

NC COASTAL RESOURCES COMMISSION (CRC)

May 5, 2011

NOAA/NCNERR Auditorium

Beaufort, NC

Present CRC Members

Bob Emory, Chairman

Joan Weld, Vice-Chair

Renee Cahoon

Charles Elam

David Webster

Jerry Old

Veronica Carter

Melvin Shepard

Lee Wynns

Benjamin Simmons

Pat Joyce

Present Attorney General's Office Members

Christine Goebel

Mary Lucasse

CALL TO ORDER/ROLL CALL

Chairman Emory called the meeting to order and reminded Commissioners of the need to state any conflicts due to Executive Order Number One and also the State Government Ethics Act. Chairman Emory stated the State Government Ethics Act mandates that at the beginning of each meeting he remind all members of their duty to avoid conflicts of interest and inquire as to whether any member knows of any conflict of interest or potential conflict with respect to matters to come before the Commission. If any member knows of a conflict of interest or a potential conflict of interest, please state so when the roll is called.

Angela Willis called the roll. There were no conflicts reported. James Leutze, Chuck Bissette, Bill Peele, and Ed Mitchell were absent. Based upon this roll call, Chairman Emory declared a quorum.

Chairman Emory read the following letter from Governor Perdue.

Dear Board members,

As you may know I issued Executive Order Number 34 on December 9, 2009, requiring appointees to attend at least 75% of the Board's regularly scheduled meetings. I recognize extreme circumstances may have made this Order difficult for some to follow. Please make every effort to attend 75% of the Board's meetings in the coming year to remain in keeping with Executive Order Number 34. Do not hesitate to contact my Office of Boards and Commissions at 919-715-0275 if you have any questions. Thank you for your willingness to serve the State of North Carolina.

Governor Beverly Perdue

MINUTES

Melvin Shepard made a motion to approve the minutes of the February 23-24, 2011 Coastal Resources Commission meeting. Lee Wynns seconded the motion. The motion passed unanimously (Weld, Cahoon, Elam, Webster, Old, Carter, Shepard, Simmons, Wynns, Joyce).

EXECUTIVE SECRETARY'S REPORT

DCM Director Jim Gregson gave the following report.

Budget

The House budget released last week includes some items that affect the Division of Coastal Management. As with the Governor's budget, the House Money Report shifts five DCM positions from state funds to federal receipts. Additional DCM positions may be affected if the reduction in federal receipts for next year's grant cycle is substantial. We are currently planning, and have been told by NOAA, to plan for a 10% reduction in the federal funds (around \$200,000.00).

The budget also calls for the closure of the Raleigh DCM office and eliminates the Assistant Director for Policy and Planning, which is Steve Underwood's position. It is unclear what timeframe what would be mandated for the office closure. We are already planning for the closure of that office by July 2013.

The Department as a whole takes quite a hit in this budget proposal, including a major reduction in staff at all seven regional offices. So far, that does not appear to include any of the DCM staff at the Washington and Wilmington offices. The budget transfers several DENR programs into the Department of Health and Human Services and the Department of Agriculture and Consumer Services. The total DENR budget was reduced by roughly \$35 million for each of the next two fiscal years.

Legislative Update/Bills of Interest:

SB 110 - Terminal Groin Bill: To allow terminal groins to be constructed in N.C. inlets for the purpose of erosion control. The Senate bill, which passed in March, would allow up to two terminal groins per inlet. The bill was amended by the House to allow only three terminal groins to be built, two with public money and one with private money. The House bill also bars local governments from borrowing money for a project unless the debt has been approved by a referendum. The Senate did not concur with the amended bill, so it will now go to conference committee for resolution.

HB 819 - CAMA Setback Requirements: Introduced by Rep. McElraft, this bill would allow repair or replacement of single-family and duplex structures that do not currently meet the CRC's large structure oceanfront setback. These types of structures that are larger than 5,000 square feet, and that were constructed before August 11, 2009, would have to meet a minimum setback of 60 feet or 30 times the erosion rate, whichever is greater, for replacement. This bill has passed the House.

SB 22 (S.L. 2011-13) – APA Rules: Increasing Costs Prohibition: Prohibits agencies from adopting rules that result in a financial impact on all persons subject to the rule of at least \$500,000 in a 12-month period. This has been signed by Governor Perdue.

SB 709 – Energy Jobs Act: Directs Governor Perdue to create a compact with the governors of Virginia and South Carolina to work toward expanding the search for offshore oil and natural gas, and to lobby for a state share of any revenues generated. The bill also renames the current Energy Policy Council to the Energy Jobs Council, and makes some changes to the membership of that council. A committee substitute passed the Senate Commerce committee on Tuesday, which made several changes to the original bill. First, lawmakers changed the distribution formula to give DENR a larger share of offshore royalties. The money could go toward things such as inlet management projects, channel navigation or water quality management. The committee reduced the royalties for community colleges in order to increase the DENR allocation. The committee also added three members to the Energy Jobs Council, with expertise in wind energy, biofuels and environmental management.

SB 747 – Offshore Wind Jobs and Economic Development: Encourages development of the state's offshore wind energy resources and encourages wind turbine manufacturing facilities to locate in NC. The bill requires utility companies to sign long-term power purchase agreements for 2,500 megawatts of offshore wind capacity by 2017. This bill is currently in the Senate Commerce Committee.

HB 116 – Coastal Wetland Riparian Buffer Grandfather: Allows development of single-family residences to encroach in the current Neuse and Tar-Pamlico River Basin 50-foot buffer under certain conditions. This bill is currently in the House Environment Committee.

HB 415 - Topsail Beach/Nags Head Littoral Rights: States that the owners of Topsail Beach and Nags Head property that abuts lands raised by beach nourishment projects shall keep the littoral rights they possessed prior to the beach nourishment project, including direct access to the Atlantic Ocean. Passed the House in March; currently in Senate committee on state and local government.

SB 428 – Study Consolidated Environmental Commission: Directs the Environmental Review Commission to study the feasibility of consolidating the state's environmental commissions into one full-time commission. This is similar to bills introduced in previous sessions. Currently in Senate committee.

SB 482/HB 623 – ALJ Final Decision Authority: These companion bills eliminate agency authority to make final decisions in contested cases; instead, the Administrative Law Judge's decision would be final. For us, this means that contested cases would no longer come back to the CRC for a final agency decision. Both of these bills are currently being considered in their respective committees.

Nags Head Nourishment

The Nags Head beach nourishment project is moving forward. This project will affect DCM's management of sandbag structures located in Nags Head. You'll be hearing a more complete report on this from Ted Tyndall later this morning.

BIMP Final Report

The Beach and Inlet Management Plan final report is now available for download from DCM's website. The link is located under "What's New" on the left side of the homepage.

APNEP Grant

DCM's Coastal Reserve-National Estuarine Research Reserve Program has been awarded a \$27,000 grant from the Albemarle-Pamlico National Estuary Program to conduct an estuarine shoreline outreach and education campaign. The campaign will promote awareness and stewardship of estuarine habitats through hands-on workshops for teachers, decision makers and the public.

Staff News

Raleigh office policy analyst Scott Geis and his wife Gina welcomed a baby girl, Sophie Marie, on April 14. Wilmington District Manager Steve Everhart will retire from DCM on June 1. Rick Carraway, NC Geodetic Survey, has moved into the Morehead City DCM office due to the budget cuts. Rick Carraway and Loie Priddy's names are on the original Inlet Hazard Report that dates back to the 1970's.

CHAIRMAN'S COMMENTS

Chairman Emory introduced May Lucasse, CRC Counsel. Chairman Emory stated the State is in tough budget times and it will affect the Division's programs as well as the CRC schedule. If there are not variances or legal items then we will squeeze the other items into a one day meeting. There will not be a CRAC meeting. We are in the process of reinstituting standing committees. There will be the need for at least one of the standing committees to meet at the next meeting. This will give the CRAC more of a voice in these meetings. By our next meeting we will likely know the fate of the groin bill and depending on how that goes it will dictate how we spend our time over the next year or two.

PRESENTATIONS

Marsh Sill Study Results (CRC 11-08)

Dr. John Fear

Dr. John Fear stated this study was done in response to a CRC request. The Division conducted the study with the participation of many other organizations. We defined a marsh sill for this study as a shore parallel structure. It is made up of two critical pieces. The first is an offshore mound that is used to break wave energy and the second is an intertidal area behind the mound where emergent marsh grows. We wanted to see if the marsh sills are performing as we thought they might. The first thing most important to the property owner and the primary function of the marsh sill is if it protected the shoreline where it was installed. Secondary to that we wanted to see if there were any unexpected impacts caused by the sill that might have cause detrimental or

positive impacts. We also wanted to look at the existing marsh sill General Permit conditions to see if any of them might need revision. We also added a public outreach and public input piece to this project. We wanted to get an idea of what the public thinks about these structures. We asked the homeowners that have sills as well as the adjacent property owners what they think about this method of stabilizing the shoreline. We went out in the field as a team and we visited the sills that have been constructed within the state. There were 27 sites. We feel like we had a good representation of the conditions that sills can be located within the state. At each sill each property team member filled out a questionnaire and surveyed landowners and adjacent land owners. All that data was combined and analyzed and used to come up with the results. We saw sills made up of various materials from oyster bags to granite rock. Granite rock was the most predominant sill material that we observed. We had one sill that was made out of broken concrete. We saw sills of different lengths ranging from a single property size sill of about 95 feet to a sill that was over 1,000 feet long. We also looked at sills in different tide states. We also saw sills of various ages. The oldest sills in the state are going on 10-12 years. The team also saw sills that are brand new. We were able to come up with 10 project findings which are included in the report. The first finding was that the marsh sills did not appear to present a hazard to navigation. This is a good thing to find because the CAMA permits are designed to not cause a hazard to navigation. We also observed that the sills were providing erosion protection to the property on which they were installed. We also found that marsh sills were often combined with other stabilization structures. Of all the 27 sites we saw, 44% of them were associated with another structure. The team found that sills that utilize the gap or overlap design provided better water, fish and other nekton access to the intertidal area behind the offshore wall. It was unclear to the team whether marsh sills caused any erosional impact on adjacent property. While it might sound like a non-finding, it is an important finding. Because of the nature of the study, the team was only afforded a one-time snapshot view of the sills. While we might have seen some erosion on the adjacent property, we couldn't say that it was caused by the sill. From looking at all the data, it did not seem that this was a predominantly problem for marsh sills. However, the adjacent property owner questionnaire showed that 50% of adjacent property owners did think that the sills were causing them problems. Another important finding was after the completion of the field aspect of this project, the resource agencies still desired permit review on a case by case basis. At the end of the project the resource agencies sent us letters summarizing their thoughts and feelings from this project. The Wildlife Resources Commission, Division of Water Quality, and Division of Marine Fisheries all stated very similar things that marsh sills need to be considered on a case by case basis and that the permit review process should remain as it is now. We found that the mound material used in marsh sill construction was often colonized with oysters. You can consider these oysters new habitat and new oyster growth. Oysters are declining in this State so this could be a partial bump up in oyster levels. We found that the marsh sills were supporting marsh grass and did not appear to be creating new uplands. Creation of new uplands was one of the main concerns when sills were first proposed many years ago. The field team did not see this going on in the field. The team also observed that marsh sills seem to be free from damage. The property owner survey results corroborated this. The property owners said that they were very happy with their sills and the only instance where they had to be repaired was one person had to replant their grass after a major storm. The team also did not observe any issues with water quality due to the sill. While we were there the sill had already been constructed and was in the operational phase. I have no doubt that during

construction that there might have been some initial temporary impacts to water quality. The oysters growing on them might actually cause a water quality benefit.

Dr. Fear stated the CRC requested this study. With the new information coming out in the next couple of months, the CRC should have a wealth of information to take into committee and decide what the next steps will be.

Commissioner Weld suggested an ad hoc committee to begin to look at this and try to come up with some suggestions while we wait for the other information. Chairman Emory stated the Estuarine and Ocean Systems Committee will have this as the first thing on their agenda to come up with next steps.

Amendments to 15A NCAC 07H .0312 Sediment Criteria (CRC 11-10)

Jim Gregson

Jim Gregson stated staff is proposing amendments to the technical standards for beachfill projects. This rule became effective in February 2007. This is a very technical rule. The rule has been amended once. In 2008 it became apparent that some of the requirements for seafloor surveys that couldn't be done based on water depth. The rule was amended to not require geophysical imaging of the seafloor in areas that were less than ten feet of water. Based on some recent meetings with representatives from Carteret County, New Hanover/Wilmington Ports Waterway and Beach Commission, as well as two engineering firms that work on beach nourishment projects it became apparent that there were some changes that were needed and need to be done fairly soon to the sediment criteria. These would affect the characterization of borrow areas that are located within navigation channels or existing sediment basins within the active nearshore or inlet shoal complex, as well as offshore disposal areas. The only offshore disposal area affected would be the EPA designated ODMDS off of Morehead City. These are changes that only reduce the amount of sampling. There is nothing in these proposed changes that would increase what the permittees would have to do. A lot of the projects that were formerly only federally projects are potentially having to be taken over by local governments because of the reduction in federal funds. The federal government doesn't have to meet our sediment criteria. For the offshore dredged material disposal sites we are proposing that there only be one set of imagery without elevation that is required. The line spacing for the geophysical imaging should be reduced from 1,000 feet to 2,000 feet. The grid spacing for the actual sediment sampling should be reduced from 1,000 feet to 2,000 feet. Characterization of the material deposited in those disposal sites after the initial characterization of the entire site shouldn't be required if it can be documented that the new material that is removed came from the active nearshore beach or inlet shoal system and if the original two sampling sets are compatible with Section 3(a) of the rule. It would reduce the sampling protocol for federal or state maintained channels that would be expanded to include all maintained navigation channels or sediment deposition basins that are located within the active nearshore beach or inlet shoal system. In these areas only five evenly spaced vertical samples or sample spacing of no more than 5,000 linear feet per channel or sediment basin would be required. That is the existing criteria for removing material from state and federally maintained channels. Swath sonar imaging of the seafloor without elevation or geophysical imaging of the subsurface would not be required. Characterization of the recipient beach would not be required for removal from these

areas and carbonate analysis would not be required. For subsequent nourishment events, two consecutive sets of sampling, with at least one dredging event in between, from these areas could be used for characterization of material if the original two sampling sets are found to be compatible with Section 3(a) of the rule. These changes would be intended to reduce sampling costs for communities where past sampling and/or project history has shown that removal of material from these types of areas has consistently been beach compatible material. It is estimated for the Bogue Banks project that implementation of these changes would reduce the sampling costs by about a half a million dollars. This is a very significant cost savings.

Joan Weld made a motion to send the amendments to 15A NCAC 07H .0312 to public hearing. Renee Cahoon seconded the motion. The motion passed unanimously (Joyce, Simmons, Webster, Wynns, Carter, Weld, Shepard, Cahoon, Elam, Old).

Sandbag Enforcement Update Ted Tyndall

Ted Tyndall stated back in February we issued 12-13 letters to the most egregious sandbag structures in South Nags Head requiring that the bags be removed within 30 days. It was an effort to get the letters out due to the nature of the ownership. In the meantime, Nags Head took the ball and got their nourishment project permitted and it is now taking shape. They have a pre-construction meeting coming up next week. Several folks with the Division and had conversations with stakeholders about revisiting the sandbag removal. There is a condition on the major permit that says no sand shall be placed on sandbags that are determined to be required for removal according to the rule. If the property owners don't remove the sandbags then they won't get sand. When the dredge and pipeline gets in front of your house there will be an issue about where the sand can go. We ran into this situation down south the property owners were very receptive in getting the sandbags out so they could get the sand along the beach like everyone else. We feel it best to upgrade the number of letters that we are sending out and go forward with removal letters to the entire 52-55 property owners in Nags Head. The Attorney General's office is reviewing property ownership to make sure we have accurate addresses. In the letter there will be language that talks about DCM working with the property owners in the timing and amount of removal of the structures.

Sandbag Stakeholder Meetings Summary Report (CRC 11-09) Mike Lopazanski

Mike Lopazanski stated there have been a series of stakeholder meetings regarding the implementation of the Commission's temporary erosion control structures policy and enforcement. In 2007, the Commission and the Division of Coastal Management began to prepare to notify property owners of the May 2008 deadline for removal of a large number of sandbag structures. This was based on a prioritization that the Division did looking at the bags least in compliance with the CRC's rules and were an impediment to beach access. Throughout 2008 DCM moved through the enforcement process. Also around this time the Commission was looking at some of the specifics of the rules and how they were being applied in the inlet hazard areas. The CRC made special provisions that expanded the use of sandbags and giving them a longer timeframe as well as allowing them to be used repeatedly based on whether their

community was participating in an inlet relocation project. At the end of 2008, DCM began to send notices of violation to property owners. In 2009, the General Assembly enacted a moratorium on the removal of sandbags in communities that were anticipating beach nourishment projects. While the moratorium was related to enforcing the time limits on sandbags, it didn't prevent DCM from moving forward on acting on sandbags that were in violation of the other provisions of the rules. In 2010, we were looking at the pending expiration of the moratorium. The Commission again decided to direct the Division to enforce the provisions of the sandbag rules. At the same time the CRC requested that Staff engage stakeholders in an effort to discuss how the structures were being managed as well as look for opportunities to facilitate some changes in the implementation of the sandbag policy. We had four sandbag stakeholder meetings. At these meetings a variety of people attended including representatives of the CRC, the CRAC, local government, representatives of property owners, DCM Staff, and contractors. During these meetings we discussed the evolution of the sandbag rules and some of the specific management issues such as the requirement for removal of sandbags prior to nourishment projects, covered and vegetated requirements, and use of other criteria in the permitting and removal of sandbag structures. The group began to refine the issues including how federal flood insurance payouts as well as building standards related to piling depths may be contributing to the problem. Since the National Flood Insurance Program will not pay a claim until there is a loss, there is no incentive for the property owner to remove the structure prior to that event. Requirements for piling depths and the use of sister pilings maintain these structures longer than might be expected under the circumstances. Many of the structures are held by out of state owners or LLCs and it makes it difficult to contact the property owners once the structures are condemned. In most cases it becomes the local government's responsibility to pursue removal once they are condemned and there has been little financial help. There was general agreement that while the focus has been on the sandbag structures protecting the houses, it has been the houses on the public beach that is the core issue. Several people in the group proposed possible solutions that CRC could consider. Some of them involved the technical and specific aspects of sandbag structures such as configuration and installation/removal criteria, alignment and anchoring. There was a proposal for local government management of sandbags. You will recall that prior to 1996, sandbags were permitted under the local permitting program. This proposal would allow communities to be responsible for management of sandbags as part of a locally implemented shoreline management plan. Sandbags would only be allowed if the community was pursuing a beachfill or inlet relocation project under an umbrella permit to the local government. The local government would have this authority once the shoreline management plan was approved by the CRC similar to the static line exception provisions. There would be no time limits associated with sandbag structures as they would be tied to the shoreline management plan. Once a beachfill project is approved, the sandbag structures would no longer be necessary and could be removed. Much of the discussion of this option centered on whether or not the same pitfalls, which currently exist for the state regarding the removal of structures, could be avoided by local government. We heard about an innovative strategy that involved a tax credit in exchange for an advanced agreement to remove a structure. This strategy would utilize a property owner incentive to ensure removal of the structure once it became threatened by erosion. In exchange for getting a tax credit on the value of the property, the owner would obtain an insurance or bond that would ensure the state that the structure would be removed. Under this scenario no sandbags would be allowed since once it became threatened then the structure is supposed to be removed from the

property. There was some concern about how much value the property owner could receive and the limitations of individuals capable of taking advantage of such a tax credit. There were also questions about implementing bond requirements versus escrow. We heard a proposal to address existing sandbag structures that would further limit their use. They would only be allowed in limited circumstances such as to allow time for removal of a threatened structure or when a pending beachfill or inlet relocation project would offer protection. There were also suggestions made for limiting the size and number of bags to prevent the creation of seawalls and requiring restoration of the oceanfront lot and daily penalties for exceeding time limits. The group heard other suggestions for management of existing sandbag structures including tying continued use of sandbags to the viability of the structure being protected such as a Certificate of Occupancy. There is interest in looking at the financial responsibility for sandbags to be incorporated into the deed, talks about reconsideration of the dimensional requirements after installation, requiring that property owners keep sandbags covered with sand, and allow sandbag installation contractors the ability to experiment with sandbag dimensions, methods of placement and anchoring to secure alignments within permitted dimensions. The group discussed the need for financial assistance and what may be available for property owners and local governments to remove structures. The Upton-Jones Amendment to the Federal Flood Insurance Program was cited as having been an effective measure to achieve removal of the structures from the beach. The Texas Open Beaches Act was also mentioned as a successful program where cash payment is made to the property owner for removal of structures. The Hazard Mitigation Program was also seen as an option to assist local government with structure removal. You will recall from the February meeting that there was a presentation on this program and interest was expressed in submitting an application to FEMA for the removal of structures. The possible solutions for the management of sandbags and the implementation of the temporary erosion control measure policy focused on community management, tax credits, refinement of rules, cash payments, private salvage efforts, as well as possible help from the FEMA Hazard Mitigation Program. There was general agreement that the issue ultimately has fallen to the local government as has been seen in the Town of Nags Head. There was interest expressed by some in drafting rule language that would address the community management idea however; there was concern of a potential conflict with taking steps to change the rule while there were ongoing enforcement actions to remove sandbags. Since many of the properties subject to ongoing enforcement were unlikely to benefit from a potential rule change because they are on the beach, this may not be that much of a problem. These potential solutions are being forwarded to the Commission for consideration in the management of sandbags and the implementation of the temporary erosion control policy.

Chairman Emory stated the Ocean Hazard Area Committee will take this report and further discuss the options.

National Flood Insurance Program – Community Rating System **Berry Williams, Williams & Associates**

Berry Williams stated that in the 20 coastal counties there are 47 communities that's citizens hold a flood insurance policy saves six million dollars per year in the premiums that they do not have to pay. This is a result of the efforts undertaken by local governments and some state agencies, including the Coastal Resources Commission's rules and regulations that have been

adopted and enforcement procedures that have been set in place. Two and a half years ago we adopted a strategic plan to look at the entire Community Rating System to see if the things we are doing are achieving the goals that have been set out for the program. We are looking at all 18 activities where local governments can receive credit. Not all changes will help every community. We will probably reduce credits in some categories. In June we are going to look at the value of rate reductions that we give for every activity and every element within that activity. There are three goals (1) reducing flood damage to insurable property, (2) trying to strengthen the insurance aspects of the NFIP to make sure that the rates are equitable, and (3) encourage a more comprehensive approach to floodplain management than we have seen in the past. The CRC helps do that in a number of activities including the planning that you have local governments undertake. There are 500 points needed to move from one class to another in the current system. There are 10 classes. If you are a Class 9 community you have score at least 500 points and properties that are in a special flood hazard area the policy holders receive a 5% rate break. Class one is the best and we do not have a community at that level in North Carolina. There is one nationally and that is in Roseville, California. There are a little over 1,100 participating communities in the country. In North Carolina, there are nine communities in Class 9. There are 27 Class 8 communities. There are seven Class 7 communities and five Class 6 communities within the twenty coastal county area that comes under CAMA. There are no Class 1 - Class 5's. When you look at the way coastal communities get their credit, you can see that the highest percentage of the communities get that credit by providing a map information service. They are helping local citizens, lenders, insurance agents, and others understand the flood insurance rate maps and what the risks mean (worth 140 points). This credit will go down. Coastal communities in North Carolina should still do very well because of the new provisions we are writing in to help. Open space preservation is the next highest category. In the future we will increase the credits available in this category, in part, because of climate change and sea level rise. The next highest category is storm water management. After that it is higher regulatory standards. In North Carolina, more than 80% of local governments have adopted freeboards (building higher than the base flood elevation provided by FEMA). There are 18 activities and they are grouped under four series (1) public information, (2) mapping and regulations, (3) flood damage reduction and (4) flood preparedness. Public information provides information to your citizens about the risks and things that can be done to minimize the risks in the future. North Carolina communities are going to lead the nation in the mapping/regulation category because of the state's mapping program. We have been in a series of meetings with State about the current program and that is going to drive some changes in how we score things in the National Program. Flood damage reduction includes both floodplain management planning, acquisition and relocation. Flood preparedness changes will have little impact in North Carolina. North Carolina engaged in updating its mapping and taking ownership of the maps after Hurricane Flood due to all of the flooding. We clearly realized what poor quality the maps were. With the open space preservation, if you have a problem in that you have buildings that were built and you build them to a higher standard then you get more credit. The biggest benefit at reducing flood loss really comes from leaving the floodplain open. You will see that in the new rating system these points may double. You will find if you look at the planning process you will see that it mirrors the process that the CRC has laid out. Communities can score pretty well in the state but the big deficiency seems to be not having the level of public participation in the planning process that we credit. If the CRC ever looks at these rules again then you may go back and look at the Community Rating System to see how credits are given. Habitat

conservation plans are worth 10 points if a community has one and it includes certain items. We have some conservation habitat plans in this state that have not been credited yet because the local government hasn't shown them to the office specialist that comes to visit them but we are going to correct this. In the new rewrite which will come out in 2012, you will see that we will substantially increase these points. For acquisition and relocation after Hurricane Floyd we moved between 4,500 and 5,000 buildings out of the floodplain in this state. Those local governments can get quite a bit of credit for that. We have one local government that is a Class 5 community because so many buildings that were moved that it automatically became a Class 5 community. Coastal communities tend to score pretty well with the flood warning and emergency operations. The biggest deficiencies have to do with how emergency operations plans are written. We have identified in our hazard mitigation plan the kinds of problems that we could face for the facilities and people that will need help, but then when we look at the operations plan we don't see how we are going to deal with it so it doesn't score very well. When it comes to hazard mitigation planning and floodplain management planning we are going to move to doing a content analysis. We want to be crediting implementation.

The first thing that we need to do from a coastal erosion standpoint to get credit is that we need to map the erosion rates. Local governments in North Carolina, because of the work that the CRC has undertaken, receive 50 points without any impact adjustment. If you had just drawn a line on a map and said that you measure from this line, that would not be as good in our view and we may only give half as many points. There are some states that do it that way, but I encourage you to keep the process that you have now. Open space credit in the coastal area. We give credit for the area that is preserved between the dune and the sea. We don't give credit currently for any area that is behind there. Seaward of the dune you can get open space credit. The area behind the dune would not get you any credit. We are getting ready to change that. Areas behind the dune are the areas where all of the buildings are located. If we could encourage folks not to build there, or to build to a higher standard and leave more open space in the parcels, the fund would benefit the disaster program because we wouldn't pay as many disaster losses. We are looking to give substantially more credit. Your coastal regulations for setbacks and setback revisions are also credited. Thirty points is given now. With the new scale that the CRC has adopted we could give more than 30 points, but I would have to work with each local jurisdiction to see the permitting pattern in order to adjust the score. You require that the buildings be setback at least 60 feet and it is 20 points for that. If you require substantially improved buildings to meet the erosion setbacks then it is an additional 15 points. If the building is substantially damaged and the new building must meet the setback standard then it is another 15 points. When a building becomes threatened and you require it to be removed and the court upholds the provision in your regulations then we will give every coastal community in North Carolina 75 points. FEMA doesn't like hardened structures. They give credit if hardened structures are prohibited. I am glad that you are moving forward on the sandbag enforcement provisions. There has been some discussion about taking away the 50 points from North Carolina communities because there has been no enforcement. If a building has to be setback, even if it is an accreting area, you can earn 25 points and the CRC has this provision in the state. If a local government has regulations prohibiting vehicular or pedestrian traffic across dunes then we give credit for that. For prohibiting building seaward of existing buildings along the oceanfront there are points available. The frequency of updating the shoreline erosion rates is important. Local governments in North Carolina have been getting 10 points. But since the CRC

did not update on a five year cycle, we have now been taking the points away. There is some discussion of changing the frequency to 10 years. The current standard is five years. The maintenance of the beach nourishment projects that are going on is very important and we give credit depending upon the level of protection that those nourishment projects provide. After Hurricane Katrina, we had an opportunity to go back and look at the buildings that were damaged. After Hurricane Floyd some of us went out and did a study for FEMA to talk about rates. We changed the Community Rating System to give a community up to 650 points if it will require buildings in the zone behind the V Zone to be constructed up to V Zone standards. We are now getting communities that are adopting these regulations because they are now showing up on the flood insurance rate maps as new studies or done. At the end of this year or next year when you get your preliminary maps for the coastal area you will see this new zone called a Coastal A Zone. This is the area between the V Zone, which is bounded by a three foot breaking wave, to an area that they have mapped further inland where you have a 1 ½ foot breaking wave. In that area if you regulate to V Zone standards then you can receive a substantial amount of credit. It used to be that even though the regulation said that you only get 650 points, communities were only getting ten percent of that because there was a default value. Now, we have changed that and now the average community with these regulations is getting 245-265 points. That is half a Class. A couple years ago, FEMA started a series of studies looking at climate change and at the frontal dune regulations and the Coastal A Zone. Out of the studies, they said that they did a much more extensive analysis and we really need to be concerned about an area further back than the Coastal A Zone. The proposal out of the study is to divide the Coastal A Zone into three areas. Eventually you will see these on the map. The Community Rating System is going to do something in advance of this. In the January manual that comes out you will see that we are going to provide credits for all three of these areas and we will have building standards for all three of the areas. The credits in these areas will be substantial for the local government if they adopt them. After FEMA maps these areas, different insurance rates will be established for these three zones. FEMA has a climate change study underway on its own but it isn't released yet. As far as the CRS was concerned, we said that we need to move ahead because we want to put out a new manual in 2012 and cannot wait on the FEMA study. We have gone back and looked at various studies to see what the CRS can do to encourage better development. We have not tried to debate the science. We looked at the likely effects that will occur and what should we do about it to encourage a change in behavior in how people build. Increased flooding, damage to our natural features, and coastal erosion are the big three effects to coastal areas. We set three goals (1) encourage local governments to find and use the best available data for their jurisdiction, (2) educate their citizens about changes that are coming and (3) undertake mitigation actions to help reduce future flood risks. We set certain actions in each case. We are looking at creating a website to assist local governments with this process. We are going to add credits to the program for communities that educate their citizens about climate change and sea level rise. You can expect that the current credits for freeboarding will increase. A jurisdiction can now get up to 300 points. That may go up to 500 in the new manual. One of the problems we continuously see is enclosures. We have substantial credits for buildings where local governments prohibit enclosures or limit the size of enclosures. You can expect that these credit points will increase. We want to see better planning when it comes to infrastructures. We want communities to look at future floodplains and making decisions about whether it is a good place for infrastructure that encourages development. Some communities are doing this. We want to encourage communities that adopt open space provisions based on future conditions are

given credit. Communities that have rules that protect the natural and beneficial functions of floodplains can get 25 points. This will go to 250 points in the new manual. The emphasis is on trying to get communities to think about what the future may look like. The NFIP has limitations that maps are based on current conditions. We need to move beyond that and this is one way of doing it.

PUBLIC INPUT AND COMMENT

There were no public comments received.

PRESENTATIONS

2011 Draft Erosion Rates 15A NCAAC 07H .0304 (CRC 11-11)

Ken Richardson

Ken Richardson stated we received an e-mail in January that advised that communities needed points to apply to the Community Rating System. That made updating the erosion rates a high priority for the Division. This will mark the sixth update study that the Division has done since CAMA was enacted. The current rates became effective in 2003. We try to update the rates on a five year cycle, but we are a little overdue. This method was the same as we have done with all the erosion rate updates by applying the end point method. The rate is the measurement of distance between the two shorelines divided by the time between the two shorelines. To do this you need two shorelines and one transect. You need an early shoreline. You need a recent shoreline, and in this case it is the 2009 shoreline. You need a transect which is perpendicular to the trend of the shorelines. The required data is a transect and the two shorelines. The transects are spaced 50 meters apart perpendicular to the shoreline. They are consistent with previous studies because they are the same transects were used in earlier studies. The early shoreline is a composite of National Ocean Survey Topographic (NOS T-Sheets) and early photography. The current shoreline is the 2009 wet-dry line that we pulled off of aerial imagery that was supplied by the USDA National Agricultural Imagery Program. This imagery was taken during the summertime. The early shoreline is a composite. The NOS T-Sheet shorelines are a variety of shorelines starting in 1933 and 1952. We did not have a set of T-Sheets for 1933 for the entire coast so we had to take what was available. The spatial extent was from the South Carolina/North Carolina border to approximately Nags Head. In the previous study we were trying to get 50 years in between current and early shoreline to meet the long-term definition. The imagery that was used came from the Army Corps of Engineers. Most of that imagery was 1940 from Nags Head to the northern end of Corolla. 1962 photography was used around certain parts of the National Wildlife Refuge. When we use imagery to define the shoreline we use the wet-dry line. The wet-dry line is where the wet sand ends and the dry sand begins. Each transect has a value. The way we smooth the raw data is a 17 point running average. We take 17 transects, average those values, and get a smoothed rate. Blocked and smoothed data is the same as the setback factor. There are several rules that are applied to get blocked data. For erosion rates that are less than two feet per year they receive a blocked default value of 2. We group liked segments based on the mean smoothed rate. We prefer to take blocked segments and transition to the next one at one foot intervals where feasible. We would use a minimum of eight transects to block when you have a rapid increase in numbers, such as when you approach an inlet. If a transition boundary splits a single-family lot, that boundary is slid towards the higher rate to give the property owner the benefit of the lower rate. If it splits a larger parcel or multi-

family parcel, we slide the boundary between the structures themselves giving that structure the benefit of the lower rate. At inlet hazard areas, as per the rule, blocked rates are applied into the inlet hazard area. For the most part, either rates stayed the same or they dropped a little bit. As you get into areas like Nags Head you have some fluctuation where in some places it was 3.5 feet and now it is 2.5 or 4.5 feet. There were 307 miles analyzed, 103.7 miles was actual accretion. Staff is recommending approval of the report and the results of the erosion rates. Public hearings will be held in the eight oceanfront counties. We are working towards having the rule adopted by the October 2011 meeting, however with the new requirements for rulemaking, it may make this projection a little bit more difficult.

David Webster made a motion to approve the erosion rate report and send 15A NCAC 07H .0304 to public hearing. Melvin Shepard seconded the motion. The motion passed unanimously (Joyce, Simmons, Webster, Wynns, Carter, Weld, Shepard, Cahoon, Elam, Old).

Chairman Emory stated that staff should let the CRC know the schedule for the erosion rate public hearings so Commissioners can attend in their area if they are able to attend.

Implementation of Beach and Inlet Management Plan Steve Underwood

Steve Underwood stated this is a big deal not only for the Division of Coastal Management but also for the State as well. I honestly think this Plan is going to create the new beginning for how North Carolina manages, funds and environmentally reviews projects on our state. I am so proud to be a part of these effort. The timing in my opinion is good as it brings good news from DENR in the midst of all the bad news that is being cast out there. More importantly with the very limited dollars that are available, it helps outline one way for the state to spend some of its money to get the highest return on that investment. This promotes a strong economy and a healthy environment. This BIMP is the state's first comprehensive Plan for its 320 miles of coast and its 19 inlets. Originally, the BIMP began as a joint project with the Division of Water Resources and our Divisions, but now DCM has taken the lead role in implementing this Plan. DWR was responsible for securing the original funds through appropriations from the General Assembly. DWR then contracted Moffatt & Nichol to help develop the BIMP. Eventually the USACE is going to need to play a role in implementation as well. They have a similar program called the Regional Sediment Management Program which has very similar ideas and goals related to managing sediment on a regional basis and working on reviewing projects with a Programmatic EIS. Together we can also work on the funding needed for true implementation of our respective programs. The Wilmington district will be getting a new colonel in July, so we will make sure we brief the new colonel on the BIMP and also sit down with the outgoing Colonel Ryscavage on his thought and ideas on these efforts. The BIMP is posted on our website. We also have a limited number of CDs available. You will notice on the CD that it has all the Adobe pdfs to choose from, but they are listed in alphabetical order and not in the order that you will see on the website. If you want it displayed as it is on the website then there is a link to the BIMP Final Report on the CD as well. The legislature appropriated funds for the BIMP because the realized the need for as systematic management strategy for North Carolina's

326 miles of oceanfront barrier islands and 19 active tidal inlet complexes. The BIMP is also a culmination of past efforts, legislative actions, and studies and recommendations and they all needed to be combined and implemented. We know that North Carolina's barrier island populations have continued to increase and demand for those resources are greater than ever. The demand for cost of shoreline and inlet management projects have increased and we have outgrown the financial foundation that we now have in place. We need a long-term plan and a way to pay for it. Without one, the state will lost business and cost the state income. We need to do more shoreline management and not crisis response. We need to keep making investments that create jobs. We need to show that we can afford our commitments. Comprehensive planning leads to better natural resource protection. This program can drive innovations. The BIMP has three primary objectives. The first begins to comprehensively evaluate the condition of the state's beaches, quantifies the socio-economic values of our beaches, and provides estimates of the total and annual costs of beach maintenance. By doing this it provides necessary starting point for the funding analysis and recommendations. This is the first document that attempts to pull the economics and costs in one comprehensive document. However, this strategy is more than just a plan for funding beach nourishment. It is about the importance of the state having numerous options for management strategies to help address ongoing challenges to coastal erosion, accelerated sea-level rise, shifting shorelines, and storms. The second thing the BIMP does is to divide the North Carolina coast into four regions and five subregions. These regions reflect physical distinctions along the coast and generally coincide with established political and jurisdictional boundaries, providing framework for development of regional funding strategies. The obvious advantages include planning projects regionally allows for an efficiency of scale which can reduce the costs associated with individual projects; the potential to save time and reduce costs if the environmental, geotechnical, and monitoring studies for similar projects are combined, and voiding individual local governments competing for the same resource. The third objective is the BIMP supports the need to develop a stable funding mechanism to support the state's shoreline management and beach restoration programs. A stable source of funding for coastal communities could help facilitate long-term planning and establish a predictable local match. Establishment of such a fund would reduce financial uncertainties at the local level that often contribute to project delays, cost increases, and the disruption of local planning efforts. A program of reliable and predictable state funding would better position coastal communities in allocating new or existing sales or property tax revenues to coastal projects, knowing the state was committed to a share of the project. We want to develop a smaller version of the BIMP. We want to disseminate BIMP CDs along with a cover letter from the DENR Secretary, DCM Director, or CRC Chairman to the Congressional representatives in DC and select General Assembly members and some of the original sponsors of HB1840. We want to hold meetings with local governments in all BIMP regions to discuss funding criteria and ideas for a permanent fund. We want to have meetings with the Division of Water Resources to discuss funding criteria. There should be discussions with CRAC and newly formed subcommittees. We should pursue grant opportunities for implementation form Coastal Services Center and Projects of Special Merit. We should also support coastal communities that have already initiated some of the BIMP recommendations. DCM is part of the PEIS process for Bogue Banks. Because of this work that we are doing with them it has also led to the changes to the sediment criteria. The Department requested money to assist Bogue Banks, but it fell through. Another example of BIMP concepts being implemented on the ground is the Wilmington-New Hanover Ports, Waterways and Beach Commission for the process they use of local control through a

coordinating body, and a dedicated funding source in the form of a local occupancy tax. There are a couple of examples we should continually support and recognize and learn from. The CRC and CRAC have a very long-term track record on having a forward thinking mindset. Support from our North Carolina citizens, including the legislature, is especially critical. The state can't do it by itself. We will see how well it gets implemented, but I look forward to that effort and putting this document on other people's desks and generating some positives for the public and the legislature to consider. We can't afford to let this moment and opportunity pass. An opportunity now exists to reopen the dialogue concerning the adequacy of the state's existing shoreline project funding programs and management strategies and to reconsider the previous attempts to create a dedicated state fund for coastal projects and we continue to ensure that our natural resources are protected.

Chairman Emory stated at the next meeting there should be a review of what is in the BIMP. Just a bulleted list and simple statements without a lot of detail will be provided as a reminder to Commissioners. This bulleted list should also be available to local governments.

Progress on Sea-Level Rise Policy Development **Tancred Miller**

Chairman Emory circulated a letter received from the Carteret County Board of Commissioners. The Board had expressed great concern with our original draft policy. This letter expresses their support for the changes that were made at the last meeting.

Tancred Miller stated this letter from Carteret County is representative of the general tone since the CRC has made the changes to the draft policy. There have been a few meetings with local governments since then with North Topsail Beach, Southport, and a regional meeting in Dare County. There was a lot of satisfaction with the direction the Commission has gone with the draft policy. A couple of folks said that maybe the Commission had gone too far in the other direction, but that is reflective of the CRC's approach that this policy is about education and conversation. The Science Panel met about a month ago and they looked at some of the reviews, critiques, and criticisms that have come out on their report. They take them very seriously. There was a lot of discussion and they have expressed a desire to strengthen their report. They also expressed even more confidence in the one meter planning benchmark. We have not had a lot of requests from communities to come out and speak about the policy, so we will offer two or three more regional meetings and then move forward with a decision on whether or not to move forward with rulemaking. The real value in these meetings has been the education.

Determining the Socio-Economic and Environmental Impacts **of Sea-Level Rise to Bogue Banks, NC** **Jeff Allenby, Duke University**

Jeff Allenby stated he is a Masters student at Duke University. This presentation is part of a GIS based model of sea level rise on Bogue Banks based on the state's estimates of .381 and 1.4 meters. The study area used was Bogue Banks. There are four incorporated towns and one unincorporated town on the island. Each of the towns have exercised the ability to make their

own CAMA land use plan. There are two types of barrier islands. The regressive barrier island which is historically been building out into the ocean. Transgressive barrier islands have lower elevation and migrate landward. Recently, the entire island has been experiencing erosion counteracted though beach nourishment. I created a GIS based tool that modeled the effects of sea level rise on Bogue Banks. Most existing models focus on the issue of coastline retreat, however my model also addresses the issue of sound-side inundation. After the at-risk areas were determined on both sides of the island for each of the official sea level rise scenarios, they were combined with county tax maps to determine the number of properties that would be affected, the acreage impacted, and the potential loss in tax base for each of the towns. These totals were calculated based on sound side inundation and shoreline retreat and then combined for a total risk for each of the sea level rise scenarios. It is important to know that the erosion rates used in this analysis are based on 2004 DCM data. The model I used for the shoreline retreat was based on the Bruun Rule which is a method of thinking about shoreline retreat. It also incorporates the amount of existing erosion. The tool calculates the base of the active beach profile and determines the length of the profile and the height of the profile. From these values, in addition to the existing erosion rates, retreat rates were calculated for each of the points and then connected to form the new shoreline. Areas at risk to inundation were calculated by identifying all of the land with an elevation below the estimated amount of sea level rise as well as the area that would be inundated by an average astronomical spring tide. This land will be at risk to wetland conversion and will cause other problems for development. The western end of Emerald Isle shows limited coastline retreat and estuarine inundation due to its higher elevation in the low scenario. Emerald Isle also has a history of beach nourishment which partly explains the low rates of erosion. With one meter of sea level rise more properties along the front row will be affected, however there is not much of a change on the estuarine side in the extent of inundated land. There is a higher percentage of the affected land that will be permanently inundated. The high scenario shows an increase in properties affected by coastline retreat, however the extent of inundation still does not change much. Almost all of the land affected will be permanently inundated. The Eastern portion of Emerald Isle shows very similar changes. There is not much shoreline retreat in the low scenario. The one meter scenario shows limited erosion and no change in the extent of inundation. There is an increased amount of permanently inundated land. The high scenario shows significant shoreline retreat and almost all of the inundated land will continuously be underwater. There was not a significant change in the amount of land effected on the sound side. For Indian Beach and Salter Path there is a substantial amount of shoreline retreat including a number of large multi-unit buildings. There is a very limited amount of inundation on the sound side of the towns for the low scenario. For the one meter scenario there is an increased amount of retreat as well as a substantial amount of temporarily inundated land. Of particular concern is that a large portion of this land consists of a mobile home park. In the high scenario, a large portion of the back side of the island will be inundated regularly and the new shoreline will be about equal to the primary vegetation line. With this decrease protection of the dune system, the entire island could be at risk of overwash and the island could transition to a transgressive barrier island, much like Atlantic Beach. For Pine Knoll Shores in the low scenario, shoreline retreat will be an issue for many front row properties in Pine Knoll Shores. Inundation is concentrated within the Roosevelt Natural Area and almost no residential areas will be affected by it. The one meter scenario shows almost the entire first row of properties affected and some second row properties. Inundation is concentrated within the Roosevelt Natural Area. Some residential properties will also be affected. The potential for overwash and flooding of

Highway 58 is fairly high in the western portion of the town. The high scenario will affect a large portion of properties along the coast and inundation will permanently flood a large portion of the natural area including the aquarium. A number of interior residential properties will experience periodic flooding that could significantly impact zoning and septic tank permits. The difference in the effects of sea level rise on transgressive barrier islands, such as Atlantic Beach, is immediately apparent with large portions of the back side of the island, including large development, being affected by inundation. Due to the amount of beach nourishment Atlantic Beach receives, it will not be affected by coastline retreat in the low model. In the one meter scenario, inundation will affect a significant portion of the town including a number of areas that are not currently considered at flood risk. This inundation will include the entire Causeway coming to Morehead City. This is one of the main evacuation routes off of the island. Coastline retreat is still negated by beach nourishment, however the future coastline is about even with the current coastline in places and some properties on the far eastern and western sides of the town will be affected. The high scenario sees large portions of the island, including a large number of developments and the causeway to Atlantic Beach, permanently flooded. Coastline retreat will also negate nourishment efforts causing properties to be at an increased risk. There is a threat of inlets breaking through the island in a number of places where inundation and coastline retreat meet. The socio-economic effects of sea level rise will be significant to Bogue Banks with between \$1.67 and \$4.36 billion dollars of property value being at risk and thousands of property owners having to make important decisions about how to manage the effects of sea level rise. Even in the low scenario, which is a direct extrapolation of the historic rate of sea level rise, will cause extensive damage on the island causing a drastic loss in tax revenue for the island's communities and the county. Due to its low elevation and the slope of the coastal plain, much of eastern North Carolina will feel the effects of sea level rise. Wetlands will migrate into land that is now dry, causing a number of zoning issues. Septic tanks will have a higher rate of malfunctioning with a higher water table, which has the potential to release raw sewage into coastal ecosystems. Flooding and storm surges will affect properties that were previously safe and cause insurance and zoning issues. Finally roads may become impassable due to higher sea level and the issue will not be whether or not they happen, but the extent to which they will happen.

Sea Level Rise and Marsh Migration – High Marsh Dr. Bob Christian, ECU

Dr. Bob Christian stated this discussion will be about sea level rise and marsh migration. Carolyn Currin spoke at the last meeting and focused on the low marshes. This discussion will focus on the high marshes. High marshes are irregularly flooded. In a tide like you would have with a strong astronomical signal, you have the movement of water back and forth and generally in the summertime it stays in the low marsh and then moves up into the high marsh on spring tides or storm tides. In the summertime in Pamlico Sound it doesn't penetrate to the high marsh except during a major storm or a hurricane. In the wintertime you will have the same picture with a few more incursions into the higher marsh. You can have the high marsh flooded for days, weeks, or months in the winter. The patterns of flooding are very different. One of the things that is important in these marshes is that the sediments are trapped by the marsh as the water moves across the marsh. If we think about how marshes stay up with sea level, the only reason we have marshes today is that for the past thousands of years they have been able to keep

up as sea level has risen since the ice age. There are two primary ways that marshes keep up with sea level. The first is the deposition of sediments. The second is the development of organic matter falling onto the surface and become peat or the organic component of the soil. Because in the irregularly flooded marshes you don't have a lot of sediment coming in, the primary mechanism for the development and the elevation increases in the high marsh are due to plant processes. We have a different mechanism which dominates how these marshes can keep up with sea level rise compared to the low marsh. If you look at a transect from the low marsh to the high marsh to the upland, you find that the organic matter in the soil is much more prevalent in the high marsh than in the low marsh. If you look at *spartina alterniflora* as you decrease the amount of flooding from the edge it grows better on the edge and then gets worse as you go inland. If you are talking about sea level rise then you are increasing the amount of inundation of the marsh and are improving the production of the marsh. Does the high marsh act in the same way? The jury is out on that. A lot of the models about how marshes move and grow are based on *spartina alterniflora* and not what is happening in the high marsh. This is one of the complications of what we don't know. If a marsh is moving up and the upland isn't, the marsh is likely to move over the sand. The migration part of the story of how marshes move inland depends upon the slope between the marsh and the upland. If you have a steep slope the marsh stalls. The migration of the marshes also depends on the kinds of plants that are there, the soils, hydrogeomorphology, and the human activity near or on the marsh. When we talk about marshes that exist along the edge of a stream a lot of the migration occurs in pushing the stream upward. With sea level rise we push inward and lengthen the stream with marsh. A fringe marsh when moving up also moves across the landscape. At the outer regions of Pamlico Sound there is nowhere to migrate. Marsh moves up and erosion is always occurring so you end up losing the marsh. Barrier islands are susceptible to erosional forces by storms and hurricanes. Portions of the barrier island complex can disappear rapidly.

NC Coastal Reserve Education Efforts (CRC 11-12)

Scott Kucera

Scott Kucera stated I am the Education Coordinator of the North Carolina Coastal Reserve and National Estuarine Research Reserve. The CRC has identified estuarine shorelines and sea level rise as priorities for observing, understanding, and managing North Carolina coastal systems. These management issues are also priorities in the management plan of the NCNERR. Education is a key aspect of coastal management and managing coastal resources. Citizens who are informed about coastal issues will be prepared to make better decisions that could impact the resources. The North Carolina Coastal Reserve is one of 28 Reserves within the NERR system. Our education section is guided by the broad goals of the National Reserve system. Number one is to enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education, training, and interpretation. Number two is to conduct and coordinate estuarine research and gather and deliver information necessary for improved understanding and management of these estuarine areas. I collaborate with my colleagues in the research and stewardship sections to collect and analyze data, engage the audience with issues and inspire responsible actions that affect coastal communities and ecosystems. We also work the Division policy and regulatory staff. We develop messages and programs that support their activities. The North Carolina Coastal Reserve has a staff of four in the education section, including one in the coastal training program. We target three main audiences. The formal

education audience includes kindergarten through college students and teachers. The informal education audience includes families, civic groups and the general public. The decision maker audience includes professionals dealing with coastal issues, such as elected officials, planners and resource managers. The majority of the education programming takes place here in Beaufort, but we are working to expand our activities in the southern and the northern regions of our coast. We offer a variety of programs and activities to reach a wide audience. Site visits and guided field trips are popular with the general public as well as teachers and their students. During a field trip, the guide introduces the site and gives a brief background about the designation as a reserve. These protected, natural areas also make excellent outdoor classrooms where participants can observe a variety of estuarine shorelines, witness ongoing shoreline erosion and see representative flora and fauna. Indoor classroom activities expand on concepts and fundamentals of physical and biological sciences. All of our formal education programs are aligned with the North Carolina standard course of study for science. We offer outreach programs to schools that cannot travel to Reserve sites. The informal education audience includes families with children and civic groups. Site visits and outreach programs are offered throughout the year to teach about our estuarine areas. The third main audience is coastal decision makers. Elected officials and professionals attend the highly effective workshops in our coastal training program to learn about a range of coastal issues such as sustainable development and water quality in the estuary. Each year we are reaching a wider audience ranging from pre-kindergarten to senior citizens through a variety of educational programs. I want to focus on three specific issues that we address in current programs and that will be a significant part of future program development. These are climate change, sea level rise, and estuarine shorelines. The reserve education section has a spectrum of programs and activities that already incorporate these topics. We are developing new products to create awareness and understanding. The DCM recognizes the importance of sea level rise and estuarine shoreline as part of a comprehensive management strategy. These topics are also a priority at the NERR system which is beginning a climate change initiative strategy in the next fiscal year. The goal of this initiative is to understand, mitigate and adapt to climate change impacts on estuaries and coastal communities. Existing reserve funding, staff and programs will focus on carrying out this initiative and we will seek partnerships and other resources to implement the strategy. One proposed goal is to establish a network of Sentinel Sites for climate change impacts on coastal habitats. The focus will be on the impacts of sea level change and inundation on emergent and submerged vegetation. The Rachel Carson Reserve was selected as one of five Sentinel Sites in the nation because the data collection infrastructure was already in place. Our staff and the research, education and stewardship sections will collaborate to interpret this data for the target audiences. This scientific data presented in engaging programs will help create awareness and understanding of climate change impacts on the estuary system locally and across the nation. Reserve educators from around the country are collaborating on projects that deal with climate change. We are writing a middle school science curriculum that includes climate change education in each of ten principles about estuaries. At the North Carolina Reserve we are developing a new sea level rise curriculum that includes GIS mapping and we are collaborating with local middle schools to host a climate change student summit next year. These new tools and collaborations will be incorporated into future programs at the North Carolina Reserve sites. The Albemarle-Pamlico National Estuary Program recently awarded the reserve a \$27,000 grant to teach the value and function of estuarine habitats, how these habitats may be affected by sea level rise, and alternative methods of estuarine shoreline stabilization. This campaign will

incorporate the various resources and activities that DCM staff has already been working on with respect to estuarine shorelines. We will utilize the data collected in the CICEET project that was presented to the CRC previously by Dr. John Fear. We will also refer to data from the estuarine shoreline mapping, the marsh sill assessment project, and the estuarine shoreline vegetation monitoring. The latter is a part of the Sentinel Site here in North Carolina. Our education staff will use this information to develop engaging workshops, trainings and field experiences that explain the estuarine shoreline in the Albemarle-Pamlico region. The deliverables generated in this grant will also be used with central and southern regions of our coast in the future. This grant award gives us an opportunity for the first time to address all three of our target audiences on the same topic. This will serve as a model for future education efforts. Through the Division's efforts to address sea level rise, it has become clear that education is a necessary step to increase the public's and coastal decision maker's understanding to support policy changes related to planning. Division staff will utilize the sea level rise scoping survey and the APNEP Climate Ready Estuaries survey to develop messages and strategies for raising awareness about sea level rise. These efforts will be coupled with the National Reserve system's climate change initiative strategy to understand, mitigate and adapt to adverse changes in the estuary system. Climate change, sea level rise, and estuarine shorelines are complicated, scientific phenomena. If we want to engage our audience and effectively teach these issues then we need a trained staff that is able to communicate these complex ideas. Our programs need to make it easy or to facilitate so the audience will understand how they can make a difference. The education staff has a network of professionals to work with and gain insight from. Education coordinators from other Reserves collaborate on training and workshops. Our CTP coordinator completed an online workshop series on communicating climate change. NOAA, the National Parks Service, USGS, and other national agencies have many resources and opportunities for training. In the fall we will take part in a climate change communication training that is offered by the North Carolina Aquarium at Pine Knoll Shores. These networks and other resources will enhance our staff capacity to deliver an effective and robust message on climate change, sea level rise and estuarine shorelines in North Carolina. In conclusion, I would like to tell you about a recent guided field trip in the Rachel Carson Reserve. Our education specialist was leading a group of about 20 adults and children. A kayak was taking a break on the Reserve and as we passed she asked if we were from the Aquarium. After an explanation of who we were she said that she was not aware that we offered education programs. We have a dedicated staff that reaches thousands of participants each year. They are effectively teaching about the importance of estuaries and how we are connected to them. I plan to do more to create awareness about our program. As we focus our attention on the priorities of DCM and the National Estuarine Research Reserve system, our highly trained staff will incorporate climate change, sea level rise and estuarine shorelines into our existing programs. We will develop new opportunities to engage our audience by interpreting and facilitating awareness and the impacts on our estuaries.

Sea Level Rise Education and Outreach for Coastal North Carolina (CRC 11-12) **Casey Dziuba, Duke University**

Casey Dziuba, Nicholas School of the Environment at Duke University, stated I am a second year Master's Student at Duke University. For my Masters project I worked on Sea Level Rise Education and Outreach for Coastal North Carolina. I am sure everyone here is familiar with sea

level rise, however not everybody is. Sea level rise falls under the category of what are known as global, environmental problems. These tend to be more difficult to understand than other environmental issues due to their nature as a long-term process, the fact that they are abstract and contain some degree of uncertainty which the general public tends to have trouble understanding. North Carolina is ranked as extremely vulnerable to sea level rise due to its low lying elevation, gradual slope, barrier islands, and high rate of erosion. Sea level rise presents a number of impacts including coastal erosion, inundation and damage to property. The studies that I have read have said that about seven billion dollars in property is considered at risk from sea level rise in North Carolina. The CRC's draft policy on sea level rise advocates from public education on sea level rise. As part of my Masters project at Duke I worked on an educational section of the Division of Coastal Management's website and created an educational module for use by DCM and other agencies. The module includes a PowerPoint presentation, demonstrations, hands on activities, a field activity as well as lessons that anyone could run through and present this module. The first thing I did was to work on an educational section of the DCM website. Websites serve as great educational tools because they can display a large amount of information, they allow for the use of graphics and other images that can aid in reader comprehension and understanding, and they can provide links to additional sources of information on the subject. The website addresses a lot of common questions such as what sea level rise is, what causes it, why predictions vary, some of the rates for North Carolina, how it will affect the coast, and links to current news stories on sea level rise. There are hands on activities for students to understand and grasp some of the more difficult to visualize processes. The module is loosely divided into two sections. The first is the science behind why sea level rise happens. The second is more applied and looks at how sea level rise might impact the North Carolina coast. When I designed this module I tried to appeal to different styles of learning. It includes a visual component of a PowerPoint presentation. It includes an auditory component of a lecture with group work and discussion. It also has hands on activities and demonstrations. There is also a field component. The engage state was addressed by a KWL Chart at the beginning of the module. This is a form of self evaluation. This leads to the explore stage which is addressed by incorporating hands on activities and demonstrations. After these activities, the module goes into the explain stage in which the learner is explained to what they witnessed in the activities. Finally, evaluation is done through the completion of the last column of the KWL Chart. One piece of the module deals with the effects of melting ice on sea level rise. It first explains about land-locked ice and compares these to floating ice. Then it moves on to an activity in which the students observe differences in how the melting of these two types of ice will impact sea level rise. Students will observe the models, write down their observations and then follow up with discussion. The first demonstration that I incorporated into the module was on thermal expansion. Thermal expansion has been the largest contributor to present day sea level rise. This section starts off with an explanation of different states of matter and that matter has a tendency to expand when it is heated. Another activity includes the examination of how sea level rise impacts coastal areas with different topography, elevation and slope. Sea level rise is not expected to have the same effect everywhere and that is what this activity demonstrates. The final activity included was a two part activity that looks at some of the effects of sea level rise and coastal infrastructure. For the second part of the activity the students are instructed that they are in charge of deciding where to put homes and roads on the coastline. Finally, I included a field component in the module. This field component was designed to see how sea level rise might impact coastal marshes. For this activity the students identify different zones of the marsh

based on flooding characteristics and specific vegetation. Once students have identified the zones of the marsh they are asked to envision how the marsh might change with the rise in sea level. I came across a couple of things I would like to recommend. One is to alter and expand the module to target a variety of age groups. This module is catered toward a middle school age audience. Another suggestion would be that a museum or aquarium program would be a great way to get this information out there. Television remains the public's dominant media source for getting news and information about science. The last suggestions would be to get some sort of infomercial or television commercial would be good way to reach a very large audience.

ACTION ITEMS

Land Use Plan Certifications and Amendments

Town of Shallotte LUP Amendment (CRC 11-14)
John Thayer

John Thayer stated staff has reviewed the request for the Town of Shallotte Land Use Plan amendment and believes it meets the substantive requirements of the 7B guidelines and has been duly adopted. Staff recommends certification.

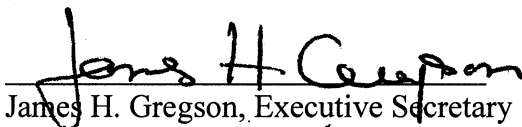
Charles Elam made a motion to certify the Town of Shallotte Land Use Plan amendment. Renee Cahoon seconded the motion. The motion passed unanimously (Joyce, Wynns, Weld, Shepard, Cahoon, Elam, Old) (Simmons, Webster, Carter absent for vote).

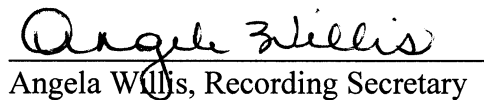
OLD/NEW BUSINESS

Chairman Emory stated that Commissioner Peele will Chair the Estuarine and Ocean Systems subcommittee. The members of this subcommittee will be Pat Joyce, Ed Mitchell, Melvin Shepard, Jamin Simmons, and David Webster. Commissioner Carter will be assigned to this subcommittee as well. Commissioner Wynns will Chair the Ocean Hazards Areas subcommittee. The members of this subcommittee will be Chuck Bissette, Renee Cahoon, and Boots Elam. Commissioners Leutze and Old will be assigned to this subcommittee. Ray Sturza, CRAC Chair, will make assignments of the eight CRAC members that did not sign-up for a subcommittee preference.

With no further business, the CRC adjourned.

Respectfully submitted,


James H. Gregson, Executive Secretary


Angela Willis, Recording Secretary