APNEP Scientific and Technical Advisory Committee
Winter Meeting
January 30, 2008
Willis Building, East Carolina University, Greenville, North Carolina

STAC Members Present: Michael Rikard, David Mallinson, Robin Dennis, Don Field, Jud Kenworthy, Jeff Hanson, Michael Piehler, Pete Peterson, Tim Spruill, Mike Mallin, Robert Reed, Lorry King, Stan Riggs, Wilson Laney, Lane Price, Tony Rodriquez, Pete Kalla, Kirk Havens

Liaisons: Bill Swartley (NC-DFR), Jack McCambridge (VA-DOT), Cherri Smith (NC-DOT)

Advisory Committees: Marjorie Rayburn (CAC)

Presenters: Bill Rogers

Staff Present: Dean Carpenter, Bill Crowell, Joan Giordano, Lucy Henry, Jimmy Johnson

10:10 AM: **Call to Order: Michael Rikard:** Michael convened the meeting and welcomed everyone. He noted that Dean Carpenter has copies of the agenda for those who need one. He asked us to do brief introductions. Michael noted that we would move Kirk Havens up to 1:30, and Dean would do the indicator talk at 2:00 PM. Michael asked for approval of the summer meeting minutes. There were no comments. Approval was moved and seconded, and the motion was approved.

10:15 AM: **APNEP Update: Dean Carpenter:** Dean thanked everyone for coming to the winter meeting. He thanked Bill, Jack and Cherri for being state agency liaisons and attending today's meeting. He noted that Jeff Hanson was attending his first meeting. There have been no resignations over the last three months. The STAC Executive Committee met on December 13. The STAC spring meeting will be April 30th, at Jockey's Ridge State Park, a coastal setting in honor of Mike and Nancy's last quarterly meeting as Co-Chairs. Dean noted he was soliciting volunteers for two new co-chairs. He noted the APNEP staff has really been focused on indicators, for the last little while. The CCMP Steering Committee met on January 22, and the STAC had two liaisons for that meeting.

Dean asked for any announcements from the group. Lane Price noted the US Department of Agriculture's Conservation Reserve Enhancement Program (CREP) program is being expanded from the Pee Dee River, all the way east. The program focuses mostly on riparian buffers. Kirk noted that he would be attending the NEP national indicators meeting in Oregon next month, and would report back to us. EPA will be sponsoring that meeting. It is in conjunction with the National Wetlands Assessment that is being done.

10:20 AM: **National Estuaries Chapter of the U.S. Climate Change Science Program's Preliminary Review of Adaptation Options of Climate Sensitive Ecosystems: Charles "Pete" Peterson:**

The title of Pete's presentation was "Management Options for Protecting the World's Estuaries." He will also be giving this presentation at the 2008 AAAS meeting in Boston. Pete noted the present US administration has done little to implement measures to address climate change. On the other hand, he noted, they had committed a lot of funding to studying it. Pete noted that he was asked to address this topic, and did so with a number of colleagues, several of them on the STAC. Pete noted there are three major habitat issues, worldwide, raised by climate change. Polar Zones, Tropical Coral Reefs, and Temperate zone salt marshes. These entail the decline of polar bear, gray whale, walrus and penguins. There has been a decline of 40 percent in coral reef habitat, holding the greatest biodiversity in the ocean. Finally there have been 25 percent declines in salt marshes.

Pete noted this is Synthesis and Assessment Product 4.4, and has made it through the FACA (federal review) process and will be on the streets in a month or so. This is part of the US Climate Change Science Program**.** It reviewed potential management adaptation options for responding to climate change. It identified characteristics of ecosystem and adaptation response to promote or inhibit successful implementation. He noted that APNEP could be both a barrier and a means to facilitation.

Pete reviewed the US NEP. It includes 28 estuaries. Each one is responsible for implementing and updating its own CCMP. The problem Pete sees is there is no regulatory authority. Pete noted that all APNEP can do is to comment from the peanut gallery, and the primary means of doing so is through the Policy Board, and he wonders if they do so enough.

He noted there are a number of management goals that are similar, nationwide, for each NEP.

Pete noted that if you have no regulatory authority, you have to look to other means, other federal and state regulatory mechanisms. He listed a bunch of them (NEPA, ESA, CZMA, CWMA, etc.).

Pete listed traditional stresses to estuaries: nutrients, sediments, pathogens, fishing, wetland loss from development, etc.

Emerging stressors as climate is changing include: temperature increase (ranges move pole-ward at unequal rates so new species mixes, disease and parasite increases, phenology mismatches), sea-level rise (interacting with shoreline armoring to suppress transgression of shoreline habitats), enhanced intense storms (shoreline erosion, pulsed floods), CO_2 rise and ocean acidification (organisms making $CaCO_3$ shells or internal skeletons challenged), precipitation changes (salinity and stratification effects) and species introductions facilitated by disturbance. Pete noted a lot of these may not have been included in original CCMPs but need to be factored into their revisions.

Pete discussed estuarine changes projected from interacting stressors. Interacting stressors include the least widely appreciated yet most serious threats to ecosystem services. Disease and parasitism rates increase with interactions between temperature and other stressors like hypoxia, nutrients, and toxins. Rising sea level interacts with growing use of bulkheads and other anti-erosion structure preventing transgression. Sea level rise and increased frequency of intense storms interact to deconstruct coastal barriers. Increased temperature and changing precipitation interact to affect water column stratification and hypoxia/anoxia with resulting dead zones. Pete noted that we have had a respite from this, for awhile, but this will seem like the good times, as sea level rises.

Pete indicated their committee suggested that we need to worry about the ability of our estuaries to move into alternative states. He titled this potential passage past thresholds inducting estuarine state change. Loss of water filtration by overfished oysters and other bivalves interacts with increased phytoplankton production to expand scope, intensity, and duration of eutrophication. Overloading of nitrogen induces state shift from submerged aquatic vegetation (SAV) to phytoplankton and macroalgae. The ability of salt marsh to maintain elevation in the face of sea level rise by accretion ends abruptly as a threshold rate of SLR is exceeded. These are only three of the issues needing management attention.

Climate Change Projections (2007): Pete noted the assumptions they made as reasonable expectations, in their report. Temperature rise in surface atmosphere ranged from a low of 1.1-2.9 C to a high scenario of 2.4-6.4C by 2100. Sea level rise ranged from a low scenario of 0.18-0.38 M to a high of 0.26-0.59 m by 2100 even without increasing contributions from ice shelf melting, which could dwarf this rise. Stan Riggs noted that we are already at the high option, in the last century.

Pete addressed estuarine management. He noted that status quo management is inadequate, because it will guarantee failure to meet all the goals. Especially urgent is management adaptation in Louisiana, North Carolina, and Florida where relative SLR is highest and land slope the lowest. Over a few decades, management adaptations may build estuarine resilience sufficiently to minimize ecosystem service losses. After that period, major losses in some services are inevitable.

Pete reviewed water quality changes under status quo of management. Our estuaries are going to turn into bathtubs, given bulkheads and seawalls. Marsh, SAV, oyster reef and intertidal flats disappear under SLR with bulkheads stopping transgression.

Pete reviewed fish and wildlife changes under status quo. Habitats required will disappear. Eutrophication, hypoxia and bottom dead zones will expand. Instead of top-level predators, we will be producing microbial ooze.

Pete reviewed projected habitat changes under status quo management. As sea level rises, all the habitats will be in serious trouble.

Human service changes under status quo of management will alter: commercial and recreational fisheries will decline, natural amenities derived form wildlife will suffer, nuisance algal blooms and fish kills degrade the quality of life, aesthetics of estuarine shoreline living decline, bulkheads and dikes offer a false sense of security, setting the stage for major loss of life and property in an inevitable big storm event. They set us up for disaster.

Water quantity changes were reviewed.

Pete indicated their group discussed the time scales of response. First is reaction to injuries, to major storms and so forth. Second is planning now, implementing later after indicators show urgency or when a window of social feasibility opens, like after a natural disaster. Finally, there is immediate implementation of proactive policies. Pete used Topsail Island as an example of where management has failed to permanently remove dwellings after they have been wiped out, but instead allows them to rebuild. Another example is bulkheads.

Pete reviewed the determinants of choosing the appropriate time scale. These include, balancing costs of implementation versus risks of delaying under the status quo; degree of reversibility of the negative effects of climate change and costs of reversal; recognition and understanding of the problem by managers and the public; uncertainty.....

In the short term, there are things we can do to help, for the next two to three decades. Eutrophication is likely to increase through increased stratification, higher biological oxygen demand (BOD) at warmer temperatures, less effective buffering by flooded riparian wetlands, and greater organic loading in more frequent floods.

Pete addressed strategic shifts in existing policies: most federal, state, tribal and local environmental management programs fail even to contemplate climate change; local cost prevention of future problems can be found by review of existing management plans, laws and regulations; for example, riverine flood hazard zones should be modified to reflect reality of expanded flooding frequency and extent; for example, landfills and hazardous waste sites should be located on even higher ground; for example, eliminate public subsidies for risky barrier island development and erosion protection applying Coastal Barrier Resources Act everywhere. The principle from that Act should be broadly expanded.

Pete reviewed proactive implementation required for estuaries. Take actions now to manage development of undeveloped shores for orderly retreat under rolling easements is necessary to preserve ecosystem services because this action is precluded later. One such area in North Carolina is Albemarle Sound. We have to educate to counteract ignorance, denial and disinformation; identify costs and risks of present policies now subsidizing risky development; explain why rolling easements do not represent a “taking” of private property; discuss how not all shorelines can be diked because of costs; explain how modest protection falsely implies safety. Pete stated that this approach is feasible for the Albemarle Sound shoreline and probably nowhere else.

Pete stressed that monitoring and historical baselines are essential. Geological reconstructions are critical to understanding and communicating the dynamics of estuarine shorelines and coastal barriers under conditions of changing sea level. Pete used fisheries management as an example. We have far too often fished beyond maximum sustainable yield, to determine where the danger point is.

Pete indicated they used Albemarle-Pamlico Estuary as a case study since it possesses much low-lying land, and is projected to lose more habitat under all SLR scenarios. It faces disintegration of its protective barrier, the Outer Banks of North Carolina. It has an ecosystem-based management plan, the Coastal Habitat Protection Plan (CHPP), and a legislative study commission which can facilitate management adaptations to preserve services, following guidance of the US Commission on Ocean Policy.

Pete showed a map of the land area below 1.5 m, which shows what is likely lost under SLR. But, he noted that it includes no consideration for erosion. It is a simple approach. The hotspots are clearly in NC, FL and LA. Pete noted that a close-up view shows that an astounding amount of land area is within 3.5 m of sea level.

Pete noted that a lot of people rest behind the notion that marshes will capture sediments and keep up with SLR. The trouble with that is that erosion does enter the picture. There is tremendous erosion at the end of marshes. Our marshes are actively eroding, and that is evident. At the higher elevation we see scarping, which acts as a seawall and accelerates erosion at that end as well. The prediction is that these critical shoreline habitats will disappear, sequentially, beginning with salt marsh, then oyster reefs, then SAV. Pete noted that with a bulkhead in place, the marsh simply disappears.

Pete reviewed the ecosystem services of salt marshes, from the Millenium Ecosystem Assessment.

The global distribution of non-Arctic tidal marshes, is skewed, with an unusually high percentage in the Southeastern US.

There are 25 species or subspecies of turtles, snakes, shrews, small rodents, sparrows and rails, dependent on marshes, and 23 of them are American.

Pete reviewed the issue of coastal barrier deconstruction.

Pete noted the need for management adaptation in the estuary. Climate-related losses are already occurring for all estuarine ecosystem services; maintaining the status quo guarantees further losses of all important services; the conflict between protecting private.....

The Clean Water Act requires no net loss of wetlands, and Pete stated that allowing bulkheads violates the CWA. Common law is also violated as the public trust tidelands (intertidal shore)

disappear. Pete noted that we do a good job of this on the ocean shoreline, but we blow it away in the sounds.

Pete stated a possible solution to the dilemma. It is implementation of "rolling easements" on shorelines. Other useful management adaptations will include building ecosystem resilience, reduce other stressors, sustain biodiversity, avoid transitions towards state changes, reduce public subsidies of injurious development on risky lands, and develop and implement ecosystem-based management to achieve holistic stewardship.

11:15 AM: **Technical Information Sharing at the Onslow Bight Forum: William Rogers:**

Bill reviewed the MOU signatories of the Onslow Bight Forum (OBF), mission technical subcommittees were reviewed. Conservation Reserve Design, Fire Learning Network, Red-Cockaded Woodpecker. Bill noted they have had many successful projects. US Marine Corps (USMC) has ownership of development rights, but management falls to other entities [i.e., NC-Wildlife Resources Commission (WRC)]. Bill noted APNEP must have gone through a similar process of defining boundaries. Bill showed the Onslow Bight landscape map with identified corridors. The North Carolina Natural Heritage Program (NHP) played a large role, as did The Nature Conservancy (TNC). The boundary has not been altered. It goes north and west, particularly for black bear. Although they recognize funding is limited, the corridors help to focus efforts. Projects that fall in the corridors are more justifiable. The U.S. Fire Learning Network is a national program. Margit Bucher (TNC) heads this committee. Their vision is to engage more than 100 projects. Bill showed the pre-settlement vegetation map for Onslow Bight – much based on Cecil Frost's work, mapped by TNC GIS staff (Constanza?). They have a Wildland Urban Interface map as well. The last committee Bill reviewed was the Red Cockaded Woodpecker (RCW) committee. Purpose was to identify RCW habitat outside of currently managed areas but demographically connected; develop searchable GIS tool. First step was to create a shapefile of all parcels within 5 miles of managed areas. They got 150,000 parcels which they narrowed down to those with high loblolly pine potential and 100T acres in extent reduced number to about 500 parcels. Bill described the RCW analysis that will be used to further refine their process.

Questions: Tim Spruill asked if the Forum was initiated by USMC? It was--along with TNC. A major purpose of USMC was to control land use on major adjacent parcels. Bill noted there were a lot of overlapping interests. The projects may be done by partners outside the scope of the OBF. Kirk Havens asked if there had been any discussion of SLR and allowing it to invade. Bill noted it has been discussed, and the military is beginning to address it in their planning. US Department of Defense (DOD) is getting ready to put money toward it. Don Field noted Dean had forwarded him an e-mail from Mike Street (NC-DMF) regarding purchasing new imagery from a new GOI satellite producing hyperspectral imagery. OBF is a major partner. They will use now high-value habitats to look for similar parcels. Tim Spruill noted to him that this seemed to be a proactive approach to solving people problems, by controlling land use. You won't accomplish much unless you address the use aspect. William.H.Rogers@usmc.mil – 910-451-9384.

12:25 PM: **North Carolina Barrier Island Dynamics: Stan Riggs:**

Stan noted he was giving his Core Banks talk not his SLR talk. At this time rate is half a meter/century just in the last 200 years. Southeastern North Carolina is not likely rising at the same rate, is probably less than that. Little sediment preservation in Southeastern North Carolina, in contrast to 205' of quaternary sediments in Northeastern North Carolina. Stan noted this is only a small part of a large project funded by US Geological Survey (USGS) and US National Park Service (NPS), over the past years. Began on Core Banks because it is likely most natural. Comparison was made to Cape Hatteras National Seashore. Cape Lookout National Seashore goes from Ocracoke Inlet to Cape Lookout. Inlets and overwashes are king in this system. Storm dynamics maintain health, and long-term evolution. Core Sound is really shallow. Islands there will migrate/survive. Pamlico Sound is deep (24' in comparison). Northern Barriers will collapse due to depth and sediment deficit. There will be shorelines, such as Mamas Harbor. There is not new sand coming into the barriers. US Army Corps of Engineers (ACE) took 77 profiles in 1960. All were taken out by a hurricane, to in 1961, ACE re-did the profiles. Ash Wednesday Storm of 1962 took them out again. In 1970-71 Godfrey and Godfrey resurveyed – found 141. East Carolina University (ECU) 2001 survey relocated some of the benchmarks. ACE had done elevation, so ECU could do comparisons. 1962-1971 there was accretion average of 12'/yr. Comparing ACE to Godfrey surveys the barriers rebuilt. The ECU and North Carolina Division of Coastal Management (NC-DCM) databases both reflected long form rate of -5 feet/yr. Storms cause anywhere from 75-250 feet recession. Stan noted that the long-term rates are really misleading. An 80' lot can't endure the storm drive erosion rate. We can't wait until we have a storm to have a plan in place. Every storm will create a disaster, unless we do something. Stan reviewed history of Drum Inlet 1933-2003. Inlets are crucial. The survey revealed that Core Banks are building in elevation. The overwash plan builds the island's elevation. As the island builds vertically, the terrestrial ecosystems change front side is eroded, back side is built. Time-slice analysis was used to develop evolution of barrier islands. Stan used Portsmouth Island as an example – 1998 aerial. Stan noted importance of algae, even for barrier island dynamics. Stan noted natural evolution has eliminated a lot of habitat for listed species, so what we need now is a big storm to re-set the clock. Stan noted Portsmouth has gone through multiple cycles of erosion and accretion. Are the processes important at Portsmouth important for the northern Outer Banks? Stan noted there is a bill in the North Carolina legislature to stabilize all inlets using the Oregon Inlet terminal groin as an example of "a perfect groin." Stan reviewed the history of North Carolina Highway 12 on Pea Island. Stan noted the North Carolina Department of Transportation (NC-DOT) has kept the island out of equilibrium. Stan reviewed Ocracoke Island history.

Stan reviewed evolutionary history of Cape Lookout. Stan showed us geologic map of Onslow Bay. Point is huge shoals of sand off the Cape. Stan discussed sand-rich versus sand-poor barrier islands. Old Cape Fear River channel is massive across the shelf. Sand-rich are from Core Banks south to Brown Island. Fort Macon groin is the other one legislature is using as positive example. Stan showed us Figure Eight Island and Rich Inlet. Stan showed fallacy of groins at Cape Hatteras Lighthouse.

Stan stated if we build Oregon Inlet Bridge as proposed now, we will have bridge to nowhere in 5-6 years. Pea Island will survive if we let it survive. Stan noted one book just came out. Three more are coming out. He provided a handout.

1:20 PM: **STAC Briefing Papers: Kirk Havens:**

Kirk Havens asked Dean about the briefing papers, then we had a brief discussion. Dean noted we have evolved down to a 1-2 page format. Kirk noted these are directed at policymakers, hence the brevity. The APNEP Policy Board is the primary target. Dean noted the papers are created by the STAC. They are not subject to change by the Policy Board. Teams are designated by STAC to develop the briefing papers, then go to STAC Executive Board for distribution to Policy Board and public. Kirk asked for input in the concept. Robin Dennis liked the concept, but stated he would like to see more supporting text/references. Kirk agreed that was another concept we could use. We could have a 30-second elevator talk, or bullets from a meatier white paper. There was no further comment. Mike Piehler suggested there should be an accompanying technical paper provided to further underpin the Policy Board actions. Kirk noted perhaps the STAC could do a press release as well to highlight the STAC advice. Robin stated that was consistent with his suggestion – i.e., have a one-page summary, with an accompanying 5-page technical supporting document. Robin stated he had a hard time pulling out the essence from the five examples provided. Dean noted he has asked for comments.

Bill Crowell noted the same information goes to the Policy Board and the Management Advisory Committee. Bill noted the STAC has to agree by consensus that each briefing paper is correct. The STAC can either take a position or just define an issue. It was noted the team that produced 3-4 of the current papers didn't have consensus. Tim suggested we should take positions, not just identify issues. We should be stating positions strongly as an Advisory Committee. Kirk noted the Policy Board may not know what the issues are and our role is to assist them with their recommendations. Tim noted a lot of the issues are sticky ones. What he sees lacking is a thorough discussion of the issue and how we reach agreement/consensus. Kirk stated it is incumbent on members to get their input in on the subject. Tim asked for clarification of the process. Dean clarified once a team is comfortable a draft is released to entire STAC. STAC comments, comments go back to team for further discussion. Then goes to STAC Executive Board, who decides on further distribution. It was noted that in the present case the author has engaged in discourse with the team producing the paper. Unresolved disagreements have to come before the entire STAC.

It is envisioned that only raising issues versus positions will be a rarity. Dean noted the team can submit a dissenting opinion to the STAC, but he would envision a unified position emanating from the STAC. It was envisioned that some papers will either be greatly revised, or never make it out of the STAC. It was noted that most of the members of one team have been largely silent. Robin asked if we had a process for developing what things to raise to the Policy Board? Kirk noted a list has been circulated. He noted we had been proactive in raising certain issues, developed at the summer meeting. We can respond reactively to issue raised by Policy Board as well. Most motivated members get their issues raised early. Robin noted he has heard need for

several other papers, based on the presentations today. Kirk asked Dean about summarizing process. Dean noted he has asked for written comments, will compile and then back to team. Kirk noted we had discussed adding supporting text. Robin wanted to see a compelling argument. He said a single point to be made should have good underpinnings. He didn't feel the present batch was very sharply drawn. We should say what we want the Policy Board to do. Dave Mallinson asked what else needs to arise? Dean noted we had prioritized the list of issues – each should have a briefing paper. Tim noted he saw merits of one bulleted page or two as a summary or going with a four-five pager. Robin agreed you have to The one-pager, but question is, how much more do you need in the way of supporting information. Kirk and Bill noted the expectation is the Policy Board will come back to us with request for more information as we are effectiveness. Dean noted we have three teams (Monitoring & Modeling Tools, Management Effectiveness & Efficiency, and Forecasting) and their respective leaders (Enrique Reyes, Pete Kalla, David Mallinson & Heather McGuire).

1:50 PM: **Water Quality in Albemarle-Pamlico Coastal Lakes: Mike Piehler:**

APPLS – Albemarle Pamlico Lakes – Pungo, Phelps, Mattamuskeet, New. Mike reviewed shallow lake limnology. New Lake is private, hard to gain access for work. Mike reviewed physical data – depth, secchi, dissolved organic carbon (DOC), chlorophyll-a, $N\text{-}No_{x,}$ $N\text{-}NH_4$, $P\text{-}PO_4$, TN, ON. Began with Lake Mattamuskeet (a lesson in media relations). Mike noted a small change in drive (nutrients) can cause a shift in state (i.e., from low algal to high algal). Need to understand ecological thresholds. In Mattamuskeet, west side is algal-dominated, east side SAV-clear water; obtained historic plant data – 1993-1995-1997 – plant system appears stable. Did nutrient addition bioassays. Mike reviewed other contrasts – East vs. West. Looking at nitrogen cycling, greenhouse gas fluxes, and zooplankton. Mike reviewed the history of Mattamuskeet. Matthew Waters, did Ph.D on paleolimnology, looked at sediment cores, studies focus on particular pigment types. COI (mitochondrial gene sequencing) and phosphorus, plotted graphs over time, mapped for many pigments, 1940 road construction led to domination by plants. Mike noted trophic structure – waterfowl, fish and zooplankton.

Mike noted they are using LIDAR data to examine the geomorphology of the lakes and explain their differences. He noted at some point they all may have sand bottom clear water lakes.

Mike Mallin asked about fish structure differences. Mike noted there are few data. Tim Spruill asked about pH – can be changes on West side due to algal blooms. Marjorie Rayburn asked about mercury issues? Mike doesn't plan to examine. Jud asked about macrophytes. Naja vallisneria in patches. Stan asked about springs on groundwater flow? Mike noted there is no information. Stan noted he thought there may be some spring feeding based on geomorphology. Wilson Laney noted there are some fish data and waterfowl data. Mike agreed – noted Ph.D. student two years ago had looked at waterfowl grazing – shows it had little effect which further documents stable state of lake's sides.

2:20 PM: **APNEP Indicator Development: Dean Carpenter:**

Dean Carpenter gave an update on the status of APNEP indicators – noted the STAC had short meeting at all-hands November meeting where Bob Christian stated concerns. Dean hoped he can demonstrate more forward progress. Dean gave a presentation roadmap – STAC indicator development, Indicator Steering Committee (ISC) indicator development. Indicators can be for whole watershed and subregions. Initial target is to report at region and subregion. Dean reviewed the teams present chart is down to nine boxes – one pressure Human Dimensions – and eight ecosystem state boxes. Each box is complex.

APNEP Indicator Steering Committee developed final indicators list. Steve Smutko pulled indicators suggested from 1994 CCMP. That is where we were in November 2007. Staff did multi-hour effort in December, trying to make things more systematic. Modules are the nine boxes at top-metrics (about 200) are at bottom. Indicators will be the indices supported by the metrics. Human Dimensions is biggest – 75 metrics. Dean reviewed all of them. Lane asked what "High Hazard Areas" are? Dean noted we have to define these. Bill noted they could be inlets or floodplains. One dimension is fisheries-landings. Jud noted some of these indicators will be strongly correlated. Dean agreed and noted he had decided to be inclusive for the moment. Jud asked if these lists would be distributed? Yes. Human Dimensions has five categories. Second module – land use; 3) materials balances, I & II, III, IV, V; 4) water quality and hydrological processes; 5) atmospheric resources; 6) living aquatic resources; 7) wetland resources; 8) terrestrial resources; 9) species introduction and removal. Marjorie asked about coyotes. Why they were in terrestrial and not invasive? The STAC agreed that was a good question. Stan noting the list is comprehensive, asked what are we going to do with them? Dean agreed the list is long, but deemed is not unmanageable. Living Aquatic Resources has 35. Dean noted in 2008 we want to develop the APNEP Monitoring Plan based on the NEP outline

We need indicator metric proposals for each. Dean proposed a timeline. January 31 – March 4 for Living Aquatic Resources – Water Quality and Hydrologic Processes (March 5 – April 11). CCMP goals development would proceed on a parallel track. Dean noted the remaining modules are as yet unscheduled. STAC members will be asked to focus in their area of interest. Wilson will head the LAR effort. Sometime in 2009 we will have two documents. Stan Riggs asked is this just another document that will be lost in the bowels of EPA? Who is going to do all the work? Stan noted it is changing as we speak. He asked about funding long-term. He noted he is currently involved in the EPA Climate Ready Estuaries Program and still hasn't figured that out.

Dean noted during the 1980s, APES study they assessed, produced a 1994 CCMP, followed by an implementation phase which produced little. Stan agreed. Dean noted goal now is to conduct regular assessment on an ecosystem basis. Stan noted he wanted to make sure the program goes somewhere. Bill Crowell noted about 30 of the 49 management actions from the 1994 plan were done, rest won't likely be. Under new CCMP we will have more measurable metrics, and can assess how well we are doing. We have to have a monitoring plan first. There won't be a lot of funding. If we don't ask, it won't happen at all. This year APNEP is getting $42K more. Total operating budget is around $500K. Bill noted there are funds used by other partners that are

included in APNEP. Bill noted that as a member of the Environmental Management Commission, Pete is a part of APNEP technically. He noted STAC, or Policy Board, can petition for change, i.e., the "bigger APNEP." Jud noted other NEPs are underway right now. Goal is ecosystem-based strategy for APNEP, and Jud asked if there are examples from other NEPs. Mike Piehler suggested we need to have one proxy rather than a comprehensive list. He sees that as a major disconnect. He said we can't do all of this. We need to have a plan for something we actually do. Several chimed in with assent. One noted he was going to make fun of the breast milk toxicant metric. Robin noted many of these are being measured by others. Bill noted this list is considerably smaller than the one we started with in Smithfield. Mike Piehler wanted again to focus on what we really want to know. Marjorie agreed we can obtain some of these but to her question the is, are they really meaningful? Lane stated we still haven't sorted out the questions we want to answer, rather than collecting a lot of information and then trying to decide what to do.

3:10 PM: **Adjourn:**

Meeting adjourned. Dean reminded members that the spring meeting will be on April 30 at Jockey's Ridge State Park.