



Albemarle-Pamlico National Estuary Partnership

Joint Policy Board & Scientific and Technical Advisory Committee

July 29, 2015

East Carolina University, Greenville Centre,
2200 Charles Boulevard, Greenville, North Carolina 27858

DRAFT MEETING NOTES

APNEP Policy Board Members Present: Tom Allen, Kirk Havens, Carl Hershner, Wilson Laney, Holly White

APNEP STAC Members Present: Dr. Christine Avenarius (ECU), Johnny Boggs (USFS), Heather Deck (PTRF), Dr. Robin Dennis (USEPA Ret.), Dr. Don Field (NOAA), Dr. Kirk Havens (VIMS), Peter Kalla (USEPA), Dr. Jud Kenworthy (NOAA, retired), Dr. David Kimmel (ECU), Dr. Wilson Laney (USFWS), Dr. Robert Miller (U-WI Ret.), Dr. Burrell Montz (ECU), Dr. Michelle Moorman (USGS), Dr. Rua Mordecai (SALCC), Dr. Hans Paerl (UNC-CH-IMS), Dr. Christine Pickens (TNC), Dr. Tim Spruill (USGS, retired), Randy Swilling (NPS-CHNS), Dr. Jessica Whitehead (NC Sea Grant), Dr. Rich Whittecar (ODU)

APNEP Staff Present: Dr. Dean Carpenter, Dr. Bill Crowell, Marie English (Americorps Intern), Jim Hawhee, Jimmy Johnson, and Marygrace Knight (REACH Intern)

State Agency Liaisons Present: Misty Buchanan (NC-NHP)

Guests: Dr. Stanton Hales (Barnegat Bay NEP), Ed Sherwood (Tampa NEP)

Call to Order, Welcome and Introductions

Dr. Tom Allen gavelled the group to order and welcomed everyone, noting that it is unusual for APNEP to be having a joint meeting. He reviewed logistics and lunch plans. Tom asked for introductions and all complied.

Dr. Bill Crowell also welcomed everyone, noting that he is actually serving as APNEP director only halftime with his other duties as Clean Water Management Trust Fund Deputy Director.

Tom Allen said that the meeting attendees are an impressive group. The first two items on the agenda are deferred, because the policy board and STAC notes from their respective prior meetings have not yet been distributed.

Director's Report, Bill Crowell

Bill noted that he would give the director's report and Dean would chime in with more science details. The Policy Board met on March 27. Last week NC-DENR (APNEP's host) received the grant award notice from EPA, which is much earlier than usual. Because the accounting is set up on the NC-DENR side, things can move ahead. Bill thanked Rhonda Evans and Tina Lamar in the EPA regional office for expediting the funding.

Bill welcomed the two new members of the Policy Board: Holly White (present) and Mac Gibbs. APNEP has three positions vacant. The project coordinator position (vacant since Lindsey Smart's resignation in August 2014) should be advertised any time now. The ecosystem analyst and outreach positions had been delayed. Tom Reeder, now on the policy board as the NC-DENR representative, had asked questions about the positions and managed to make them available. The two positions should also

be posted very soon. APNEP set up two service contracts (NCSU and ECU) for this summer to do some ecosystem analysis work. Jim and Dean could provide more details on those.

NC-DENR appears to be paying more attention to APNEP. For the first time APNEP was mentioned in the state budget but there were no funds attached. Select NC-DENR divisions (State Parks, Aquariums, and Zoo) are proposed to move from NC-DENR to a new Department of Natural and Cultural Resources (NC-DNCR), and the remainder would become the Department of Environmental Quality (NC-DEQ). The NC House budget does not have a NC-DENR split, but does have some similar language relative to studies on where to locate the organizations under the Office of Land & Water Stewardship: Natural Heritage Program, Clean Water Management Trust Fund, and APNEP.

Per direction from the policy board and STAC leadership, Bill has begun inquiring to university on North Carolina system representatives about any interest in hosting APNEP. The NC-DENR Deputy Secretary wants a report back from Bill in order to make some recommendation. Bill will be continuing to investigate this. Summer has not been a good time to catch people. Policy board member Dr. Susan White (NC Sea Grant and WRI) is helping Bill with contacts in the university system. He is also exploring a potential linkage with the CMAST lab in Morehead City. APNEP staff located both in Raleigh area and at the coast would be desirable.

Later in the agenda Dean will discuss APNEP's role in the National Coastal Condition Assessment. Bill welcomed Stan and Ed, and noted that Dr. Curtis Bohlen (Casco Bay NEP) had to cancel because his mother fell ill.

Pete Calla asked if the new APNEP positions will be funded by the state or EPA. Bill stated that currently APNEP is totally funded by the EPA grant. Jimmy's position is cost-shared with the state. APNEP has 23,000 miles of shoreline, and a lot of counties. Staff cannot possibly conduct the program without its many partners. Bill hopes that the new project coordinator when hired will work to secure some additional grant funding.

Tom Allen noted that the policy board was really pleased to see movement on the vacancies, and hopes that will translate to forward progress on Comprehensive Conservation Management Plan (CCMP) implementation and monitoring. Tom hoped that Bill's status as halftime director would also be addressed. Bill stated that the NC-DENR secretary is willing to revisit the issue, noting that NC-DENR leadership is comfortable with the present arrangement, and there is some advantage to Bill serving both APNEP and [North Carolina Clean Water Management Trust Fund](#) (CWMTF), but he is not sure it is worth the cost.

Dean provided an update on APNEP activities, noting before he began that he and Bill didn't have the opportunity to compare notes beforehand, so there may be some overlap. Dean briefed members on the [Defense Coastal Estuarine Research Program](#) (DCERP) annual conference at Camp Lejeune; SAV monitoring workshop in Beaufort; APNEP Sound Series kickoff at the Nature Research Center; Marygrace Knight, APNEP's REACH summer Intern; STAC and policy board leadership meeting in Greenville; support to ECU's SAV survey in Albemarle Sound. Dean elaborated on each of these and provided details. He explained his interest in the DCERP.

APNEP staff had supported the SAV monitoring program by assisting with the selection of sentinel sites, which are meant to complement the aerial monitoring component. The second cycle of aerial images were acquired during the 2012-2014 period. Maps from interpretation hopefully will be forthcoming soon, and will enable APNEP to explore change detection. Funding limitations dictate that APNEP cannot support flights annually.

Jim Hawhee is coordinating a “[Triangle Sound Series](#)”, where monthly presentations on scientific topics associated with the Albemarle-Pamlico Estuarine System are scheduled. Tom Allen gave a presentation, and Michelle Moorman is scheduled next month. Other STAC members have also presented. The series has a YouTube channel as well. Jim can provide details.

NC-DENR’s [REACH Program](#) has provided APNEP a summer intern, Marygrace Knight, who Dean would talk more about soon.

The STAC and policy board leadership met in Greenville. Things are looking better for APNEP now and staff appreciates leadership engaging during a very rough period.

APNEP monitored two of the ten SAV sentinel sites, conducting a boat-based survey. The sites are fairly large and sampling effort is intensive. The survey is mostly sonar but the protocol calls for quadrat samples as well.

Additional activities include: Support for NCSU’s Wetland Condition Monitoring (picked up by NCSU since NC-DENR didn’t want to do it); consult with NC-DWR staff on water protection planning; ecosystem analyst contractors support 2016 APNEP ecosystem assessment; Marie English, APNEP special project assistant finished her tenure with APNEP and has moved to the University of Tennessee, Knoxville. Marygrace is assuming Marie’s APNEP responsibilities.

APNEP is funding two economic assessments for oysters and natural resources respectively. Both research teams are now moving forward, both being led by RTI staff. Former STAC member Dr. Laura Taylor is on the Natural Resources research team. APNEP staff is enthusiastic about this effort, because while CCMP implementation requires a substantial investment from other partners there is a need to get the word out about the vast ecosystem services provided by our estuarine system. Anadromous fish are one example because NC estuaries provide recruits to many coastal fisheries. Dean requested of member that if any know of economic evaluations of natural resources in the A-P geography, please send those to him so he can share them with the team.

Dean noted that he had shared just a few of the highlights.

Jud asked what is covered under the economic assessment of natural resources. Dean noted the emphasis will be on the estuarine portion and the coastal plain. It will include representative pieces of the terrestrial system. Dean is encouraging the research team to be as comprehensive as possible. They may elect to invest further in a particular piece, such as oysters. Dean noted that the RTI folks are interested in urban forestry and the associate thermal mitigation it provides.

Regarding the steering committee for the natural resources assessment, Dean thanked Lisa Campbell for her willing to be the STAC representative, and Carl Hershner to be the policy board representative. Also on the steering committee are two NC-DENR resource economists: John Hadley (DMF) and Jucilene Hoffmann (DWR) who are resource economists and will also be assisting. Dean noted that he is really excited about the project, and looking forward to seeing what comes from their work.

CCMP Implementation Workgroups Update, Dr. Dean Carpenter

Dean reminded the policy board members that they have seen a previous version of the overview at their March meeting, so there will be some repetition. Dean reviewed APNEP’s adaptive management cycle. In 2012 APNEP planning was rebooted to an ecosystem-based management (EBM) approach via a new CCMP. The adaptive approach has certainly been used throughout APNEP’s history: Plan—Manage—Monitor—and Assess. APNEP published a new ecosystem assessment in 2012, which was released

shortly before the CCMP. APNEP's past efforts has seen the four basic steps in the cycle being implemented in a serial fashion, but in this new era we are attempting an implementation that is more iterative.

APNEP is now working to boot-up the "Manage" part of the cycle, CCMP implementation. Within the CCMP, the 58 actions are aggregated into five component sections: Identify, Protect, Restore, Engage, and Monitor. Ideally APNEP would have the capacity to assign a workgroup to address a very small number of actions if not individually; however, that isn't really possible with the resources at hand. Dean put up the Contaminants Workgroup as an example. This workgroup recently split into a nutrients group, and all other contaminants (e.g., toxics, PPCPs). Consistent with an ecosystem perspective, individual actions once implemented impact multiple ecosystem components. A number of actions have to take place to move toward a healthy ecosystem. While some believe 58 actions is a lot to address, the system is complex and must be addressed as such. All the actions were thoroughly vetted by an EBM Transition Team, who looked at all of the factors. These actions address those factors that once mitigated will produce the greatest movement toward a healthier ecosystem. While discussions of reducing the number of actions is not surprising given diminished staff and partner capacities, Dean reminds those that to reduce the actions is to hamper the ability to demonstrate the benefits of EBM. More investment is required by partners upfront to implement an EBM approach.

Dean shared the workgroup kickoff schedule, including a table with the staff lead and backup support, and the month in which a particular workgroup had their initial meeting. Definitely the first and perhaps a second meeting must be in-person, but once they are set up and running, they should be able to operate via telephone and e-mail. Staff shortages has led to delays in workgroup operations. Bill advised that groups indicated for kickoff in July are NOT going to happen in July. Dean noted that staff really desire to get these workgroups operational.

STAC members are assigned to particular workgroups and their role is to provide technical support. STAC members' role is to assist with the design of options for CCMP management measures. Based on their technical expertise they can share how they expect the system to behave in response to various management options. They may be able to assist in the setting interim thresholds designed to trip whether an intervention is working as designed. Despite the collective wisdom of the workgroup and/or management team, the resources may not respond, so we have to go back to the drawing board and engage in adaptive management. They can consider as well when issues need to be revisited.

The question was asked if more workgroups are planned or if this is the entire list. Dean advised this is the entire list have yet to be operational. Bill noted that two new groups have been set up since the last meeting. As additional staff are hired, workgroup support will be spread around to lighten workloads.

Dean noted that every year, a third of STAC members' term ends, and he is pleased that nine of the twelve whose term this term agreed to continue serving another term. Dean noted that this is Johnny Boggs' first meeting as a STAC member and he welcomed him.

National Estuary Program Overview, Rhonda Evans

Bill introduced Rhonda Evans, who has been APNEP's EPA regional liaison for about four years now, and noted she has been a pleasure with whom to work. APNEP staff generally has had good relationships with the EPA Southeast Region staff. Bill indicated that Rhonda's charge is to provide an overview of the entire [National Estuary Program](#) (NEP). For this joint meeting, the intention was to give the STAC and policy board members an overview of the whole program then to hear from some other NEP units: [Barnegat Bay](#) and [Tampa Bay](#). We will also contrast and compare when Kirk and Carl give their presentation on the [Chesapeake Bay Program](#) (not an NEP unit).

Rhonda noted that she had help set up the Tampa Bay NEP, probably when Ed was in elementary school. She noted that she is very happy to be back in the NEP, working with APNEP. Her presentation will be very brief and very basic. The NEP was established in Section 320 of the 1987 Clean Water Act amendments. Section 320 established a process for estuaries to be nominated by state governors. [Sarasota Bay](#) is an exception whereby it was actually established by Congressional action. Each NEP unit must develop and implement a CCMP. These are envisioned as the real plan by which all actions are to be taken. The CCMP also establishes a management conference to use a consensus building approach and collaborative decision-making process. Rhonda noted that most of the NEP units have a collaborative process that directs what they do. The management conference has diverse representation, including citizens and other stakeholders. Rhonda explained the purposes of the NEP management conference. She reviewed six purposes, the first one being to assess trends in water quality, natural resources, and uses; collect, characterize, and assess data on toxics, nutrients, and natural resources, etc.

The CCMP is a long-term plan that contains specific targeted actions designed to address water quality, habitat, and living resources in the estuarine watershed. It should be uniquely tailored to local environmental conditions, based on local input and support local priorities, and it should be adaptive.

There are 28 NEP units in the nation and Rhonda displayed a map of them. APNEP is very large and it is a big challenge to cover. Also displayed were individual maps of the six NEP units in EPA Region 4 (Southeast).

Rhonda reviewed what [EPA Region 4](#) staff believes are the keys to success. These include the management conference itself; dedicated talented staff; collaborative problem solving; local and state commitment; watershed focus; use science to inform decision-making; involve the public; and dedicated funding.

Rhonda reviewed and commented on each of these keys to success then reviewed the management conference structure. Each NEP unit has a policy level committee; committees at a management level; and committees at the science level. She reviewed the typical NEP program office: a director, scientist, outreach, grant specialist and administrative assistant. The host organizations vary: state departments; state special districts; cities; university system; water management district; and regional planning council. The hosts accept the EPA funds and follow the directions of the management conference.

Rhonda displayed a graph of what EPA has brought to the table in terms of financial assistance. The funding was higher early in the NEP in order to get the units off the ground. Major accomplishments were reviewed, including water quality restoration; habitat protection and restoration; environmental justice and community support; public awareness and outreach; financial leverage; and others. Habitat restoration and protection in Region 4 amounts to 63% of the national total.

Rhonda asked for specific questions. Jud noted that Rhonda had at one place stated that \$12 was leverage for each unit dollar expended by the program but later she said it was \$14. She clarified that the value was between those two figures. The return is to the system, not necessarily for the NEP office. Jud asked if they had the numbers for APNEP. Bill stated that for APNEP it is around \$11 per unit dollar expended. There was a decline in leverage when the state conservation tax credit disappeared. Every NEP unit is leveraged immediately via the grant match required, but the leveraging goes beyond. For example, each policy board and STAC member contributes by his/her very presence at this meeting. Bill indicated that he is usually quite conservative which calculating leverage for APNEP. When during the first year he had used the entire CWMTF amount spend in the A-P region, NEP headquarters was very uncomfortable because the figure was so high. Rhonda and Bill noted that the leveraging was based on all of the partners, not just APNEP staff activities.

Tampa Bay Estuary Program, Ed Sherwood

Bill introduced Ed, who has been with the Tampa Bay NEP since 2008, noting that he was very glad to have Ed here. Ed noted that he was pinch-hitting for TBEP director Holly Greening.

Ed noted that there has been increased rainfall recently in Tampa Bay. The watershed is about 2600 square miles, with an open bay of about 400 miles. TBEP offices are in St. Petersburg. Ed noted that Rhonda gave a great introduction to the NEP system. TBEP was established formally in 1991. Their partners entered into inter-local agreements, which allowed them to become a special district in Florida (State Statute 189). Their funding commitments are based on population. There is public sector reporting. They are independent from the state. They will be updating their funding agreement this year.

TBEP has multiple partners: three counties, city municipalities (also three; Tampa, St. Petersburg, and Clearwater). Policy board representatives include the Water Management District and EPA. They have a technical advisory committee, which is open to scientists and managers, and a community advisory committee appointed by the policy board. There is also a management board, composed mostly of environmental staff from the counties and municipalities. The policy board meetings are open to the public and advertised in advance. They are considered separate from the state, but operate under state government policies.

Their CCMP was updated in 2006. It has eight priority actions, and 42 total directives. Their next update is scheduled for 2016. They have ten priority actions now: improving water and sediment quality; restoring critical bay habitats; maintaining fish and wildlife populations; managing dredging and dredged material; preventing and responding to spills; mitigating impacts of invasive species; educating and involving the public; public access; and climate change. Ed reviewed each of these and provided additional details.

Ed noted that Bill had asked him to highlight some of their primary objectives and some of their successes. Half of the Bay's seagrass acreage was lost from 1950 to 1980. In the early 1990s the Tampa Bay partners formally adopted the seagrass restoration target. The goal was to restore seagrasses to near 1950s levels. The Tampa Bay Nitrogen Management Consortium was formed in 1998, and includes 45 public/private partners. The members include the TBEP government and regulatory agency participants, local phosphate companies, agricultural interests and electric utilities. In the mid-1990s, the collective accepted responsibility for meeting nitrogen load reduction goals.

The Tampa Bay nitrogen management strategy was to reduce nitrogen loads; reduce chlorophyll, and restore seagrass. Nitrogen loading to Tampa Bay has been reduced by over half. Their point sources were all required to go to 100% advanced treatment. APNEP-STAC member Robin Dennis has assisted them greatly in developing estimates of atmospheric inputs. Per capita total nitrogen load was reduced by 80%. Their population is projected to continue rising.

The reduced loads have resulted in water quality improvements. This past year all four of the Bay segments have met the water quality and clarity goals. They actually have more seagrass now than they had in the past. TBEP staff is very proud of this fact. Having a healthy Bay represents one in five jobs in their region. That provides a major economic draw and ties into the political leadership. They have gotten good press because of their success. They have received a huge buy-in from the Region.

Their challenge now is human population growth. The question is: can recovery be maintained with the increasing population? The population is expected to double between 2050 and 2060. The partners have recognized that they need to continue the good work. Some of the local municipalities are looking at fertilizer use, and looking at alternative ways to manage land. The state adopted the NEP nutrient criteria

for maintaining water quality. Many of their goals have been formalized. They have very good relationships with state and federal regulators, who were at the table with them as partners.

In summary, key elements are: long-term monitoring; target resources identified by both public and scientists as “worthwhile” indicators (seagrass, water quality, bay habitats, etc.); science-based numeric goals and targets; multiple tools including regulation, public/private collaborative actions; citizen actions; a recognized honest broker to track, facilitate, assess and progress; ongoing assessment and adjustment; and recently, linking recovery to regional economic valuations. TBEP staff are discussing whether historic baseline would be a realistic goal or not. Showing how the healthy estuary links with a healthy economy has been a very important component of their discussions with local sponsors.

Ed noted that there will be an opportunity to discuss more of this in detail later. Bill confirmed that there will be a panel discussion during lunch.

Todd noted that at an earlier APNEP meeting there was a discussion about the Indian River Lagoon seagrass crash and wondered if there was a concern that a similar phenomenon could occur in Tampa Bay. Ed indicated that was always a concern in any urbanized system. Tampa Bay has had some nuisance algae blooms but they have still seen improvements. The Indian River Lagoon has a very different residence time than Tampa Bay. One major hurricane could cause them many problems.

Tim noted that one of the biggest drops in chlorophyll-a concentrations had occurred prior to establishment of TBEP. Ed replied that the state, in response to stakeholders, had required advanced treatment of point sources.

Jud asked if there is potential habitat out there to support more seagrass and was TBEP doing any kind of cost-benefit analysis. Ed indicated that they were not doing a full-blown cost-benefit analysis, but they have looked at some aspects. TBEP has already tackled all of the “low-hanging fruit”. They are basically at the limits of what loading the Bay can accommodate. They are translating that message to policymakers now, and are encouraging working with stormwater utilities and package plants to show some sort of offset in the future. Some of the old mistakes, in terms of development patterns, are still being made. There is recognition that they need to find more innovative ways to control future inputs.

Barnegat Bay Partnership, Dr. Stanton Hales

Bill introduced Dr. Stan Hales, noting that Stan is also chair of the [Association of National Estuary Programs](#) (ANEP). He did his undergrad at Davidson, attended the College of Charleston, and has a PhD from the University of Georgia. He also worked for the US Fish & Wildlife Service.

Stan thanked Bill for the invitation. Stan noted that the problems APNEP faces are very similar to those of BBP, one of the smaller and newer NEP units. Barnegat Bay is just at the tip of the iceberg in terms of how things are changing. Organizationally as director he reports to the policy committee. The Ocean County Board of Freeholders is on their board, along with Ocean County College, a representative from the Ocean County Mayors Association, and a citizen representative. They have an advisory committee, science & technical advisory committee, and communication and education committee. BBP has a staff of seven.

BBP has many, many partners. They were originally housed with the state. There are eight NGOs on their management conference. The program moved to being hosted by the county government, but after four or five years the program moved to the county college at the request of the state and EPA. Things were a little bumpy for a few years. All of their committees are chaired by outside partners. Stan

emphasized that participation such as demonstrated by APNEP's partners at this meeting, is critical to the program. He must remind EPA that they are not in charge but rather the locals need to be in charge.

Stan reviewed some of the BBP partners. One of them is "[ReClam the Bay](#)", which he indicated is mostly retired volunteers. Tim Dillingham, chair of the American Littoral Society (ALS), is on their board. Tim is very eloquent but sometimes at odds with various partners.

BBP has a CCMP, which Stan stated he read once but hasn't opened since. They created a strategic plan with 2012-2106 priorities. They are kicking off a CCMP revision process in the fall.

Barnegat Bay is a small, coastal system in New Jersey, located all within one county. For the most part the area is very heavily developed. A large pineland landward of the estuary has 13 sub-basins. The estimated nitrogen load is about 700,000 kg annually. The USGS is now working with them to explore whether they have a fertilizer/stormwater management problem. They haven't seen any changes yet in the system since regulations were put into place, and don't anticipate any for five years or so. The average drop of water hitting the Bay is ten years old and reflects past management history.

There are still three big sources of nutrient loading that aren't well assessed. All of the sewage is pumped offshore so that is one possible source. Under certain conditions, some portion of that re-enters their system. They also have the Oyster Creek Nuclear Generating Station, which generates chlorine and thereafter chloramine. The emphasis is that the current situation in the Bay is a decade in the making.

At the same time a state fertilizer law was passed, they also passed a soil health law. The density of the average lawn in New Jersey is not that much removed from a concrete driveway. That lack of permeability creates runoff issues.

They are working to address water supplies and this topic has been a big failure for them. The water supply plan has not been updated in fifteen years. There needs to be better public recognition of limited local water supplies, and the need to conserve and reuse water. There also needs to be better understanding of the effects of altered flows. This should involve: groundwater withdrawals; sewage effluent diversions; dams/reservoirs; and Oyster Creek.

BBP's third priority is protecting and restoring habitats. They identify and acquire open space, and other priority habitats. They protect riparian zones. Much of the northern part of the system is bulkheaded and few natural shorelines remain. They have had USGS working in the system now for five years. They have some sedimentary assessments in the works. Stan noted that there isn't enough sediment in the system now to sustain the existing wetlands.

Restoration of fisheries and wildlife in Barnegat Bay is another priority. They have a big anadromous fish program. The state of New Jersey completely abandoned their anadromous fish program years ago so now BBP is doing them. Ken Able is working with them to address invasive species, and has worked with them to show that the system is warming and contributes to the jellyfish issue. Two very hard winters in a row means high jellyfish abundance. The state has asked floating dock owners to remove their docks during the winter and thereby allow the polyps to die. The Bay historically had one of the largest shellfish populations, and was a center of hard clam production.

Another priority is to address land use. Stan provided a precautionary note by displaying a 1950 aerial photo of where the three tributaries of the Toms River come together, followed by a recent aerial photo, which shows huge urbanization. The rivers basically have been turned into three ditches, with urban lawns essentially like concrete. While EPA provides BBP funding, in New Jersey it is all local land use laws that control things.

Three years ago they encountered another southern invader in the form of Hurricane Sandy. Stan displayed aerial photos of the resultant devastation. The major thing happening with any alacrity is that everyone is building back higher and drier. This is federal and state tax dollars at work. Governor Cristy had actually closed down the state Climate Change Office. There is actually now a small office. Climate change is not well-received in New Jersey. Stan uses the NOAA 2050 flood risk with low-rise projections.

There is abundant high marsh in New Jersey, and there is a lot of questions about what happens when you flood it. It doesn't bode well for march that systems who must move landward when there is so much hardened shoreline.

BBP has developed a Mid-Atlantic Coastal Wetlands Assessment, and have a \$2M wetlands assessment program. They are starting to get a handle on the condition of their wetlands. They were not in good condition prior to Hurricane Sandy due to the bulkheads. The state and local groups also allow open-water marsh management, which may be causing a high conversion of wetlands to mudflats.

Another area is economics and the ecology. BBP recently sponsored an economic assessment and Stan will pass it along. The report identified their county as the most vulnerable. They have the most number of small business owners in the state, as well as a large number of residents on fixed incomes.

Stan would like BBP to spend more on education and outreach.

Lastly BBP has great access to elected officials. There are 658 elected officials and Stan can access a lot of them. BBP staff set up a special hearing in summer 2008 to showcase data on eutrophic condition in coastal lagoons. The information was taken and put to good use. There is a Governor's 10-point plan for Bargegat Bay, which was driven by BBP science. There were: closing OCNGS in 10 years; stormwater mitigation; fertilizer regulation; soil health restoration regulation; land acquisition; Special Area Management Plan (subsequently abandoned); rigorous water quality standards; education; comprehensive research; and reducing water craft impacts.

The state has monitored water quality monitoring for them, as well as also put a lot of funds into research. Right now they have a better understanding of how things work in the Bay. Stan asked for questions.

Jud noted that he was curious about the lawn conditions being just 10% less hard than concrete. Jud asked what was unique about New Jersey's soils. Stan noted that they use typical building practices, scraping off all the topsoil. What is left is easily compacted sand. Stan noted that he carries a soil penetrometer with him, and show the difference between natural soils, and developed landscapes. Improving soil functionality is one of the cheapest and easiest things that can be done nationally to improve things. Other states are putting soil health regulations in place. Stan had hoped to have this before the state legislature this summer, but the agriculture community got wind of it and managed to get the hearing cancelled. Stan noted that in many cases, the only thing from coastal homes that survived was the lawn sprinkler system. This is bad management.

Hans asked Stan to explain the fertilizer regulation. Stan explained the regulation addressed content and seasonality of application. It bans phosphorus, except for starter fertilizer. You can't apply it to anything impervious. You can get fined for having fertilizer on your driveway. There is a required training program for application. You aren't allowed to apply fertilizer during certain dates. BBP wasn't happy with that compromise but their partners were. In New Jersey anything put on the ground after September 15 is likely to runoff into the Bay. BBP pushed for an earlier date but they couldn't get it. The fertilizer

industry fought the proposal tooth and nail. Stan is making it a point to call legislators and point out that the snow pack precludes any need for fertilizer. The regulations address residential areas. They thought that they could get the agriculture folks to support it. They hope that over time this will make a difference. All the other green practices are being worked in as well.

Chesapeake Bay Program, Dr. Carl Hershner & Dr. Kirk Havens

Dean introduced Carl and Kirk to make the Chesapeake Bay Program presentation. Dean read all of their accomplishments and gave extensive introductions.

Kirk shared the structure of the program. CBP has an executive council, a citizen's advisory committee, local government advisory committee, science & technical advisory committee, management board, communications workgroup, and goal implementation teams for the following: Sustainable Fisheries, Protect and Restore Vital Habitats; Protect and Restore Water Quality; Maintain Healthy Watersheds; Foster Chesapeake Stewardship; and Enhance Partnering and Leadership. The teams are now doing the work plans to implement management strategies.

Kirk reviewed the system of Chesapeake Science Support, which comes from the STAC and STAR Science Coordination, etc.

Kirk shared the decision framework. They try to keep things simple. The questions are: is the strategy being implemented as planned?, and is it having the desired effect? CBP has a \$70M budget.

Carl continued the presentation. One problem CBP always had was multiple sources of management advice. The politicians and managers were always puzzled about to whom they should listen. About 15 years ago the relationship between the STAC and the managers was reworked. At that time the STAC position in the organization wasn't really all that different from the citizens or management advisory committees. They restructured the relationship by focusing on program goals. During the last ten years they have focused on making the timeline between questions and answers shorter and shorter. STAC now has a working relationship with CBP that helps them to craft the questions.

Carl noted that he wasn't trying to downplay the importance of independent, free-thinking research. Yet they are trying to make the CBP-STAC responsive and answer questions with significant support. That sounds easier to accomplish than it really was. Their group is similar to the APNEP-STAC. It convenes quarterly and requires constant shepherding. Kirk has been the CBP-STAC chair for the last several years and this position has taken much of his time.

Kirk asked Carl to address funding.

Carl stated that when they began, the funds were allocated widely. A couple of years ago the CBP-STAC decided that they would wait for partners to come and ask for work. They now receive a pretty constant stream of support for conducting scientific reviews, and a larger amount of support in terms of funds and staffing because they have proven their value. The EPA passed through the court challenges to the TMDLs because the CBP-STAC had provided them with the evidence they needed. This is a way to make the STAC impactful. You need to take the STAC members that dedicate a lot of time and clone them.

Kirk noted that you do really need to translate the science into messages that the decision-makers can understand and thus staying "out of the weeds". The initial concept was pretty simple but they still had to break it down. You need to take a look at strategies that establish an iterative approach.

The question was asked whether there were questions from local elected officials. Carl responded that they were not a science resource for the entire watershed, only for CBP.

Carl noted that when you review where the Bay Program has come through the years, particularly with regard to water quality, from trying to figure out what happened to now trying to restore the Bay, they are now under court order. They aren't going to make the deadline. They are behind big time at the midpoint of the assessment. They are getting to the realization that if they are going to live in the Bay, they are going to have to moderate their expectations. They will have to look at use attainability. It will be fun to look at CBP over the next five years and see if they can find a way to tackle this. They can improve conditions in the Bay, but will NOT return to the official goal. A challenge it to keep people motivated to keep working with the process.

Hans asked how that works with the TMDL process. Carl replied that it doesn't work. Once the TMDL is in place, one must demonstrate failure before doing anything else. The lag time for responses to some of their actions is ten years or more.

Todd asked Carl to explain why CBP is under an order, versus other parts of the country. Carl explained that a group of non-governmental organizations (NGOs) brought suit against EPA to force the municipalities to take action. A judge was willing to write an order to make EPA take action. Carl suggested that Pennsylvania is the state that is worth watching, because due to agriculture that is where most of the problem lies.

Tim asked what the original goal was that they don't believe they can attain. Carl responded that SAV restoration was one of them but increasing water temperatures isn't going to allow that. With regard to nitrogen and phosphorus, the legacy load is so great that even if all current loading ceased, we still won't get rid of these excess nutrients in a timely manner. If you have done all you can do and still can't meet standards, do you still put regulations in place or would those funds be better spent on something else?

Tim noted that nonpoint source inputs are another issue and derive largely from agriculture. Most states don't want to tackle agricultural inputs. One logical solution is to establish large riparian buffers, which have many benefits. They are pretty effective. One could force people to implement there installation but we don't do force well, and Tim hasn't seen agriculture acknowledge that there is a problem.

Carl said he didn't disagree but his frame is from a bigger picture. We import more nitrogen and phosphorus than could possibly be consumed, or that we could capture the remnants of. We generate a lot of manure and nothing can remove all of the excess. The only way we can halt it is to stop the agriculture practice. The same is true for development. We can't offset the loads we are creating by having people occupy the landscape.

Tim noted that a lot of times people can't decide what they want. They can't decide what the point is. Are people happy with what we have now? Or do we want to restore something. He gave the example of High Rock Lake, which is flooded with nutrients and produces a lot of fish. People love that fact. There are a lot of perspectives that people have with regard to what they want. If you can get agreement, you can get there.

Moderated Panel Discussion, Jim Hawhee

Jim asked the panelists to come to the front table: Carl, Kirk, Bill, Rhonda, Ed, and Stan moved to the front.

Carl noted that one thing they did on the CBP-STAC was to begin strengthening their social sciences cadre.

Pete Calla asked about fatigue in the process due to the legacy sediments. Yes, that is an issue.

Jim indicated that we would take a half-hour for a moderated discussion. He didn't write out any questions but he couldn't help but notice that all three of our example estuaries have been successful in working with high-level government, citing the fertilizer regulations as one example. He asked them to address what is in their recipe for success with legislators. He asked each panelist to state what they did well.

Kirk asked if Jim wanted them to answer from his perspective as a STAC member, or from the perspective of the program writ large. Jim said either one. Kirk said that establishing a relationship where users know their questions can be answered is important. Also, being at the table and developing the personal interactions with politicians is important, as is constant repetition. Being charismatic helps.

Jim asked Rhonda to respond. He asked her what she sees from her regional or national perspective. Rhonda indicated that having staff that can lobby does help. Some directors do discuss things with their Congressional delegations. When TBEP was set up, there was already a ten-year record of people working for change. There was a cohesive group of scientists who were lobbying the state government about these issues. The decision-makers have to be included. You need to decide what you want, and then target those who make the decisions.

Ed noted that he is relatively new to the NEP, but he sees their strengths in their partnerships. Everyone is connected to the Bay in some respect. They began with the perspective of reaching across the aisle to industry, to partner together to make a change. Peer pressure helps as well. Partnership and coalition building has been a big key.

Jim asked if there have been any changes. Ed stated that initially it was strictly voluntary. Now they have caps, and are looking at other tools to be able to address the issues. They want growth to occur in a responsible way.

Jim asked Stan to comment on New Jersey politics and ANEP. It is a 501-3(c) organization. All of the NEP directors sit on the ANEP board. They have two contractors who work for them. One of them works for an environmental think tank/consulting. He managed to influence Congress to increase the NEP funding levels. The association is supported by dues from each NEP unit. Stan encouraged APNEP to find a way to pay the dues. Directors can be put in a position to educate members on Capitol Hill about what the NEP units are doing. They reach out to STACs to determine what sort of investments have been made to support the entire collaborative. One reason they enjoy strong bipartisan Congressional support is because of the 18 to 1 ratio of support to funding received. ANEP normally meets the last week in February. Many STAC members are in a position to lobby. The association has five priorities. The first is reauthorization. The bills have been introduced in House and Senate. Many of us can communicate with our representatives in the House and Senate and communicate support for the program and the funding. The bills out there now would change the program in significant ways, which might affect EPA management of the program.

Bill noted that APNEP does not pay dues nor do other NEP units that are housed in state agencies. The partners figure out how to pay the dues. Bill has not done Capitol Hill visits during the last couple of years. He has traveled with partners like NC Sea Grant in the past. There are advantages of going with partners, such as explaining how APNEP doesn't do the same thing as other environmental organizations. ANEP does both lobbying and relationship-building.

Stan noted that he has about a 30-slide presentation, which highlights much of what the other NEP units do.

Bill noted that the Charlotte Harbor NEP has a legislative committee. Some other NEP units send staff to EPA and/or Capitol Hill. APNEP has not had such an organized effort. Between North Carolina and Virginia, APNEP has one of the largest Congressional contingents so the potential is there.

Stan noted that much of what ANEP representatives do is more education as opposed to lobbying. Much of it has to do with water quality. One big point they try to make is that more than half of the NEP units do not have comprehensive monitoring for their core programs. They have surveyed all of the programs in the last two years to see what they are doing and how they are doing it. The CBP is obviously the model. Stan noted that he is glad he doesn't have to administer \$70M. Much of the activity is deciding what you want. Science gets spun like politics now.

Jim asked for questions.

Dave Kimmel noted he was glad to hear Carl say "use sustainability." In many cases there is a socio-economic issue. How much were STACs dealing with the socioeconomic issue of what society wants to invest to achieve what they want, and how much is climate change going to interfere?

Carl stated that they are waiting anxiously to see how this goes. It takes a long time for the social scientists to adequately frame the questions. They should be consulted now.

Ed noted that early on in TBEP, the target was to return to conditions in the 1950s. As the conversation evolves, the stakeholders need to decide whether they want green healthy lawns or healthy estuaries.

Dave Kimmel thought that some tradeoffs were easier. Stakeholders often say they are willing to pay the cost but in practice rarely do so.

One commenter noted that some people say you can only influence the next generation.

Ed noted that Rhonda reminded him that they already have fertilizer regulations in one of their counties, and some municipalities. In those areas the populace is far more knowledgeable. It gets back to common messaging and getting your message across.

Stan noted that he is traveling to three other NEP units soon to talk about the fertilizer regulations. The NGOs were upset about the BBP message, saying that in many cases you don't need fertilizer at all. They went to Vigoro and noted that there were lots of local regulations, and the company indicated that they would rather have uniform regulation at the state level. There are different costs for different fertilizer products. Some of the boutique varieties make him a little nervous. There are many technical opportunities to inform what the soil really needs. To maintain a green lawn from time A to time B, much advice is available. They ultimately had strong support from the NGO communities. There was finally recognition that they could get by with less fertilizer. Stan was raised in eastern NC and everyone used to have dirt yards. Culture does change.

Kirk noted that he has a report on how to nudge people to make the right decisions. He will share with interested parties.

Bill noted that it is a hard sell telling Cary citizens to reduce fertilizer because it affects blue crabs in Core Sound. Many people living here in Greenville may not even know there is a river here. Getting the decision-makers to acknowledge a need for change is a challenge.

Rua asked, regarding the socioeconomic questions, have anyone tried any controlled experiments? He doesn't see much of that with regard to the policy or outreach. Do you have any examples?

Carl stated that there was at least one, in metro Washington with regard to fertilizers. The program was to try to get people not to use fertilizer so much. The study was very expensive. They were all stunned at how much it cost. It was hundreds of thousands of dollars and caused depression of the regulators, because they thought they would never learn how people do things. Now, there is a lot going on with regard to climate change and flood management. It seems everyone behaves differently based on factors we don't know.

Todd noted that they were in the middle of a process looking at stormwater in North Carolina. They looked at program implementation and there wasn't much expertise around on how to design effective programs. Todd asked how much attention was given to institutional barriers.

Carl said there is no standardized methodology, to his knowledge, although there are people trying to do it. The field is not well advanced. Ed indicated that TBEP is looking at this in one of their municipalities and have focused some funds on the subject. They are translating their science more and more lately to a lot of the planning people to get them on board. They are moving more with those kind of folks and are making some inroads but still have a long way to go, especially with regard to stormwater controls.

Stan noted that the age-old argument is whether to use a carrot or a stick. It probably has to be some of both. It is a challenge. They have a new freshman Congressman in their watershed. He began with an insurance business and turned it into a Fortune 500 company. He came to them and asked for incentives for stormwater controls. The problem with stormwater management is that a lot of the features take regular management, and a lot of them get built and then not maintained. In New Jersey there are no stormwater utilities and under the current governor there will be opposition to this.

Ed noted that one TBEP local county government has a fee for stormwater management in place.

Hans noted that Kirk had brought up the legacy nutrient issue. This is an issue with large lakes as well. Nutrients are needed for production as well. It is a hard message to get across that it will take a long time to fix things because it took a long time to damage them.

Carl noted that there is now greater fish production in Chesapeake Bay than historically. It is just in a different form than it used to be. When you cut back nutrient inputs, the fisheries will change. Carl hasn't found any way to effectively communicate this fact.

Hans noted that things go back to the Reagan era. Everyone thinks that engineering can fix things. He runs into that in China, where they just want to move water around rather than dealing with the nutrient issues.

Carl noted that you have to acknowledge the regime shifts as well. Chesapeake Bay was on the verge of going from fish to jellyfish. That doesn't translate well to the managers or policymakers. The problem seems to be for moving policy into a legal framework, and when we have a sound ecological reason for it, we are dealing with people who have none of this in their value system. We need to learn how to talk to people and make things understandable to them, from their frame of reference. This is beyond the training Carl has.

Hans noted that the focus seems to have shifted to doing something quick, which is very different from initiating long-term strategies. Carl agreed. He noted that he is in a group of VIMS, which deals with shoreline management. One thing they noticed is that in the 1970s all of those people believed in the ecological values of the Chesapeake Bay. Now the stakeholders believe that the biggest thing they get from the Bay is risk, flood risk.

Stan noted that focusing on human use has a benefit. They have a growing jellyfish problem in the Bay. Stan has lots of family on the Bay, and nettle abundance is very high. Using Barnegat Bay water has become difficult because of the nettles. The jellyfish may be a sign of other changes to come. You can't eat them. Someone noted that the Chinese do eat them. We may get some different ecological states of things, and that could have an adverse economic impact.

Association of National Estuary Programs, Dr. Stan Hales

Stan noted that he had already talked a little about ANEP, yet audience members may not have heard much about the association so he will give a short briefing. When Stan first began in ANEP leadership they had semiannual meetings. He could learn how other programs were working. He noted that one director told him that the best, and worst, thing BBP had was a really active management conference. Stan noted that his best resource for answering questions was another NEP director. They talk on a weekly basis.

ANEP's main priorities include reauthorization. There are 50-60 EPA programs that were targeted for elimination due to lack of support. HR 944 passed the House; there is an identical bill in the Senate. The NEP appropriations are annual. ANEP promotes NEP and EPA coordination so they can work together. They have a lot of technical exchange. Stan noted that BBP has never received EPA funds prior to October. Partners have to front the funds for BBP. They also pick each other's brains on core programs. They are also focused on coastal coordination, with federal agencies and NGOs. They do a lot of science communication and outreach.

Stan noted that he could talk the rest of the afternoon but stopped in the interests of time. He asked that APNEP partners all support ANEP.

APNEP/National Coastal Assessment Briefing, Dr. Dean Carpenter

Bill introduced Dean to address this topic. Dean asked how many of the audience had heard about the [National Coastal Condition Assessment](#) (NCCA). About half the audience raised their hands. Dean noted that NCCA monitoring occurs every five years, covering from the head of salt to marine habitat. During the 2015 cycle there are 33 core stations in the APNEP region. APNEP staff plans to double the core monitoring density to match national, regional uncertainty estimates. EPA Headquarters is contributing training and lab analyses. APNEP is seeking partner contributions. Dean addressed current status and future opportunities.

While NCCA gives EPA the opportunity to report on the national and regional (multistate) picture, 33 stations is insufficient to allow rigorous analysis at the scale of say the APNEP region. However, the design is such that you can increase the number of samples to increase statistical power.

Beginning in April 2014 Dean began strategizing with Pete and Rhonda about implementing the monitoring intensification. While Dean long had difficulty getting information about the sampling design, he finally received the information in May 2015, and sampling was to begin June 1. Ultimately,

EPA Headquarters agreed to underwrite the training and do the laboratory analysis. In return APNEP staff is to doing the best they can to make this happen.

Hans asked what sort of analysis is anticipated. Bill indicated that a contract laboratory does the analysis. To double the number of samples in order to get information of use to APNEP stakeholders, EPA will fund the additional 33 sites we need. Estimated lab analysis cost is \$50,000.

Dean showed a slide with the station locations. The core 33 stations will be sampled by the North Carolina Division of Water Resources and EPA (27 by NC-DWR, the rest by EPA contractors). The 33 intensification stations on the map (light blue) will be coordinated by APNEP.

Hans asked how the stations were selected. Dean advised it is a stratified random design. Hans noted that it appeared so. Hans asked about the samples. Dean indicated that there are site kits that will be employed to process the samples.

Whereas APNEP staff has committed to the NCCA protocol involving the sampling water and benthos, staff is now trying to engage partners to assist with sampling fish. Staff from the North Carolina Wildlife Resources Commission (NC-WRC) and NC-DWR may each do ten of the sample sites for fish. Fish don't have to be collected at the same time as the water and benthos. All the samples need to be taken by October 1. APNEP staff participated yesterday in a training webinar. Tomorrow in Beaufort they will be trained on the field protocol, and on Friday they will actually conduct sampling at one of the stations. They will begin intensification sampling in mid-August. APNEP staff hopes to work with partners to get all of the fish samples done. EPA Headquarters is excited about APNEP doing this work. NCCA planning has really cut into their time for the last weeks, including the collaboration with some partners to get needed equipment.

The question was asked what kind of gear could be used to capture the fish. EPA prefers trawls but Bill noted that hook-and-line was also acceptable.

Hans shared that it appeared the stations were non-random in placement. If they were placed random, he thought that there should be more stations out in the middle of Pamlico Sound. Bill agreed and said that he had questioned Dean about this.

Stan stated he thought it was a stratified random design.

Rhonda stated that the randomization was only within certain strata.

Misty noted that there are more red dots in Pamlico Sound and said the dots are very hard to see from the back of the room.

Bill noted that he has been advocating for years that sampling be conducted in a manner that was useful for us, and now we have the opportunity. EPA is willing to pick up the analysis. If we can get the partners, we can do it.

Don asked if there is a fish species list. Yes, there is.

Bill noted that APNEP itself does not have the equipment needed to do the trawling.

Jud asked how the decision came to double the sampling. Is that something EPA mandated? He used to kind of laugh at these reports when they came out. Isn't EPA really admitting that they are under-sampling? He realizes it is a national program but it doesn't really have a bearing on the individual estuarine units.

Dean said it would for APNEP. Staff have always said that there is a “black hole” in the sampling program. Dean is interested in sampling in intervening years as well. Right now the focus is just getting a picture so we can say something about the sound.

Hans asked again what the timing is. It is once every five years. Hans presented two scenarios. One is that a hurricane comes through just before sampling. Another is that things remain the same as they are now and the water column is stratified. This was the problem for the [Environmental Monitoring & Assessment Program](#) (EMAP) as well. They concluded that Pamlico Sound was in great shape but that is because they went out during good conditions. Hans questioned why the sampling isn’t more distributed over time, to yield a more realistic picture.

Stan noted that this decision has taken place a lot within EPA. This program is funded from a geographic program mix. There is a different question asked every year. This is where going to the meetings in Washington, DC enables us to have these discussions. One reason the samples are doubled is to allow more rigorous analysis. BBP did this in New Jersey during a previous cycle. Stan thinks the stratification has to do with salinity and sediment. He agreed that there has been a lot of discussion and debate on this program.

Tim noted that when one defines the area and the samples one should get a good picture of what the range is over time. You get a good idea of temporal variability.

Hans noted that the sample sites look rather weird to him. He is bothered by what conclusions may arise.

Dean noted that the sampling is done during June, July, August and September, but only once. He wants to take advantage of this opportunity to get started. This is not the ideal, but it is a way to get started.

Bill noted that DENR does have a water quality sampling program but it samples sites only once a year.

Hans noted that the only state program does not do vertical profiles. There is precious little to compare any samples.

Rhonda noted that EPA does assist Hawaii at a higher level. Hawaii does sample at a higher level. If APNEP cooperates in 2015 we may have enough samples to say more about the sounds. We may have more opportunity to look at the next five years, and/or design something more specific to our area.

Todd asked if APNEP participation is mandatory or discretionary. It is the latter. Todd urged caution because it sounded to him that this is consuming a lot of time and resources.

Bill agreed that it is taking time. APNEP doesn’t have the resources to do the fish.

Todd emphasized that many of the stations appear close to the shore, and noted that many stations might have been picked up by the North Carolina Shellfish Sanitation Program.

Pete stated if you want to apply the results to the entire Sound, you have to use a funny-looking sample design like this. If sampling is done frequently enough, the effects of events like hurricanes can be overcome.

Stan noted that it has been going on for quite a while.

Todd noted that it bothers him that a sampling program in Albemarle Sound was dropped to save funding, when this program is going to cost APNEP a good bit.

New Business, Dr. Tom Allen, Dr. Burrell Montz

Tom suggested that one of the workgroups could pick up on this discussion and get back to us. Tom asked about having a “State of the Sounds” symposium in spring 2016. Bill indicated that is one reason why they wanted to push to do this sampling. Tom asked if it is going to have a thematic focus. Bill doesn’t know yet.

Tom noted that at Duke University in September there is a scoping meeting to discuss a candidate long-term ecological research (LTER) site, suggesting that could dovetail well with the monitoring discussion.

Old Business, Dr Tom Allen, Dr. Burrell Montz

Tom noted that we had punted the top two items on our agenda to the next meeting. Bill indicated that he would send out the notes from this meeting with the previous ones. Burrell noted that she and Jessica would bring up their task at the next meeting. Progress will be made.

Public Comments, Dr. Tom Allen

Misty Buchanan, NC-Natural Heritage Program stated that she works with APNEP staff daily, and stated that they receive great returns for the funding which is put in to APNEP.

Jim provided a couple of staff notes. APNEP intern Marygrace Knight will be staying through September. She will be driving boats for APNEP at lot. She is working on the Hydrilla monitoring program in Chowan River and Albemarle Sound. NC-DWR and other staff are all stepping up to the plate. Katia is working at the summer teacher institute at Salter Path. Other things are brewing as well, including nutrient criteria.

Jim noted that select APNEP staff are headed to NASA Langley next week. They are looking at remote sensing of wetlands. If anyone is interested, see Jim.

Stan noted that they had talked to NASA, who told him that they didn’t have anything of sufficient scale to assist BBP. He was told to talk to the European Space Agency. Hans suggested that Stan talk to Ross Lunetta of EPA.

Adjourn, Dr. Tom Allen
2:51 pm