TNC is generating maps for them to accompany letters from TNC.

An upcoming TNC effort is the South Atlantic Bight Marine Assessment Project. Mary Conley is putting together a team to address the area from the North Carolina-Virginia line, south to Cape Canaveral. Jay will be working with Mary on this project. They are getting some information from the US Navy on marine mammals for example.

There are some challenges, one of them being that there are some significant issues in the coastal relief model. Wilson and others had assisted TNC several years ago in developing conservation targets for the entire seascape. It isn't just all boring sand out there.

Some underwater footage of some underwater patch reef habitat off Ocean City, Maryland, was featured, followed by a matrix of all the threats resulting from human use.

A summary of threats included bottom disturbance, threats to threatened & endangered species, biomass removal, human response to sea-level rise.

TNC wants to aim very high and produce a blue sky vision, and pragmatically address four themes: conservation of highly migratory species, restoration fisheries policy engagement, and coastal and marine spatial planning (this latter one being a foundation for ecosystem-based management).

With all the planned activity in the mid-Atlantic, it is almost an “urban” ocean.

TNC is excited about the [Mid-Atlantic Regional Council on the Ocean](#) (MARCO) and Jay is working with them as a consultant. The concept is to manage the ocean as one place.

The [Mid-Atlantic Fisheries Management Council](#) (MAFMC) has also really transformed themselves, during the last few years under new management.

Jay displayed the “Busy Ocean” map and Outer Continental Shelf (OCS) leasing block units. US Energy Secretary Chou wants to have 64 megawatts of wind energy in place relatively soon. Maps with red areas where leases are under consideration were overlaid with some of TNC’s data layers.

TNC are focused on working with stakeholders. They must engage thousands of stakeholders to answer three questions: where are we today, and where do we want to be, and how are we trying to get there?

TNC is designing a Coastal Management Spatial Planning portal for use. A screen-shot of the portal accompanied the message that the portal is currently in use. Data layers include the degree of commercial fishing occurring in a given block. They have data with ten-minute grid resolution, as well as the OCS lease blocks.

They also have incorporated where available high-resolution state data, such as those from New Jersey on marine mammals.

TNC plans to turn the portal into a state of the art decision support tool. It will allow the creation, saving, sharing and refinement of spatial management scenarios, identify conflicts and compatibilities between different human uses, and between human uses and ecosystem functions.

TNC produced a 30-page comic book which shows how to use the system. The comic book provides an example of how the tool can meet multiple objectives.

Jay reviewed the next steps: wind energy siting decisions, multipurpose marine cadastre; MARCO and [Northeast Regional Ocean Council](#) (NROC) data portals; informing our fishery policy engagement (e.g., EFH Omnibus Amendment by [Northeast Fisheries Management Council](#) (NEFMC)/MAFMC). They want to review cumulative impacts and sensitivity layers, and extend the benthic model to the estuaries Delaware Bay, Long Island Sound, and Chesapeake Bay.

Jay closed with a photo of an American lobster off Maryland, about 15 miles off the beach.

Wilson thanked Jay for his presentation, and noted that we were a bit behind, so asked that everyone hold their questions until a break. He introduced his colleague, Dr. Rua Mordecai, to speak to us about the SALCC.

### **South Atlantic Landscape Conservation Cooperative (SALCC)**

Rua noted that meeting attendees need to ask why they are at this meeting. Attendees all may have different objectives, but many of them need to be addressed at larger scales in the landscape. He provided a couple of examples of other partnerships which are attempting to address particular species, or quality issues, such as sparrows, American eels, water quality, and cultural resources. All of the resources he highlighted are dependent on healthy salt marshes. It is hard to deal with multiple plans, for multiple resources. Is there a consolidated plan, a shared vision? That was the concept behind the development of the national network of Landscape Conservation Cooperatives (LCCs).

The LCC roles: one role is to offer partners a landscape perspective for their conservation activities; for some resources that has been achieved, for others resources is has not. A second role is to develop explicit linkages across existing conservation partnerships that span multiple taxa and habitats. There are some plans out there for individual taxa, but they are not yet linked. A third role is to help incorporate future change into conservation planning (e.g., urbanization, sea-level rise). A fourth role is to pull these pieces together to help conservation partners define and design sustainable landscapes, and account for how some of these things are going to change.

The northern boundary of the SALCC corresponds to the APNEP boundary. The SALCC territory is pretty much Piedmont and Coastal Plain. More than most places in the US, it is all about the people. The major human landscape is driving things. Dorsey noted that this landscape had people in it, ten thousand years ago. Rua agreed that was true, more so perhaps than in Alaska, or other points west.

The SALCC Steering Committee is entirely self-directed. It includes states, TNC, National Park Service (NPS), US Geological Survey (USGS), Environmental Protection Agency (EPA), US Forest Service (USFS), Department of Defense (DOD), US Fish & Wildlife Service (FWS), National Oceanic & Atmospheric Administration (NOAA) and South Atlantic Fishery Management Council (SAFMC). Although Rua's paycheck comes from USFWS, he is full-time with the partnership. Rua named some of the Steering Committee members, including Mallory Martin from NC Wildlife Resources Commission (WRC), and Roger Pugliese from SAFMC.

The SALCC Partnership Committee membership was displayed. The technical teams for the SALCC are the partnerships, including APNEP. While the partnerships are setting conservation targets, the LCC should not establish a whole new approach. They want to establish targets in concert with the partnerships.

The full-time staff of the SALCC include: Coordinator, Science Coordinator, Socioeconomic Adaptation Coordinator (NPS), an Information Transfer position, a Gulf Coast Coordinator, and a GIS Coordinator coming soon. Part-time staff includes Doug Newcomb (FWS-ES Raleigh), Stacy Shelton (FWS External Affairs) for communication, and tons of support from a variety of partners. SALCC has a social-networking style [web site](#). A SALCC rivers and streams group is using the site, helping to craft some proposals this year. The cooperative is trying to use creative new ways of getting everyone involved.

One pilot project is designed to produce optimal conservation strategies for dynamic landscapes. It evolved from the Southeast Regional Assessment Project (SERAP). Rua has some urban growth models, which he will convey to APNEP staff today. This project has produced downscaled climate change projections, sea-level rise in Mississippi and Alabama, impacts of climate change on bird populations, change in priority species habitats, avian patch and range dynamics, and others.

The project scope and optimal strategies are to define the conservation objectives, identify and model the strategies, predict and compare the consequences of each strategy, and determine optimal strategies.

Some of the tools used for the project were reviewed, including Bayesian Belief Networks, and heuristic approaches. Example strategies include enlarge existing reserves, protect habitat gradients, corridors for migration, and connecting existing reserves.

The project didn't really get started until January. Phase I includes developing a prototype, Phase II included developing a functional prototype; and Phase III will be developing the prototype to share. Progress to date: an ad-hoc working group including representatives from NPS, USFWS, EPA, Environmental Defense Fund (EDF), USFWS, GADNR, TNC and NOAA held a three-day workshop at Auburn. Rua showed an influence diagram which will lead to a decision model. He explained how they developed the diagram.

Rua had borrowed five questions from APNEP planning, and noted that the APNEP questions are very similar to the process the SALCC are following. He reviewed the questions for us. He posed the same questions for the SALCC. They wound up with three major categories, which are cultural resources (sites, objects, and biotic cultural resources), socioeconomic resources (recreation, human health, economy), and natural resources (integrity of ecological systems, and viability of Threatened & Endangered species). Each of the natural resources was further segmented. The biggest threats in the A-P region included urbanization. Future change includes climate change, urbanization and aquatic flows. They will look at the four strategies, and landscape response in terms of quantity of sites, quality of sites, air quality, exposure and other factors. The definitions of each of the targets were presented.

Rua reviewed what stakeholders wanted to know, as reflected in the workshop. They want to know where they should take action to contribute most to LCC objectives. They don't want it to be prescriptive about specific actions, and want value based on the shared objectives of the LCC partners. They want to know how these actions will contribute to their agencies' objectives.

The final problem statement: LCC should serve as the umbrella group under which all of the partners come together to make decisions regarding the conservation of natural and cultural resources. Rua noted that each partner can speak to its strength. There are two parts: helping partners choose strategies that are based on a shared scientific understanding about the landscape, and identifying shared problems.

The SALCC has accumulated much information from other entities, such as the Fish Habitat Partnerships. There will be a presentation at the Ecological Society of America (ESA meeting) on August 7, which will showcase a functional prototype.

Rua reviewed what the SALCC is doing for other objectives, working with groups like APNEP, to pull in

the best available science.

They are beginning to move into Phase III of the project. They will be engaging with technical groups in August and September. The goal is to have the final prototype by December 2011, and they hope to improve it over time.

The SALCC products: utility value of each strategy, predicted outcome for each objective, time and value-ordered list of places for conservation, and GIS depictions of same.

Rua reviewed exciting things about this approach: allows for the formal accounting of uncertainty; is a quantitative way to prioritize research based on the potential for changing decisions; and is a rigorous way of informing decisions under uncertainty. When encountering high uncertainty in your model, you can apply sensitivity analysis to determine whether a decision will be greatly affected, or not.

The final take home messages: you are the LCC; LCC's are self-directed partnerships; and please join the website. Rua noted that he hoped that STAC members would take the time to join, and influence the SALCC's decisions. The point is for the community to set the direction which it wants to go.

The fact that individuals of various organizations and interests are all sitting at the table for APNEP is a help to the SALCC.

Wilson thanked Rua for the presentation and opened the floor for a few questions.

Kirk Havens asked if SALCC had considered, given the aforementioned uncertainty, at what point they would decide that their assumptions were wrong and further action was needed. Rua indicated that SALCC had gone through basic target-setting, and the next step will get into risk-tolerance.

Tim Spruill asked Jay how the level of effort is reflected in each of the ten-minute squares, for all the thousands of squares depicted. Jay confirmed that the effort was very unequal. TNC staff have started to develop uncertainty maps for the squares. Tim noted that the probability of seeing various species would change greatly with time. He noted that wasn't an unusual problem to have. Jay noted that a lot of the data came from the NMFS NEFSC survey, and they do take seasonality into account.

Don Stanley asked Jay about conflicts between wind and fossil fuel energy development. Jay said they don't expect any spatial competition between the two in part due to the depth limitation for wind (200 feet). He noted that the situation may be different off the North Carolina coast.

Maurice noted that he has seen some survey data for cod and noted that their location has changed over time. He asked if that was captured in the data set at all. Jay indicated that was a great question. TNC staff have done some maps showing the entire time series from beginning to end, but didn't determine how to capture that in their portfolio. They didn't account for movement.

Toddi noted that she was very interested in seeing how these two presentations fit together. She asked Jay and Rua to say how they may fit. Jay noted that given his limitations he had initially decided to ignore the entire LCC concept, but he was excited about the LCC presentation. He felt that the LCCs were more focused on the terrestrial components. Rua stated that SALCC plans to include the marine area, at least up to the EEZ, but they are trying to leverage existing efforts. They hope to work with all that is already occurring, and facilitate in placing the pieces together. They want to have the user

friendly, deliverable tools, which will make things transparent and easy. There are great overlaps right now, and Rua was thinking during Jay's presentation about how to combine efforts more. Rua noted that perhaps the LCC could help, behind the hood. If you have a great tool, then work with it. It is a matter of having the conversation. Rua noted that he is starting to get plugged in with the south Atlantic folks. It is more a matter of time to allow the synergy to happen.

Wilson thanked Toddi for asking that last question, and noted that part of our rationale behind bringing these speakers together is to promote such synergism.

Dean suggested that since lunch was still being set up that Dorsey give his presentation.

Wilson introduced Dorsey to give us the update.

### **U.S. Environmental Protection Agency's Albemarle-Pamlico Watershed & Estuary Study (APWES) Update**

Dorsey noted that substantial EPA budget cuts will affect how the APWES moves forward. APWES contributors are undergoing reorganization and many will be moved into another division. Dorsey reviewed the components which will move forward. The Neuse River Estuary TMDL was designed to reduce N loading and that has been accomplished, but there are unaccounted additional sources from upstream. Also, the groundwater will continue to provide nutrients. The target has not been met. EPA needs to figure out where the other nutrient sources are and lower the input to the estuary. The program has developed some models (Brenda Rashleigh's group in Athens), and they are developing an [Ecosystem Services Research Program \(ESRP\) National Atlas](#). There are three dates of land cover in the atlas at this point. The atlas also incorporates a lot of land cover interpretation to come up with ecosystem services. Other information such as from the [USGS National Water Quality Assessment \(NAWQA\) Program](#) are also being included. Dorsey showed us some clean water and biodiversity maps for the A-P region. Dorsey wasn't sure how well the A-P has been studied for biodiversity, so there may be some data issues. They also have a MODIS Land-Cover Change analysis. He showed a 2001-2008 map for Raleigh, NC. He noted that they can see algal blooms and significant land cover change in other areas nearer the coast. A major contribution is the use of new airborne sensors for coastal areas. These can detect isotopic N, and allow examination of N sources, information that contributes to knowledge of the functionality of coastal wetland denitrification. Unfortunately, this component is one which is likely to be terminated, because NASA tools are expensive. They are continuing research in tidal wetlands. One area is in the Open Grounds Farm area, in a restored wetlands area. The other site is a Duke University site at Alligator River, where EPA is evaluating how well the restoration performs in reverting to natural function. Another piece is to investigate buffering capacity by incorporating landscape components in GIS riparian models. This project is near completion. The agricultural areas near the Tidewater don't have the desired buffering capacity. There are high-N crops and controlled animal feeding operations (CAFOs) in well-drained fields. Robin Dennis is looking at the contribution of CAFOs to atmospheric N loading. Dorsey noted that could well be one of the missing sources. That study will continue. Dorsey showed us an example of using combined models, and looking at subbasins, using FRAMES. EPA is also using the SLAMM model to conduct sea level rise (SLR) modeling. The model doesn't take urban or developed land, or ownership, into account. It does predict what the future shoreline would look like. EPA is spending a lot of effort now on DASEES, which is a decision support tool. He showed us a diagram of how this information will be incorporated. Dorsey summarized the products. There are maps, models and data; the portal is up for APNEP in the national atlas; the nutrient work is coordinated for NCDENR; DASEES decision support tool for the Neuse Basin is being

developed. The future isn't very bright for the air quality aerial survey work. Dorsey noted that they are really going to be able to put numbers on the N denitrification in wetlands.

Mike Piehler asked if EPA was always measuring N<sub>2</sub>O? Yes. Dorsey confirmed that everyone is doing a settling block on the ground. Mike asked about N<sub>2</sub>? That is a lot harder to do.

Kirk asked what the spatial resolution is. Dorsey noted that the trailer collects information from a few square feet. The aerial equipment uses a portal and samples continuously.

### **Working Lunch: APNEP Monitoring Design Development Update and Discussion**

Wilson provided some background for today's exercise. On July 12 the APNEP Monitoring & Assessment Integration Team (selected STAC members and some of the leaders APNEP's resource monitoring & assessment teams) met for the first time to consider ALL of the candidate metrics for assessing the health of the A-P ecosystem, and to consider which ones, if any, were the most important, reflective, or essential in terms of measuring the health of the system. To that end, they went through the entire spreadsheet which Dean had assembled, and designated the ones they felt were essential/significant to our process. Wilson noted that Peter Kalla, Brian Boutin, Tim Spruill and he had participated in the process, along with Carl Hershner and Molly Roggero (APNEP Ecosystem Based Management Transition Team) participating on the telephone. They had managed to evaluate the entire spreadsheet, although they did bog down and one point and skipped to the end of the list and worked their way back. They did manage to finish the task.

Don Stanley asked if in reviewing the spreadsheet and integration team recommendations, STAC members were supposed to think forwards or backwards, i.e., consider historical data or only what is needed in the future. Dean noted that for the APNEP ecosystem assessment, the STAC needs to consider what data is available now, but for this present exercise we need to consider only the future.

Dean gave a brief summary of APNEP indicator and monitoring development for the benefit of our newest STAC members. He covered the history of the STAC and the development of all the proposed metrics. He stressed to the STAC the importance of the metrics, and confirmed that he personally felt that a good number of metrics are required, but if pressed at this time to cull it down to a few that SAV should be on the list. Once the STAC has reviewed the work of the integrated monitoring team, the lists will go back to the resource monitoring & assessment teams for further consideration. APNEP must also identify the target values for each metric.

Don Stanley pointed out that there is limited time for a thorough evaluation. Dean said he will streamline the evaluation by first focusing on those highlighted, with the caveat that just because others may not be highlighted, doesn't mean that they are going away as candidates. Dean reviewed the spreadsheet, and explained that the categories link to the three major APNEP goals: the human dimension, biodiversity, and water. He explained the codes and organization of the spreadsheet.

The first area discussed was Human Population. Wilson explained that the Integration Team had readily reached consensus on the fact that human population was the most important factor. John Hefner asked if we presumed that we would be able to map density. Tom Crawford confirmed that we would. Peter Kalla explained that just because we had a metric listed, didn't mean that we were sure how it would be measured. Toddi asked, how were we going to be able to control population growth. She expressed doubt that we could control this factor. Don Stanley noted that we could, via zoning and

other management measures. Don didn't believe the statement that we couldn't influence population growth. One member agreed with Toddi that we weren't likely able to influence this one much. Peter Kalla noted that local governments were able to control density through zoning. Bill Crowell noted that STAC members don't need to get into the details for this present discussion. Tom Crawford noted that he would like to see at least one metric which deals with economics.

Dean moved to Land Use, Land Cover. He noted the Integration Team had selected Total Area of Impervious Cover. There were no further comments.

Air Chemistry: No comments.

Air Physics, Climate Change: There were no comments, initially. Wilson noted that just because we didn't let the STAC get down into the weeds, initially, was no reason for the STAC to cease discussion. Jay asked how we would manage "Storm Frequency and Severity". Don Stanley noted that we couldn't, but noted that Peter had said that we should also consider the explanatory variables. Bob Miller noted that we need to know about storms, because of wanting to influence how we may develop. Tim Spruill noted that we need to include as many explanatory variables as we can, to be able to explain the trends. Don Stanley noted that the data will certainly be there, we assume, for the storms.

Liquid Waste Generation: Don Stanley noted that it wasn't necessarily the number of lagoons, but some other factor. Peter agreed and noted that we don't have the two-pagers in front of us, so it could be some other metric. Don concurred.

Sea Level Rise: No comments.

Carbon Cycle: None were selected.

Swimming: No comments.

Potable Surface Waters: No comments.

Potable Groundwaters: Don Stanley noted that "water consumption" was on the left-hand column, but asked if there were any metrics that really dealt with water consumption, such as for industry. Dean noted that water consumption is addressed later in the water goal. He asked Don to bring it up if he didn't see it there. Lindsay asked, with regard to using standards violation as a metric, how to deal with their constant changes. She suggested that is perhaps not the best metric to use, over time. Dean felt that standards can be normalized over time, and asked if she was suggesting that we use instead a concentration, based on what the standard is, rather than violations. Peter noted that things could be added to the list as well. Don Stanley asked what are some things which are tied to violations now, commonly? Lindsay stated low dissolved oxygen, and shellfish violations. Dean noted that those are addressed later in the list. Rua noted that the standards do link to some of the things we are concerned about. Lindsay agreed, but noted that the metric doesn't give us something that we can constantly assess over time, in part due to their dynamic definitions. Rua stated if there is a water category later, perhaps this one is more of a social metric. Someone thinking about violations may not care about what the metric parameter is actually doing. He suggested that some may be more sideways metrics, versus those which can measure trends over time. Don Stanley felt that these need to stay in, but we need to have careful footnoting and documentation of changes through time.

Water Supply: No comments.

Edible Harvest: No comments.

Recreation: Wilson noted that some of the metrics here can be viewed both positively and negatively. For example, the number of visitations and people who use coastal areas could be taken as an indication that more people are getting out and using the system, which is good, but at some point there may be too many users. Don Stanley suggested that we may want to have some measure of user satisfaction. Wilson noted that the Corps has done that for some of their larger reservoirs. Tom Crawford agreed it would be good to have those sorts of data, but it would take a major effort to collect them.

Aquatic Biodiversity Marine Mammals: No comment, except for Don Stanley wanting to know if this was Flipper. Yes.

Aquatic Biodiversity Finfish: Bob Miller asked if there was any reason to separate commercial from recreational landings. Wilson noted that they were collected separately, so are available. He noted that a bill in this session of the North Carolina Legislature would have designated three species as recreational only, but it was referred to a study commission. Brian noted that you need to have the commercial and recreational data for stock assessment purposes.

Wetland Biodiversity Mammals: No comments.

Wetland Biodiversity: Birds: No comments.

Wetland Biodiversity Herpetofauna: Don Stanley asked about the cost of measuring some of these. Peter noted that Dean had reminded us that we weren't supposed to consider expense at this stage of the process.

Upland Biodiversity metrics: There were no comments on any of these.

Don Stanley asked what the logic is regarding the use of fireflies as an indicator. Dean noted that they are declining and the hypothesis is that the decline is related to contamination levels.

Reide asked how these metrics would be used, i.e., if there is only one mammal will it be combined with others? He noted that it is hard to assess biodiversity if you have only one metric. Dean stated that total biodiversity is the factor of interest. Don Stanley felt that Reide's point is well taken. We might want to call these indicator species, since it isn't really biodiversity. Dean noted that for most of these taxa, we have more than one species. Peter Kalla noted that at the next cut we should be better able to explain.

Wilson noted that Puget Sound NEP is perhaps the example at the other extreme, where they are using only one species, the orca, to reflect the health of their system.

Dean scrolled through the entire list and noted that all of the indicators taken together will reflect biodiversity. Tim noted that a lot of these proposed indicators are important to people for various reasons. Rua noted that some species like black bear are reflective of overall habitat. He noted that you can have lower biodiversity in some natural habitats. David Kimmel suggested that we have some written justification for species selection, such as for whitetailed deer. Wilson agreed with David that

our rationale does need to be written down. Wilson had taken notes at the integrated monitoring workshop, and some of the rationale is explained. Don Stanley noted that we humans have our high-profile species in which we have a lot of interest, and on the other hand we are interested in maintaining all the biodiversity. We like orcas, but also we like the small, threatened species as well.

Wetland Stressors: Bob Miller noted that fire severity is not necessarily a stressor, it is a tool. Wilson agreed but noted that it can be viewed both ways, either as too low, or too high, depending on the fire frequency within a given habitat.

Estuarine Marine Habitats (Stressors): Don Stanley asked if we are taking SAV extent as a positive in this exercise. Yes.

Wetland Habitats (Stressors): Reide asked if for hydrologic alterations in wetlands, if was anthropogenic, or related to sea-level rise. Dean felt it could be both. Peter and Wilson felt that we had discussed it from the perspective of anthropogenic alterations.

Upland Habitat Index (Stressors): No comments.

Habitat Management: There were no comments on the subsequent metrics.

Invasive Upland Plant Species: No comments.

Invasive Upland Faunal Species: Don Stanley asked why fire ants were included. Wilson and Tim had not read the two-pager, but thought they were included as an indication of increasing stress and less healthy ecosystem. Tim thought they could be an indicator of climate change as well.

Water for Ecological Integrity: No comment.

Eutrophication: No comment.

Toxics: No comments.

Sediments: No comments.

Dean confirmed the end of the list of recommended indicators. After he receives comments from the STAC, the lists will be sent back to the indicator/monitoring work groups, with a charge to complete the write-ups. Kirk noted that he appreciated all the work that went into the development of the list, and especially the list of responsible agencies. Dean noted that this is the first cut of the list, that Rua had discussed interest in referencing APNEP indicators in future SALCC processes, and that there will have to be some sort of memorandum of understanding, or other commitment, from the responsible agencies to conduct the necessary monitoring activities. We must have a discussion of what targets we want to have, for fireflies, and orcas, or whatever. Dean noted that Puget Sound has a defined target in 2020 for their orca indicator. Kirk was interested to learn what they are going to change if they aren't on track to meet their goal.

Dean thanked Kirk for raising that issue, noting that these ecosystem metrics track status and trends (condition or outcome). On the other side are all the actions which are necessary to get there, and we have to have metrics to track whether those are getting done. If we aren't getting to where we want to

be, either we don't understand the system correctly, or, the actions such as BMPs weren't installed the way they were supposed to be. Tim noted that often the BMPs are not monitored, or monitoring was an afterthought. Dean agreed and noted that we are hopefully going to work for the managers as well. We want to have a metric which shows that the actions are being done. Don Stanley asked if we have an idea for the time frame, for which this would run. Are we talking about a decade, or five years, or twenty, or what? Dean said the time frame for the CCMP is ten years. He noted that for some of the metrics, to make changes such as estuarine water quality may take decades.

Don thanked Dean for setting up his recommendation. For the last twenty years of his career Don has tried to derive water quality recommendations for North Carolina, but he came up with a frustration: gaps in data time series. One was fish kills. He went to the responsible party and discovered that the reason for a two-year gap was a shortfall in funding. Don suggested that we consider prioritizing the metrics, even after they are adopted, so that when budget shortfalls come along agencies don't cut back across the board. If they cut back that way, you may wind up with a totally useless data set in which nothing is useful. You should consider prioritizing so that the real important ones continue. It was good that the Weather Service doesn't cut back on weather monitoring sites. USGS and state water quality agencies, have had to cut back on certain sites. The STAC should make a recommendation up front as to which ones don't get cut.

Kirk concurred with Don's recommendation and noted that is what they have done in Chesapeake. Also, once any cut funds are restored, you already have a list which can be used to prioritize reinitiating sampling.

Dean agreed that monitoring is one of the first things to get slashed. But, he also wants to have a grass roots understanding of why these metrics are important, so that the public understands why we need them.

Bill Crowell suggested that the STAC consider another letter supporting the need to continue monitoring where possible. The funding for the FerryMon Program has been cut. Bill noted in other cases the person doing the monitoring is cut. Bill suggested that the STAC prepare a letter which says that monitoring is important for APNEP to do its job. Kirk suggested that the STAC say that monitoring is important for maintaining accountability of public funds. Don thanked Kirk for making his point. Don noted that it is irrational human thinking to cut the one thing which can be used to maintain accountability.

Bill noted that the EBM can be taken to stand for accountability as well.

Dean asked if there are any other comments. Hearing none, Dean expressed appreciation for the comments provided. He will send out a tickler tomorrow, reminding members about our need to comment on the list. He hoped that by year's end we will have a first draft of the monitoring strategy.

Wilson asked Lindsay to give the STAC an update on the assessment, and to harass those STAC-authors who haven't yet provided her with draft text. Lindsay noted that she does have quite a few chapter drafts already. She noted she and Dean hope to have a draft by the fall, and a challenge will be to put everything in a consistent format. Dean explained that many of the indicators in this assessment were used in the last (1991) assessment. The time frame for this assessment is from the mid-1990's until today.

### **Action Items**

Wilson listed all the action items: 1) STAC members need to provide any comments they have on the indicator table by a week from today. All comments are welcome, including any ideas on how to interpret or combine metrics; 2) members who owe Lindsay assessment chapters are requested to get those in ASAP, since they are overdue; 3) Wilson and Tim will work with Bill on a draft letter on monitoring for consideration by the Policy Board; and 4) Wilson and Tim will work with Dean and others on the draft letters regarding North Carolina water quality standards.

**Adjourn 2:30 p.m.**