Feasibility And Advisability Of The Use Of A Terminal Groin As An Erosion Control Device

UPDATE – CRC Meeting
January 13, 2010

MOFFATT & NICHOL

DIAL CORDY AND ASSOCIATES INC
Environmental Consultants

House Bill 709

Two Sections:

"An Act To Impose A Moratorium On Certain Actions Of The Coastal Resources Commission Related To Temporary Erosion Control Structures And To Direct The Coastal Resources Commission To Study The Feasibility And Advisability Of The Use Of A Terminal Groin As An Erosion Control Device."

Items Identified In House Bill 709

Shall consider:

(1) Scientific data regarding the effectiveness of terminal groins constructed in North Carolina and other states in controlling erosion. Such data will include consideration of the effect of terminal groins on adjacent areas of the coastline.

Physical

(2) Scientific data regarding the impact of terminal groins on the environment and natural wildlife habitats.

Environmental

(3) Information regarding the engineering techniques used to construct terminal groins, including technological advances and techniques that minimize the impact on adjacent shorelines.

Construction

Items Identified In House Bill 709

Shall consider:

(4) Information regarding the current and projected economic impact to the State, local governments, and the private sector from erosion caused by shifting inlets, including loss of property, public infrastructure, and tax base.

Economic

(5) Information regarding the public and private monetary costs of the construction and maintenance of terminal groins.

(6) Whether the potential use of terminal groins should be limited to navigable, dredged inlet channels.

Project Team Members

Project Team Members

- Moffatt & Nichol – Coastal Engineering
- Dial Cordy and Associates, Inc. - Environmental
- Dr. Duncan FitzGerald (Boston University) – Coastal Geology
- Dr. Chris Dumas (UNCW) – Economics

Overall Project Work Plan

Task 1 – Coastal Engineering Analyses of Effectiveness and Impacts of Terminal Groins

Task 2 – Environmental Resource Analyses of Potential Effects of Terminal Groins

Task 3 – Construction Techniques to Limit Impacts

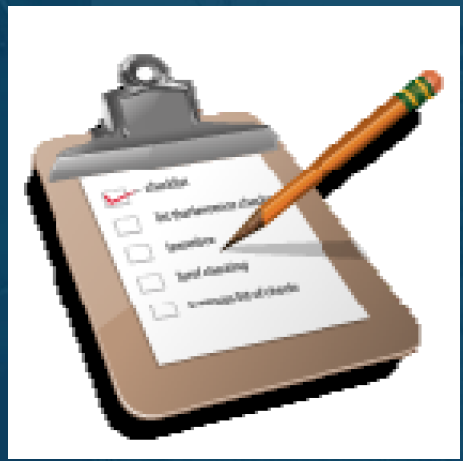
Task 4 – Economic Study of Impacts of Shifting Inlets

Task 5 – Initial Construction and Maintenance Costs

Task 6 – Potential Locations Study

Task 7 – Public Input

Task 8 – Draft and Final Report



Roles of CRC/CRAC, Science Panel

CRC/CRAC

- Will Provide Guidance to M&N During the Study
- Will Be Responsible for Developing the Policy Conclusions and Recommendations to Be Supplied to the ERC and Ultimately the General Assembly

Science Panel

- Science Panel Will Be Involved in the Scoping Meeting and Peer Review of Interim Documents and Draft and Final Report Review
- M&N Will Provide Memos Describing Methodologies and Analyses for Review and Comment

Selected Study Evaluation Sites

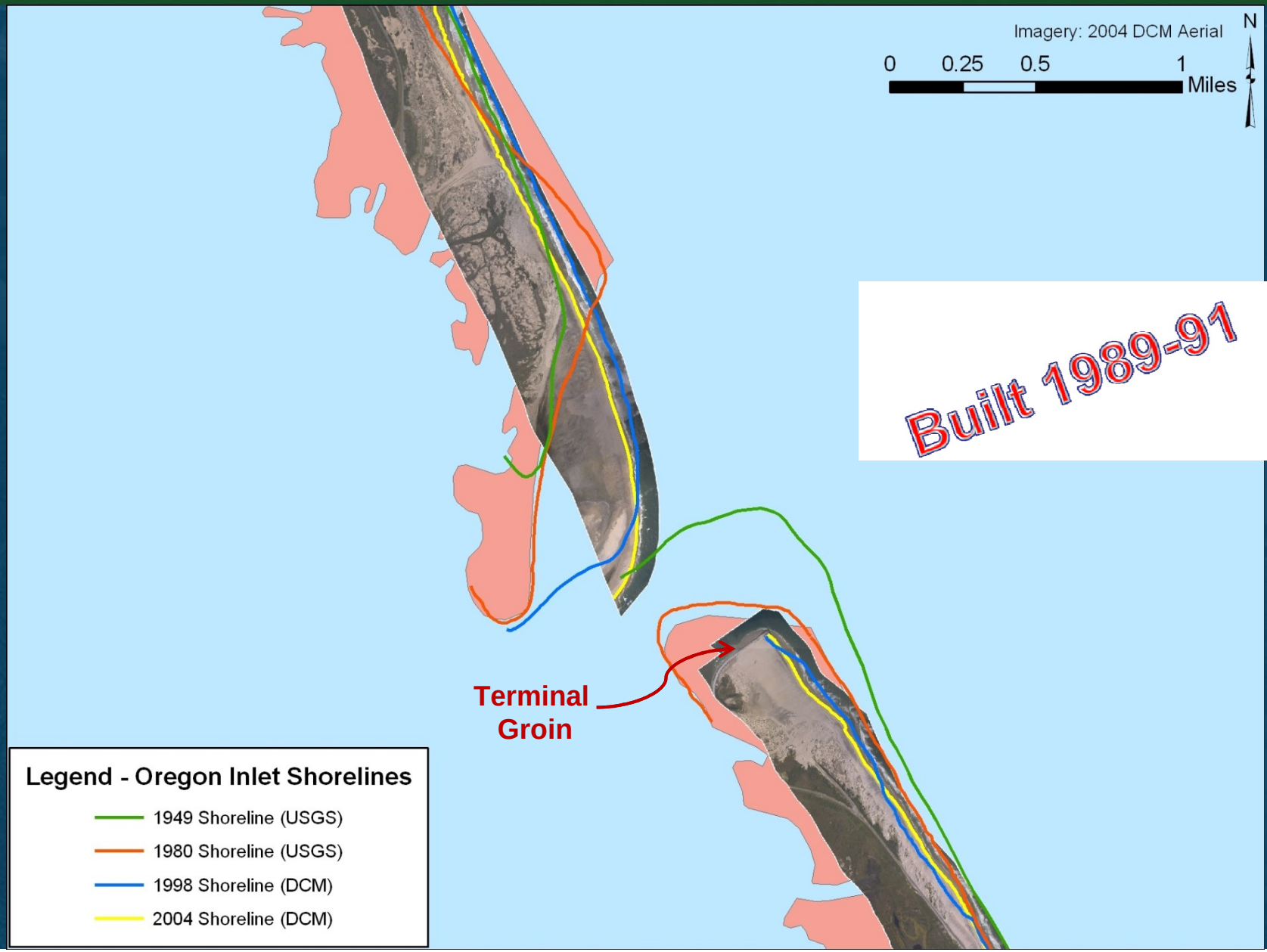
North Carolina
- Oregon Inlet
- Fort Macon

Florida
- Amelia Island
- Captiva Island
- John's Pass

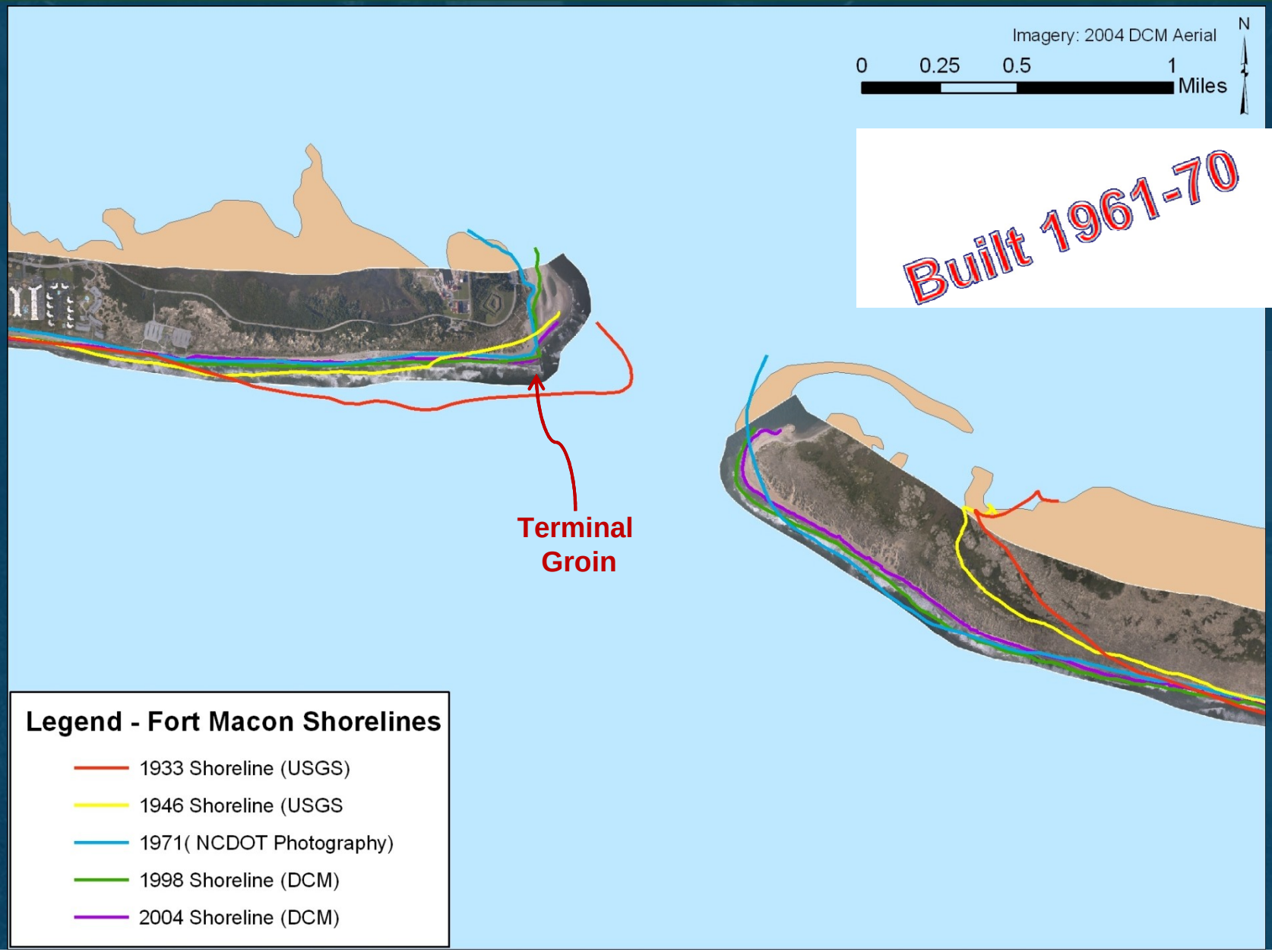
Task 1- Coastal Engineering Analysis

- Examining the Five Study Sites:
  - Physical Processes (waves, sediment transport, etc.)
  - Geologic Setting
  - Structural Characteristics
  - Pre- and Post-Construction Shorelines on Both Sides of Inlet Where Terminal Groin Constructed
  - Shoreline Change and Volume Changes (Erosion, Accretion, Beach Nourishment)

Oregon Inlet



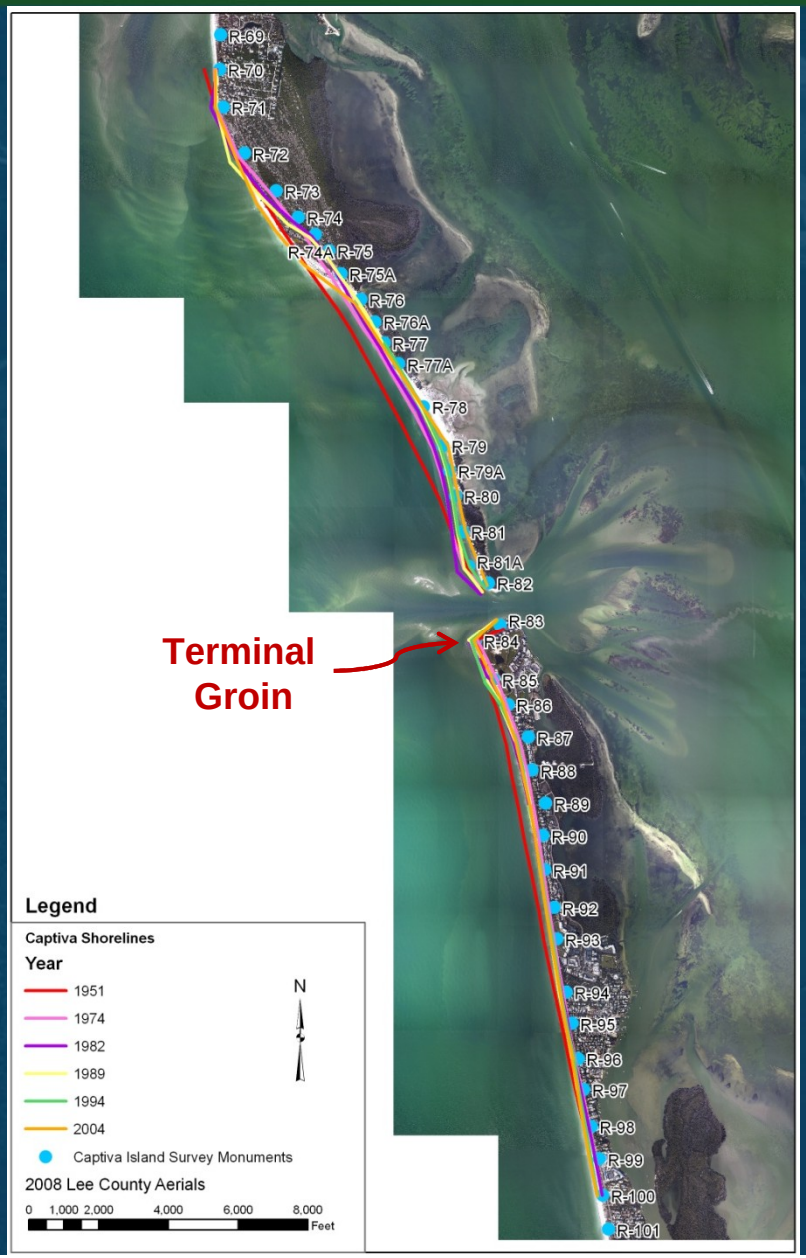
Fort Macon


Imagery: 2004 DCM Aerial
N
0
0.25
0.5
1
Miles
Built 1961-70
Terminal Groin
Legend - Fort Macon Shorelines
1933 Shoreline (USGS)
1946 Shoreline (USGS
1971(NCDOT Photography)
1998 Shoreline (DCM)
2004 Shoreline (DCM)

Amelia Island

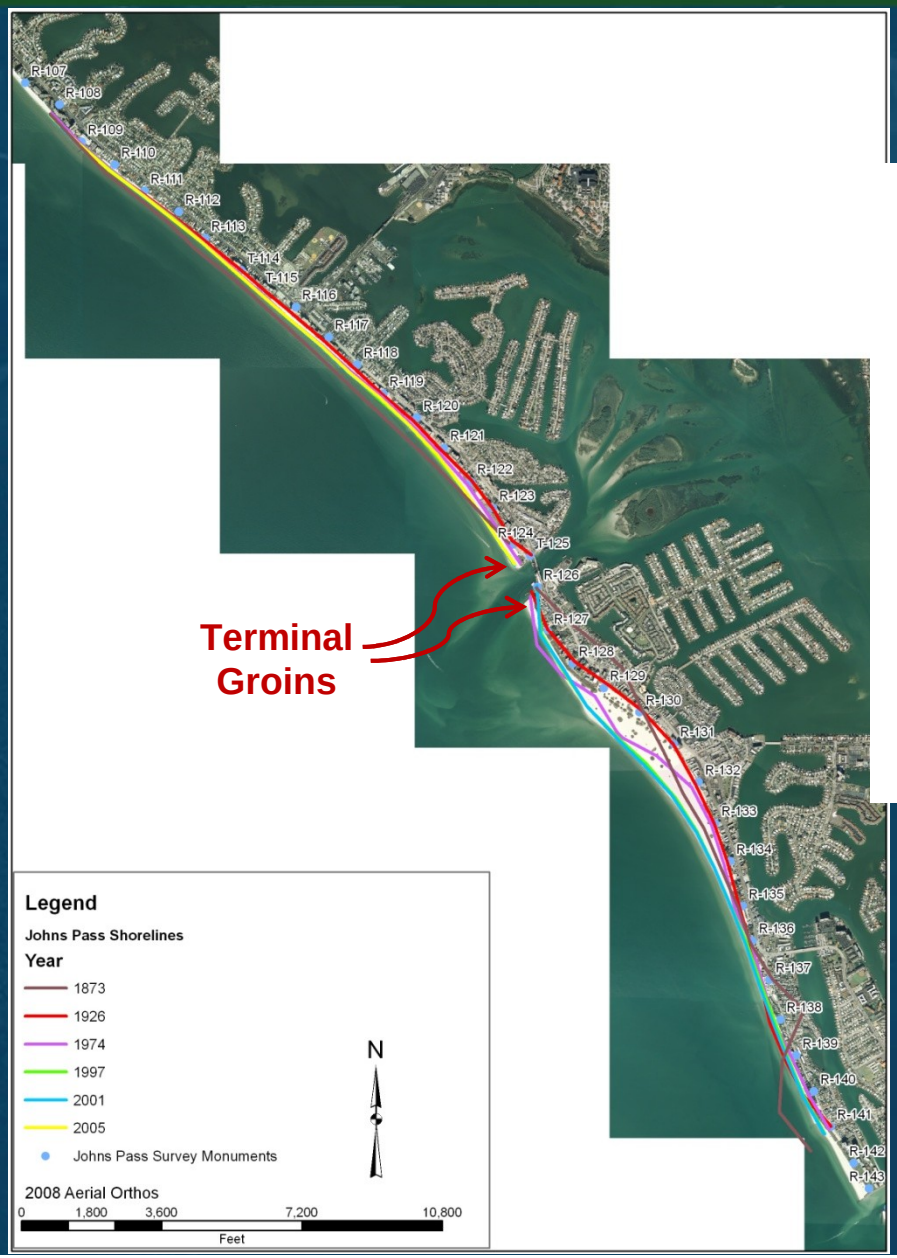
Built 2004-05

Captiva Island



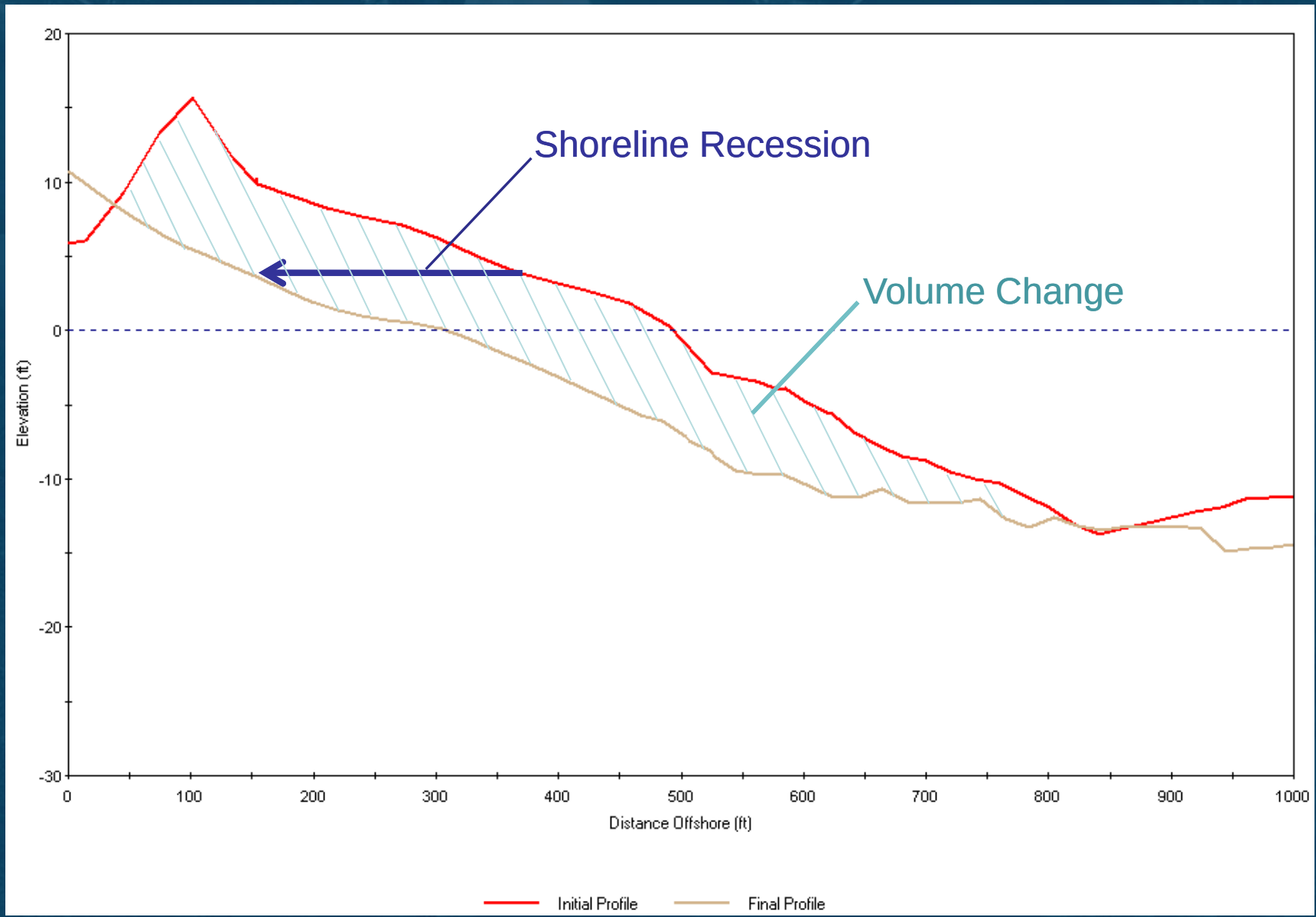
Built 1981 and Rehab 2006

John’s Pass



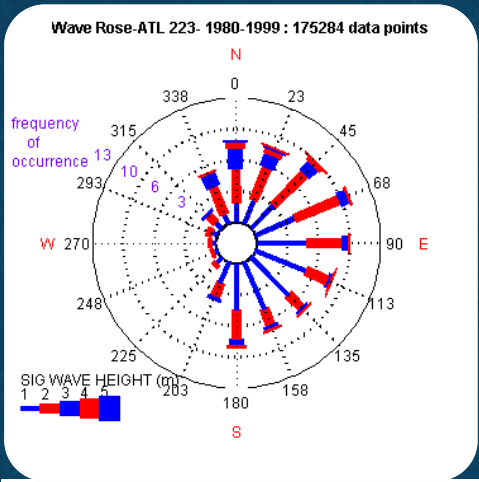
Built 1961 and 1987 Rehab (North) 2000 (South)

Shoreline Recession and Volume Change



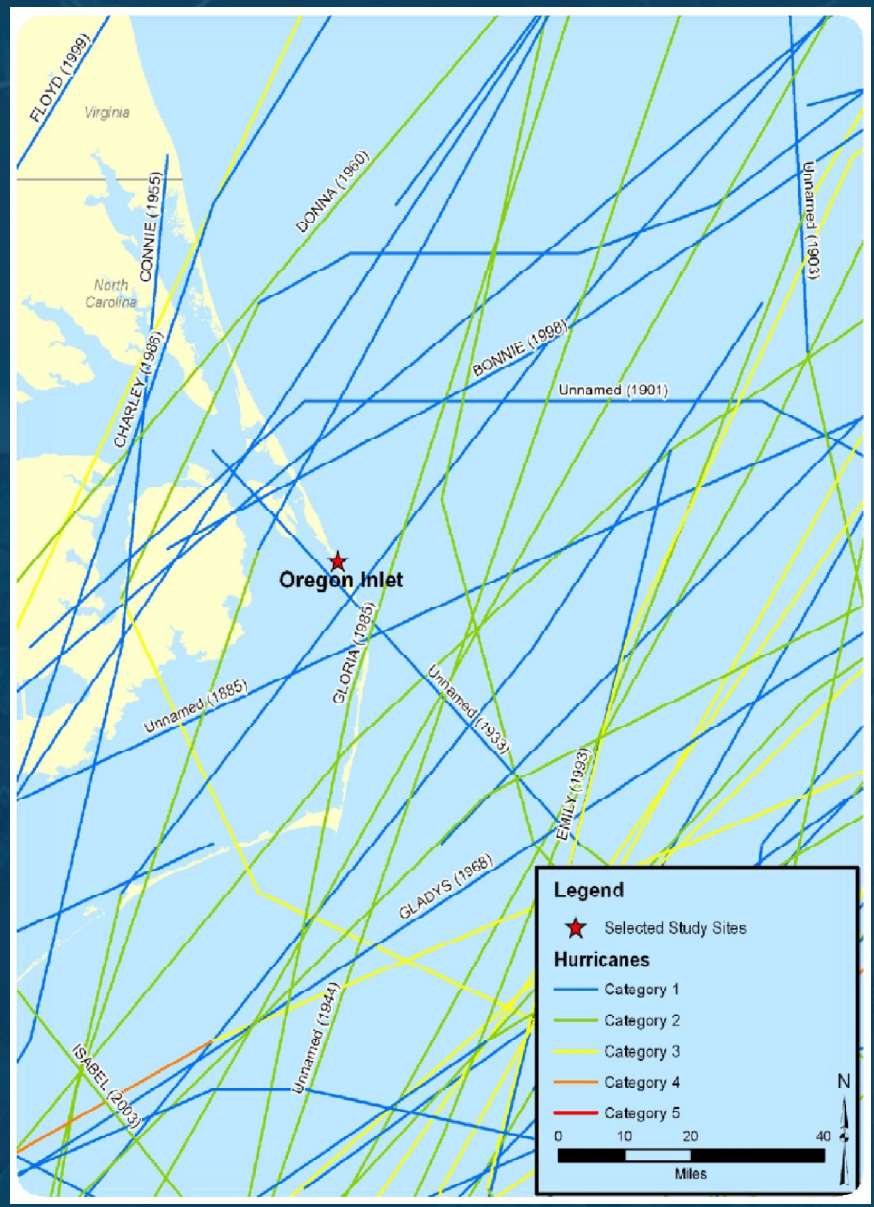
Physical Processes

- Physical Processes
  - Waves
  - Tides, Currents
  - Sediment Transport
  - Storm Activity



Tides

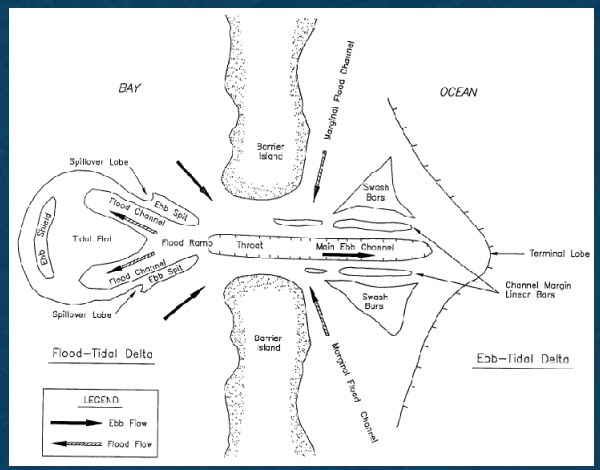
	Station	
	Oregon Inlet Marina (8652587)	Duck (8651370)
MHHW (ft)	1.17	3.69
MHW (ft)	1.02	3.37
DTL (ft)	0.59	1.84
MTL (ft)	0.57	1.75
MSL (ft)	0.58	1.77
MLW (ft)	0.13	0.14
MLLW (ft)	0.00	0.00
NAVD (ft)	0.66	2.19
Maximum	5.66	6.92
Max Date	19990916	19990830
Max Time	15:00	15:54
Minimum	-1.99	-2.66
Min Date	19960310	19800316
Min Time	21:48	12:54



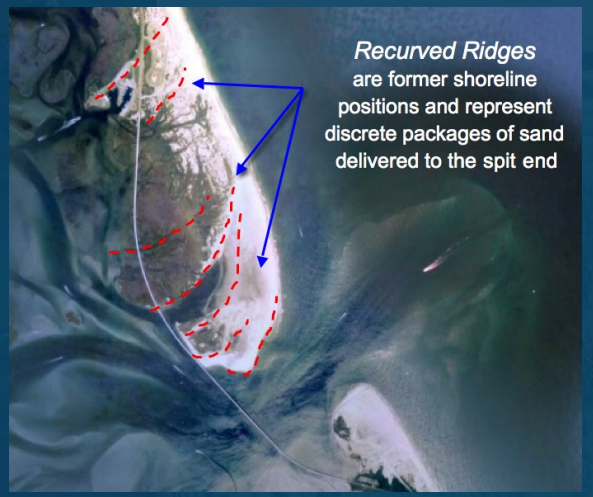
Geologic Framework

- Can Impart a Strong Signature on the Physical Processes Affecting Erosional-depositional Patterns
- Historical Geologic Features/Stratigraphy
- Inlet Migration, Delta and Channel Patterns

Oregon Inlet Migration



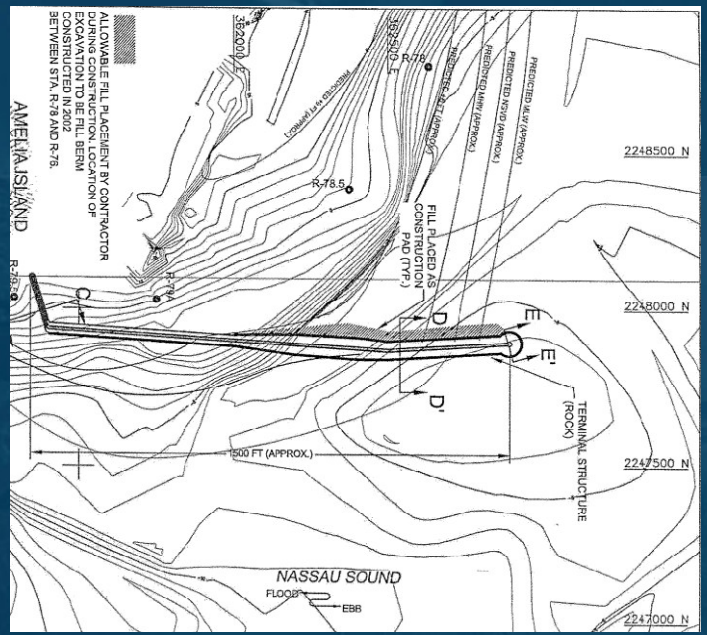
General Tidal Inlet Features

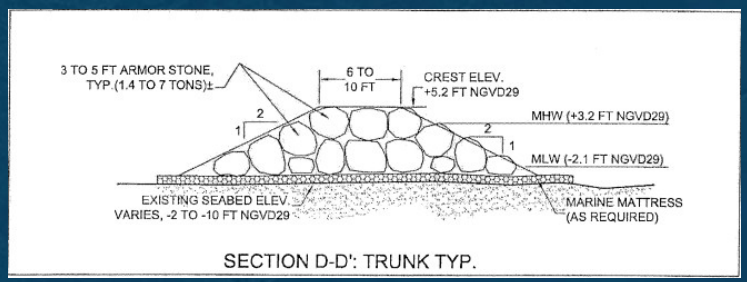


Oregon Inlet

Structural Characteristics

- Gather Available Structural Drawings
- Dimensions, Materials…





Amelia Island Terminal Groin (Olsen Associates Inc.)

Associated Activities

- Human/Engineering Activities:
  - Terminal Groin Construction
  - Dredging of Adjacent Channel
  - Beach Nourishment and Nearshore Placement

Date	Activity	Amount	Comments
1981	Terminal Groin Construction		350 ft. long rock groin at north end of island
1996	Beach Nourishment	821,000 cy	Placed along length of beach
2006	Groin Rehabilitation		Groin reconstructed and extended

Task 2 – Environmental Analysis

- NOAA's Environmental Sensitivity Index (ESI) portal was used to generate coastal classification of habitat maps, species occurrence and sensitive habitat maps.
- Sources of data for Pea Island (Oregon Inlet) and Fort Macon (Beaufort Inlet) include:
  - North Carolina Wildlife Resources Commission
  - North Carolina Division of Marine Fisheries
  - North Carolina Department of Transportation
  - Cape Hatteras National Seashore
  - Cape Lookout National Seashore
  - US Fish and Wildlife Service
  - US Army Corps of Engineers
  - Dare and Carteret Counties

Task 2 – Environmental Analysis

- Sources of data for Amelia Island (Nassau Sound), Captiva Island (Redfish Pass), and Treasure Island (John's Pass) include:
  - Florida Department of Environmental Protection
  - Florida Fish and Wildlife Conservation Commission
  - Florida Fish and Wildlife Research Institute
  - Florida Shore Protection and Sea Turtle Management System
  - Florida Department of Transportation's Florida Land Use, Cover and Forms Classification System
  - USACE Sea Turtle Data Warehouse
  - Amelia Island State Park
  - Nassau, Lee, and Pinellas Counties

Environmental Maps

Example

Figure depicts the habitat diversity in the area of Oregon Inlet, Pea Island, and Bodie Island, North Carolina.

Environmental Maps

Example

Figure depicts the species occurrence adjacent to Nassau Sound, Amelia Island, and Little Talbot Island, Florida.

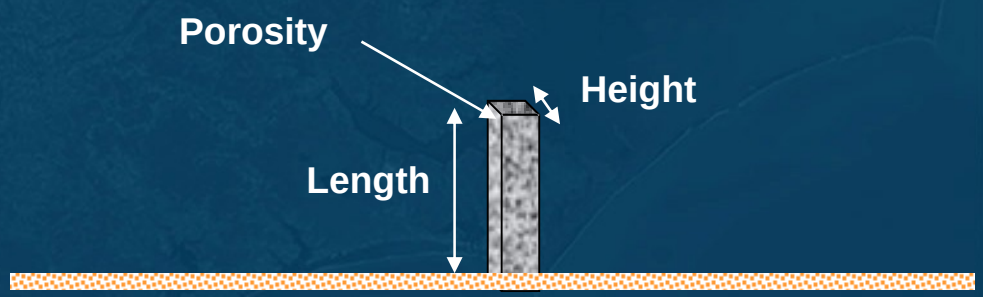
Environmental Maps

Example

Figure depicts sensitive habitats inside John's Pass behind Treasure Island and Sand Key, Florida.

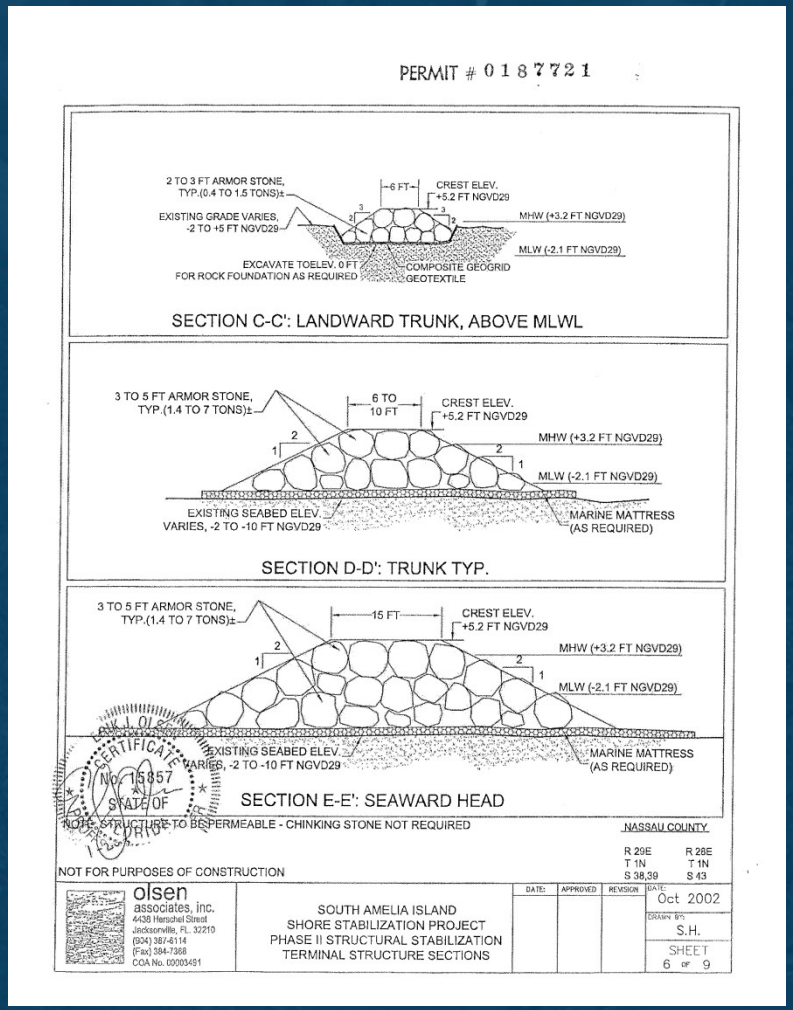
Task 3 – Construction Techniques

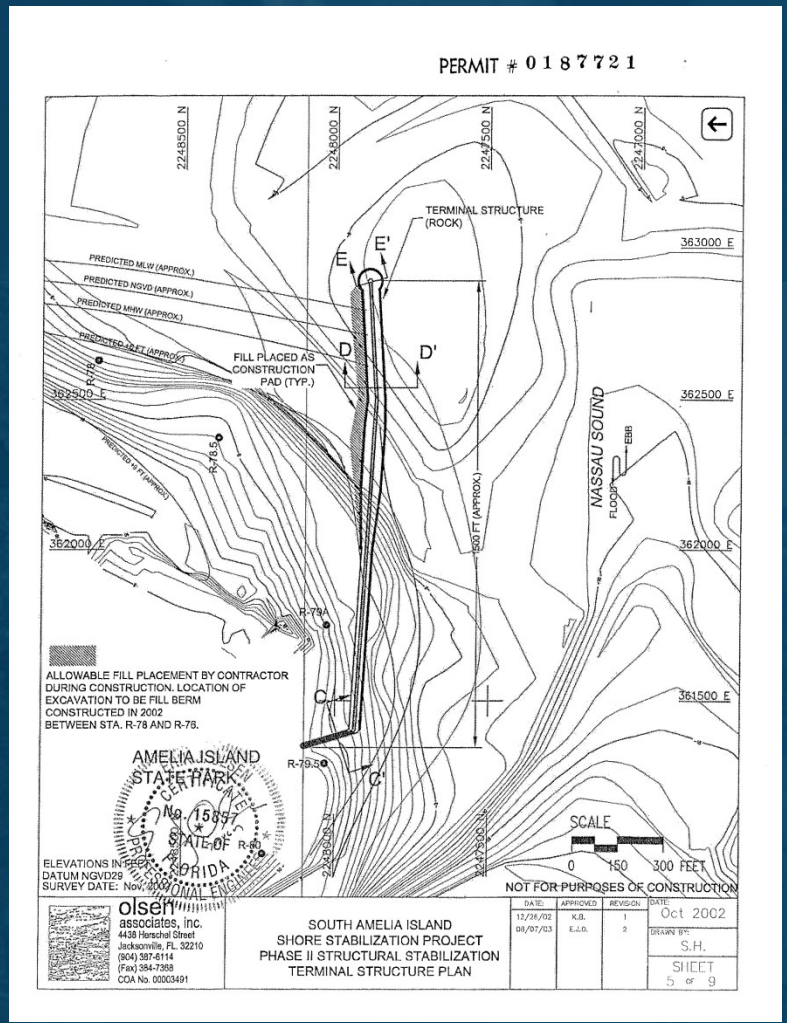
- Literature Review of Techniques Used to Limit Impacts on Adjacent Shorelines:
  - Limits on Groin Height and Length
  - Porosity of Structures (Sediment Transmission)
  - Materials, etc.
- Parametric Study Supplemented With Available Data On Site Performance



Task 3 – Construction Techniques

Amelia Island – Leaky Groin

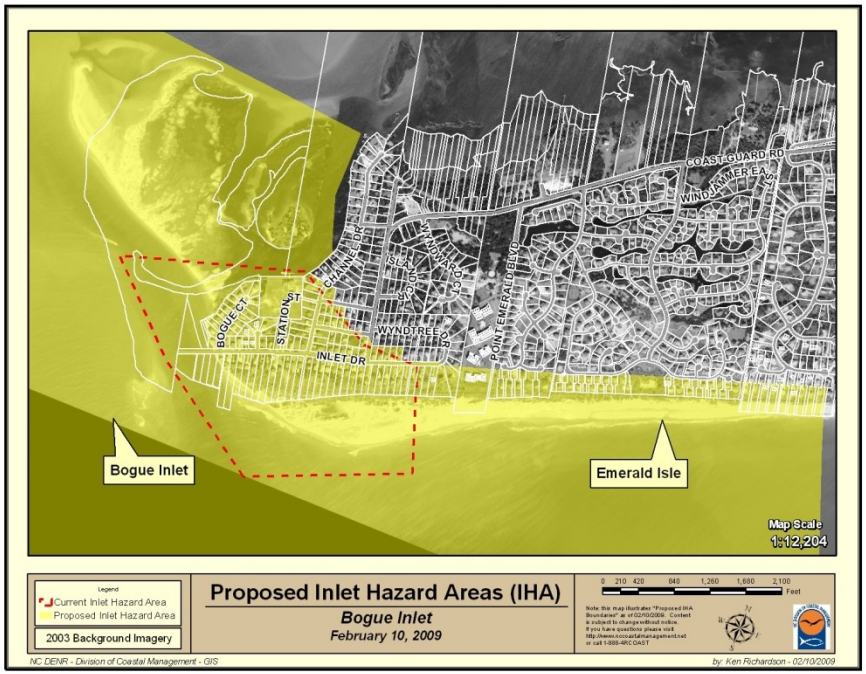




Task 4 – Economic Study

- Impacts of Erosion Caused by Shifting Inlets to State, Local, and Private Sectors
  - Properties at Risk (Use Proposed Inlet Hazard Areas)
  - Assemble Current Property Location and Value Data
  - Identify Individual Properties At Risk Over 30-yr Period (Proposed Inlet “Risk Lines”)
  - Identify Individual Properties At Risk with Terminal Groins In Place
  - Assess Property Value Losses Under Each Case Including Property Loss, Diminished Market Value, Public Infrastructure, and Tax Base Losses

Task 4 – Economic Study



Task 5 – Initial Construction & Maintenance Costs

- Review Available Cost Data For Existing Terminal Groins Including Public and Private Costs
- Develop Ranges of Potential Costs Based on Typical Expected Terminal Groin Dimensions and Typical North Carolina Offshore Slopes

Task 6 – Potential Terminal Groin Locations

- Literature Review of Existing Locations (Inlets – dredged, natural)
- Issues With Respect to Use at Navigable, Dredged Inlets vs. Non-dredged Inlets
- Inlet Behavior

Project Work Plan

Task 7 – Public Input

Public Hearings

- Sheraton Atlantic Beach – October 29, 2009 - 5 PM
- Kill Devil Hills – December 16, 2009 – Town Hall
- Raleigh – January 13, 2010 – Hilton North Raleigh
- Wilmington – February 17, 2010 – NH County Gov't Complex
- Sunset Beach – March 25, 2010 – Sea Trail Plantation

State Website

- **http://www.nccoastalmanagement.net**
- **Under What's New Section**

Email

- jim.gregson@ncdenr.gov

www.nccoastalmanagement.net

DCM Home | About DCM | Contact DCM | CAMA Counties | Search DCM | DENR Home | ncgov.com

North Carolina Department of Environment and Natural Resources

Division of Coastal Management

Coastal Resources Commission :: CRC Terminal Groin Study

The N.C. Coastal Resources Commission, in consultation with N.C. Division of Coastal Management, the N.C. Division of Land Resources, and the N.C. Coastal Resources Advisory Council, is conducting a study of the feasibility and advisability of the use of terminal groins as erosion control devices.

The study was mandated by Session Law 2009-479, which requires the CRC to conduct the study and present a report to the Environmental Review Commission and the General Assembly by April 1, 2010. The Environmental Review Commission is a joint legislative study committee.

Session Law 2009-479

Text of the 2009 Session Law that mandates the CRC study of terminal groins.

About the study

General information about the terminal groin study.

Scope of Work

Scope of work for Moffatt & Nichol, the contractor conducting the study.

Study Meetings

Information from each of the CRC's terminal groin study meetings.

Study site locations

Map and list of study site locations.

Public Hearings

The CRC will hold public hearings related to the study. To submit written comments, please email to Jim.Gregson@ncdenr.gov.

Public Comments Received

PDF file of all public comments on the study received to date. (updated 11/9/09)

CRC Science Panel on Coastal Hazards

The CRC Science Panel will serve as a peer review group for the contractor's findings.

Last Modified: November 9, 2009

N.C. Division of Coastal Management . 400 Commerce Ave . Morehead City, NC 28557
1-888-4RCOAST . Email Us

Project Work Plan

Task 8 – Draft and Final Report

- Working Draft Report (February 1, 2010)
- Final Report (March 1, 2010)

Reports to General Assembly

- April 1, 2010
- Findings of the Study and Commission Recommendations Will Be Submitted to the ERC for Consideration and Further Action

Next Steps

- Science Panel Meeting for Preliminary Analysis & Results Review and Discussion (January 19, 2010) - Raleigh
- Working Draft Report – February 1, 2010
- Science Panel Meeting – February 8, 2010 Raleigh
- Steering Committee Meeting – February 15, 2010 New Bern
- Next CRC Meeting and Public Hearing – Wilmington (February 17th, 2010)