

MEETING MINUTES
CRC SCIENCE PANEL ON COASTAL HAZARDS
December 1, 2009

McKimmon Center (room 5)
NC State University
2728 Capital Blvd
Raleigh, NC
(notes compiled by Jeff Warren, DCM)

Panel Members in Attendance:

Steve Benton, DCM retired
Tom Jarrett, CP&E
Dave Mallinson, ECU
Margery Overton, NCSU (chair)
Stan Riggs, ECU
Tony Rodriguez, UNCCH IMS
Spencer Rogers, NC Sea Grant
Beth Sciaudone, NCSU adjunct / consultant
Rob Young, WCU

Panel Members not in Attendance:

Bill Berkemeier, USACE ERDC
Bill Cleary, UNCW
Pete Peterson, UNCCH IMS
Greg Williams, USACE

CRC members in attendance:

Bob Emory, Chair

DENR/DCM Staff in attendance:

Bonnie Bendell, DCM
Jim Gregson, DCM
Ken Richardson, DCM
Guy Stefanski, DCM
Steve Underwood, DCM
Michele Walker, DCM
Jeff Warren, DCM

Moffatt & Nichol Staff in attendance:

Johnny Martin
Paul Tschirky
Layton Bedsole (Dial Cordy – M&N subcontractor)
Duncan FitzGerald (Boston University - M&N subcontractor)
Chris Dumas (UNCW – M&N subcontractor)

MEETING SUMMARY

Margery Overton opened the meeting at 10:12. Introductions were made by all attendees, and it was noted that numerous attendees from the general public were present. The meeting is scheduled from 10 to 1 without a break. The meeting was turned over to Paul Tschirky from M&N to provide a status of the data collection for the terminal groin project for which they have been contracted to complete for the Coastal Resources Commission (CRC) through NC DENR (Dept of Environment and Natural Resources).

Tschirky reviewed the 2009 authorization for the terminal groin project (HB 709). Today's meetings focus on tasks 1, 2 and 4 (coastal engineering analysis, environmental analysis, and economic analysis). The five terminal groin sites chosen for the project at the last Science Panel meeting (Sept 2009) were reviewed (two in NC – Oregon Inlet and Ft Macon – and three in FL – Amelia Island, Captiva Island, and John's Pass). Data have been identified for all five states (although to varying degrees) and most data have been acquired. A data bibliography and draft engineering activities log have also been assembled. The Science Panel has been provided with a first draft of the data bibliography, and an example table from this was shown.

For Oregon Inlet, data include: NCDOT monitoring reports, USACE dredging data, DCM historic shorelines, aerial photos, wave and tidal data, tropical storm track history, past reports and papers (journal articles, reports, etc.). Fort Macon (Beaufort Inlet) has similar data (including original engineering drawings). Carteret County has also provided beach profile monitoring data. Jarrett asked if M&N had fully tapped the USACE database for the federal projects and studies at Ft. Macon and Atlantic Beach. Tschirky would look into this. Amelia Island is more recent construction (nourished in 2003 and groin and detached breakwater built in 2005) and Olsen & Associates have been providing all documentation from their involvement in the project. Rogers asked if third-party review documents for the Amelia Island had been acquired. Tschirky had not come across these documents but would look into it. Captiva Island has past nourishment data and reports and other similar datasets mentioned above. This location has less data than other projects but enough to analyze. John's Pass has wave and tidal data, aerial photos, storm track history, and reports and articles. This project was built back in 1966 and has a similar data density to Captiva Island (i.e., not a lot but enough to analyze and continue in the study). Harry Simmons suggested contacting Pinellas County Florida staff to acquire appropriate data. Overton commented to the attendees that any written comments about additional data sources needed for this exercise were welcome.

Tschirky started discussing the coastal engineering analysis and referenced what HB 709 requires. The methods of this study included in the data and literature review include analysis of physical coastal processes, geology, structure characteristics (of the terminal groin structure itself including dimensions, porosity of groin, water depth), and performance (intended and actual performance, associated works such as beach nourishment). Young thought a description of why the structure was built for the CRC was an important part of this study. In order for the CRC to evaluate the motivation driving the construction of terminal groins in other places, it is important to put these

other sites into context. Overton asked if engineering designs from the other sites (besides Ft. Macon) were found, and Tschirky noted they were not (but the goal had been to find as much info as possible within the project timeframe).

Quantitative methods based on the data gathered include assessment of the pre-structure conditions (shoreline position, baseline erosion, past inlet migration, past engineering activities in vicinity), post-structure conditions (shoreline position, erosion rate, and associated engineering activities post construction), net out associated beach fill activities (one way to do this is to relate volumes to shoreline change / linear beach erosion, in part, by looking at beach profiles), and dredging history of inlet. Jarrett noted that the M&N rule-of-thumb volume of ~1.3 cubic yards per foot wouldn't work for Atlantic Beach (Ft. Macon). Tschirky asked if there were suggestions for other numbers. Jarrett suggested sticking to shoreline changes and not worrying about netting out beach nourishment effects. Riggs was also concerned about the specific geology at each site that would make comparison of sites difficult (from one site to another). Overton asked about the availability of beach profiles at all five sites. Benton noted that there might be beach profiles but not detailed data of the ebb tide delta bathymetry and volume. Jarrett noted a Section 111 of Morehead City Harbor that attempted to quantify volume changes for the offshore. Jarrett felt that focusing more on shorelines would be appropriate since all of the nuances of an inlet and adjacent areas of the coastline couldn't be addressed in detail in this study.

Overton felt that comparison of shorelines from historical aerial photos and newer generation data using LiDAR (MHW) must be done mindfully. In addition, considering storm histories associated with shorelines used would also be helpful (to understand the potential impact of storms on the shoreline). Martin also noted this was important to look at beach fill data associated with shorelines. Jarrett wondered (with respect to Ft. Macon) if you just looked at shoreline conditions prior to construction (mid 1960s) versus what it looks like now instead of looking in detail at the shorelines between then and now. That might be a better snapshot appropriate to the timeframe and budget of this study. Young wondered if the shorelines would look the same (at all inlet sites in project) because nourishment and structures have been emplaced to "hold the line." How do you decouple these activities? Jarrett simplified the question by asking could you have maintained the current shoreline and inlet configuration from beach nourishment alone or do you need the structure (terminal groin) to protect the shoreline (and nourishment placed there). Young asked if it is as simple as trying to tease out if nourishment volumes have changed pre versus post construction? Jarrett gave an example of Ocean Isle Beach (NC) in that the USACE did not nourish near Shallotte Inlet because the sand would not remain there due to the inlet processes. Jarrett wondered if the way to approach the study, using OIB as an example, would be to see if a terminal groin would now allow a place like OIB to nourish that portion of the shoreline (that currently can't be because of the inlet) and how do the benefits compare to the costs if a structure was built to stabilize the nourishment. Overton asked of the five inlets that were chosen, how many have a plan in place for a nourishment component associated with post construction of a groin. Tschirky answered it varied but all inlets had some component of fill.

Overton commented that assessments were being made on dredging history and shoreline locations, etc. (semi qualitative) but no new models were being run for each of these five sites. Riggs thought this was a good project, but one component that had not been discussed yet was the long-term evolution taking place on the barrier islands (including sea level rise). If you look at long-term changes, even where structures are present, there is a net recession (although pulses of accretion can be seen in the short term). When we're talking about structures with 50-100 year life expectancies, you have to consider a meter or more sea level rise during that same timeframe (and the SLR effect on these structures as well?). Short-term intervals give you the coastal dynamics but the long-term history (and future evolution) is equally important. Are inlets just there to be mined for beach nourishment or are they there for other reasons for long-term barrier evolution (i.e., locking up an inlet with a terminal groin versus letting them behave naturally be a part of the overall barrier evolution). Tschirky noted that Fitzgerald would be discussing this later today. Riggs wondered if M&N would look at volumes of sediment in the inlets and how the inlets are changing (and tie that into future nourishment plans). Tschirky didn't want to pre-assume that terminal groins must be used in conjunction with beach fill (although some on the Panel have stated that). Tschirky also felt the sand-source issue related to beach fill adjacent to inlets was beyond the scope of this project.

Overton noted that the project, as defined, is to assess terminal groins in a historical perspective. However, sea level rise documentation (and projections) could be added to the dataset list to be considered in the project. Benton commented that there was an issue with context by giving the example of Ft. Macon (Beaufort). How can you relate the impact of a small groin structure to an inlet system with complex processes, long histories of shore protection for a historical landmark, long histories of dredging for the State's second-largest port, etc.? How is this translated from site to site? Effectiveness is important to be discussed but so are impacts. Young was hoping that the report, if conclusion could not be drawn with limited data and limited time and budget (because the complexity of the coastal processes could not be simplified), would note that effectiveness and impact(c) may not be able to be determined and such a finding is acceptable and would not undermine the outcome of the report/study. For example, if you document a shoreline difference pre and post construction doesn't necessarily mean that the structure caused that change. If this study proves to be an insurmountable task because of these complexities, Young hopes the report states that. Tschirky noted that they would try to identify changes in the system (pre and post) and then try to determine with a high degree of certainty what caused those changes.

Tschirky turned the meeting over to Bedsole to discuss Dial Cordy's environmental data acquisition for the project. Contacts included state and fed agencies, non profits, non-governmental agencies, and other resource experts. A total of 62 contacts were made in North Carolina and 63 in Florida during the information gathering phase. Riggs asked about academic contacts, and Bedsole noted they were lumped under non-profits. Riggs noted that this group had the smallest number of contacts, and Bedsole asked for any help to provide additional contacts. Data included info on sea turtles, shorebirds, infauna, fish, hard bottoms, sea-beach amaranth, and habitat changes. An example table of bibliographical info was shown. Young noted that Dial Cordy had been involved in the

environmental analysis (EA) for John's Pass and Amelia Island. Bedsole responded that the five study sites were chosen without Dial Cordy's involvement. Bedsole commented there were still outstanding data requests and they were still doing limited searches but they were needing to move forward rapidly based on the project timeline. Rogers asked if there were enough data to do an appropriate analysis. Bedsole noted there more data at other sites and their report might note these other locales although the focus will be on the five sites in the study.

Overton asked if Bedsole could elaborate how these data would be utilized for this study (i.e., any standard analyses). Bedsole didn't feel the data were there to do a pre and post construction assessment (for environmental studies) of most of these sites, although all the data will be noted and provided. A lot of these sites were pre NEPA. Riggs asked how "habitat changes" were defined. Would there be loss of habitat without the structure? Is the structure protecting habitat? Without the structure, would there be a progression of habitat? Young gave an example of habitat at Rich Inlet at Figure 8 Island and what wondered what would happen if a structure was built there (relative to habitat). Young also expressed frustration that this report/study was not going to address NC-specific sites that may or may not be potential sites for terminal groin consideration. This report/study was too generic. Jarrett wondered if you could evaluate a particular NC inlet without endorsing a terminal groin one way or another.

Overton announced a ten minute break at 11:35, and the meeting was reconvened at 11:45. Dumas introduced himself and reviewed the economic portion of this study. Overall, a baseline situation with and without terminal groins were going to be addressed. At this point, the proposed inlet hazard areas from the Science Panel would be used to define the regions at risk for erosion attributed to inlet processes. Property value, tax, and infrastructure data were being assembled within these proposed inlet hazard boundaries. Rogers reminded the Panel that this approach was to identify areas impacted more by inlet influences versus oceanfront shoreline changes. The legislation asked for the study to look at economics associated with shifting inlets. Two scenarios would be reviewed – baseline (storms, existing dredging and nourishment but no terminal groins) and alternative scenario (terminal groin effect). Young wondered how erosion would be addressed if it occurred (theoretically) outside of the proposed IHA boxes. Dumas talked about two erosion lines – one occurring with a terminal groin and one without. The net comparison of those two scenarios would be the net effect of a terminal groin. Overton had not heard anything about predicting where these two shoreline prediction scenarios would be placed. Rogers commented that the best case scenario of a terminal groin emplacement would be no net loss or erosion. Young thought the best case would be reducing beach nourishment costs (associated with inlet stabilization from a groin). Jarrett suggested avoiding prediction of shorelines but, rather, look at total economic value of property and infrastructure within an areas affected by inlet processes. Then, look at the cost of putting in a terminal structure and compare the two to see if it is even worth building a terminal groin (is the cost justified by the property and infrastructure being protected). Young felt the difference would be the volume and frequency of beach nourishment (the cost savings of less nourishment with a terminal groin plus the cost of building and maintaining the groin versus the cost of nourishment and/or property loss

without a terminal groin). Young's skepticism was similar to Overton's – how are you going to draw to shoreline locations for the Dumas scenarios (and who is going to draw them)?

Dumas showed a 30-year scenario with no action (use DCM erosion rates to assess shoreline loss), construction of a terminal groin (use weighted erosion rates based on average of the five study sites), and sea level rise (shift 30-yr eroded shoreline 1.5 and 3.28 feet SLR scenario). Data would be presented as a statewide aggregate. Jarrett noted that the present rate of SLR is on par with 1.5 feet per year so shifting shoreline in scenario 2 makes no sense. It was clarified that the rates were 100 –year rates applied to a 30-year timeframe. Riggs wasn't comfortable with the weighted erosion average (discussed above) for the five study sites. (author note – it appears that the proposed inlet hazard study boxes will be analyzed and aggregated for a general NC statement but there will also be economic analysis done at the five study sites without using inlet hazard-type boxes). Types of economic impacts would be effects on residential, commercial, and government property (relative impact of ocean view, risk, etc. on property values based on NC existing studies and recreation value of beaches based on existing NC studies). All assumptions and limitations will be stated (this will not be a cost-benefit study), and navigation impacts will not be considered (the assumptions will apply the current level of navigation and navigation maintenance will be maintained in the scenarios). Environmental non-market data can also be assessed for environmental impacts (or potential impacts) and the value of the environment itself – the values and their existence will be mentioned but not applied to this study. The approach to cultural value will also be mentioned qualitatively (but not quantified).

FitzGerald introduced himself and spoke on the geologic framework portion of the study noting that tidal inlets are some of the most complex systems on the coast. However, similarities can be made from tidal inlet to tidal inlet and analyses can be made. FitzGerald used an aerial from Rich Inlet (NC) and Essex River Inlet (MA) to illustrate the morphology of the general inlet system. The similarities of these two illustrate the fact that models can be used to assess general similarities (but tidal inlets certainly are unique also from inlet to inlet). Examples of data used to assess physical and geologic framework include wave and tidal data, longshore sediment transport (LST) rates and directions, historical shoreline change rate, dredging records and disposal sites, tidal current data (hydrodynamic models), bathymetric changes, geological controls, storm data and impacts to shorelines, and sea level trends. The differences between wave- and tide-dominated inlets were discussed relative to modeling morphologic changes. The general relationship of tidal prism and channel cross section was also discussed. Aerial photos will provide an extremely useful tool in understanding the historical evolution of inlets and barriers. The major message to leave with the group was that tidal inlets are complex, but the generalities of the tidal inlet system will help understand the effects of terminal groins on the five terminal groin sites chosen for this project.

Riggs was concerned of the tight timeframe on the study and it not allowing a comprehensive study of the inlets (speaking in the geologic context). Tschirky responded that it cannot be a definitive, comprehensive study of all five sites, but the issues would

be framed and analyzed as much as time allows. Tschirky noted it was a very aggressive timeline. Riggs thought the geologic framework was the guts of the whole study and that a team of people would be good to address the overall barrier island behavior. Benton also commented that a terminal groin in these five systems are complex because a terminal groin is associated with beach fill is associated with dredging is associated with the inlet processes themselves. Potentially, the terminal groin could have less impact than the beach nourishment if you look at just the terminal structure.

Tschirky discussed the timeframe of the study and the next time the Science Panel would get together. The final terminal groin report will be out on February 1 and the report to the CRC would be provided by March 1. The report is due from the CRC to the EMC and General Assembly on April 1. The next public hearing will be on December 16th in Kill Devil Hills. The next CRC meeting, which will include a public input component to the study, will be January 13th in Raleigh (North Raleigh Hilton). The next Science Panel meeting will be on January 19th (10 am) at 2728 Capital Boulevard. The Science Panel will also meet on February 8th and March 12th at 2728 Capital (Raleigh).

Overton stated that there should be further conversation about the economic analysis scenarios and that could be handled via email. Martin stated that he would distribute appropriate memos via email. Young asked the general question about the scope of the economic portion of the study – would the report only address no action versus terminal groin? Tschirky stated M&N was trying to balance NC relevant economic data but not get into the specifics of what might happen to a particular building at a specific inlet. Rogers thought it was appropriate to put in the hands of the legislature what is at risk (economically) regardless of the management options. Tschirky responded that this was not a full cost-benefit analysis.

With no further business, Overton adjourned the meeting at 1:10.

