



THE TOWN OF OAK ISLAND, NORTH CAROLINA



LOCKWOOD FOLLY HABITAT RESTORATION PROJECT DREDGING OF EASTERN CHANNEL



Overall Project



Project Purpose and Need

Navigation

- **Provide a Safe, Adequate Depth Channel for the Purpose of Both Commercial and Recreational Navigation for Shallow Draft Boats And Users**
- **Many Areas Had Shoaled to -1 To -3 Ft MLLW**

Habitat Restoration

- **Stabilize and Restore the Estuarial Habitat Surrounding the Eastern Channel**
- **Water Quality Measurements Point to Need for Tidal Flushing**

Beneficial Use of Material for Infrastructure Protection

- **Provide Essential Beach Compatible Sand to the Badly Eroded West Beach of Oak Island Which Has Infrastructure and Structures Currently Threatened After Recent Storm Events**

Project Purpose and Need



Project Purpose and Need



Construction Timeline

Construction Began on March 4th, 2015

- Original Permit Request

April 23rd, 2015 – Beach fill placement operations cease

April 30th, 2015 – All equipment removed from beach

May 24th, 2015 – Non-beach fill placement operations cease

May 31st, 2015 – All equipment removed from Horse Island

- Revised Request

May 15th, 2015 – Beach fill placement operations cease

May 20th, 2015 – All equipment removed from beach

June 5th, 2015 – Non-beach fill placement operations cease

June 10th, 2015 – All equipment removed from Horse Island

ACTUAL

- April 30th, 2015

- May 4th, 2015

- May 22nd, 2015

- May 31st, 2015

Project Adjustments

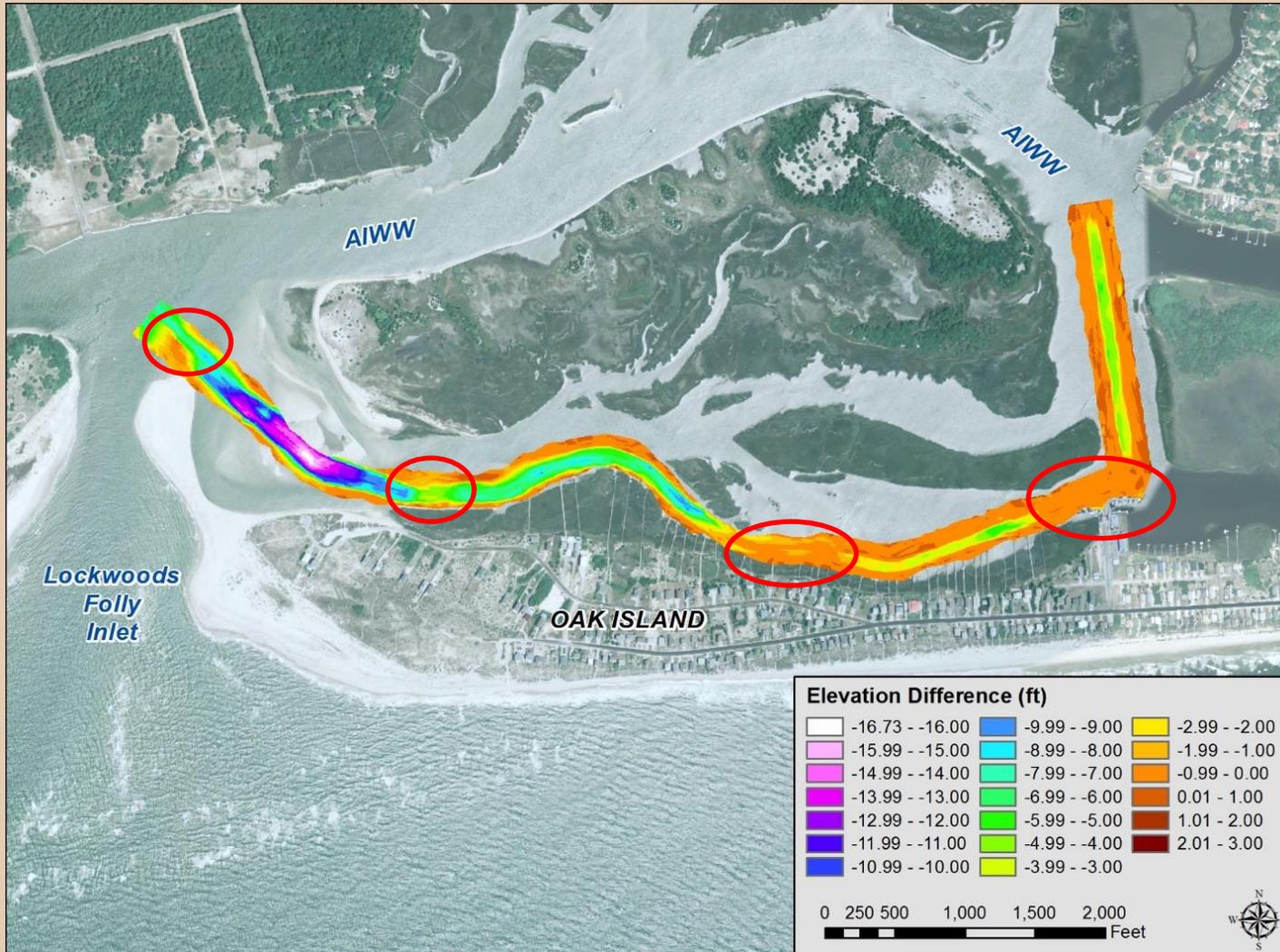
Project Dredging Template Adjustment

- Had to Shallow Dredging Template Moving Inland Given Additional Material Dredged and Better Than Expected Loss Rates
- Increased Material at Mouth of Eastern Channel Necessitated This
- Various Portions of the Inland Channel Target Elevation Was Raised by 1 – 2 ft with Minimum Target of 6' of Draft at MLLW
- Needed to be Sure That Channel Dredging and Beach Placement Would Stay Within Permit Limits and End at the Same Time for Beach Compatible Portion

Project Summary

Project Completed Within Permit Conditions

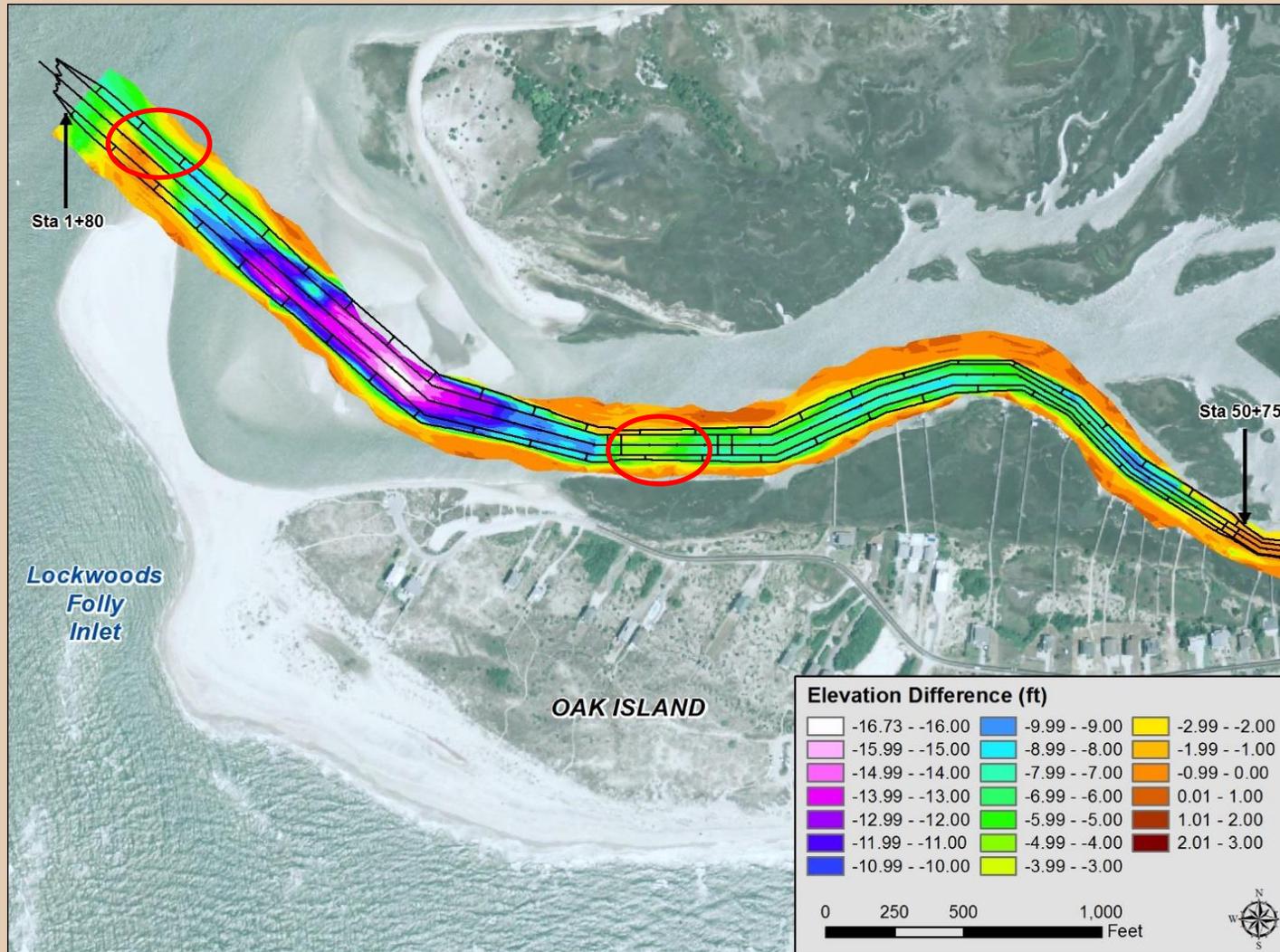
- Difference Between Pre- & Post-Construction Channel Survey



Project Summary

Project Completed Within Permit Conditions

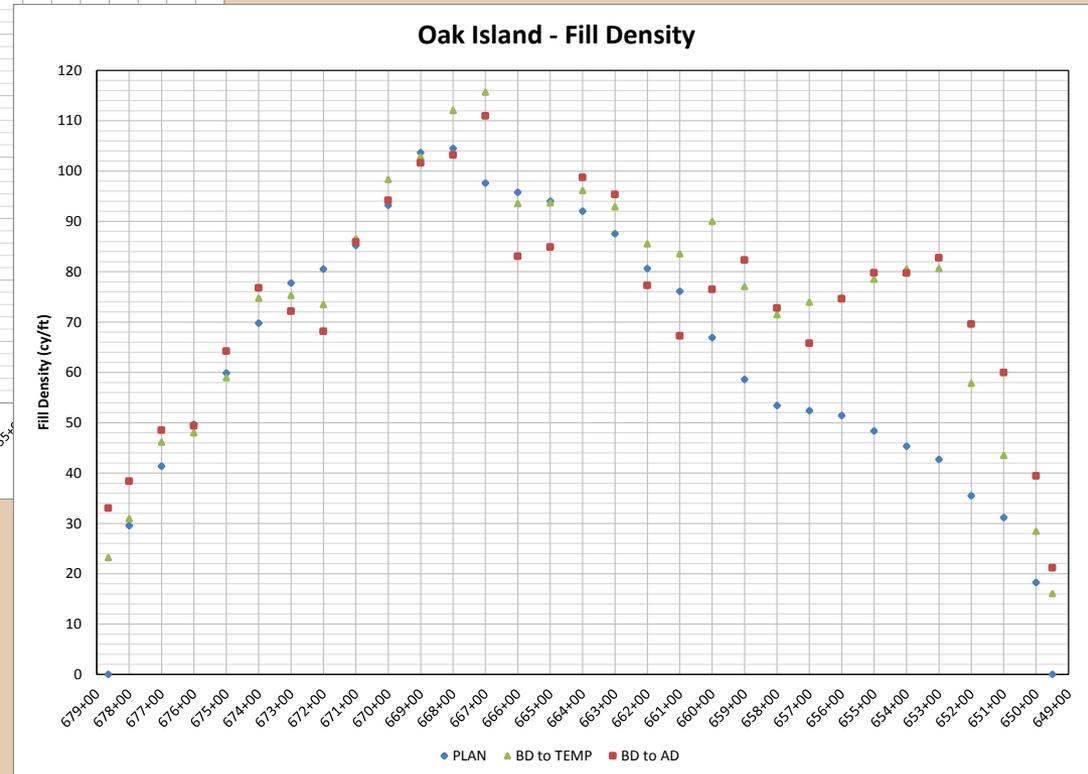
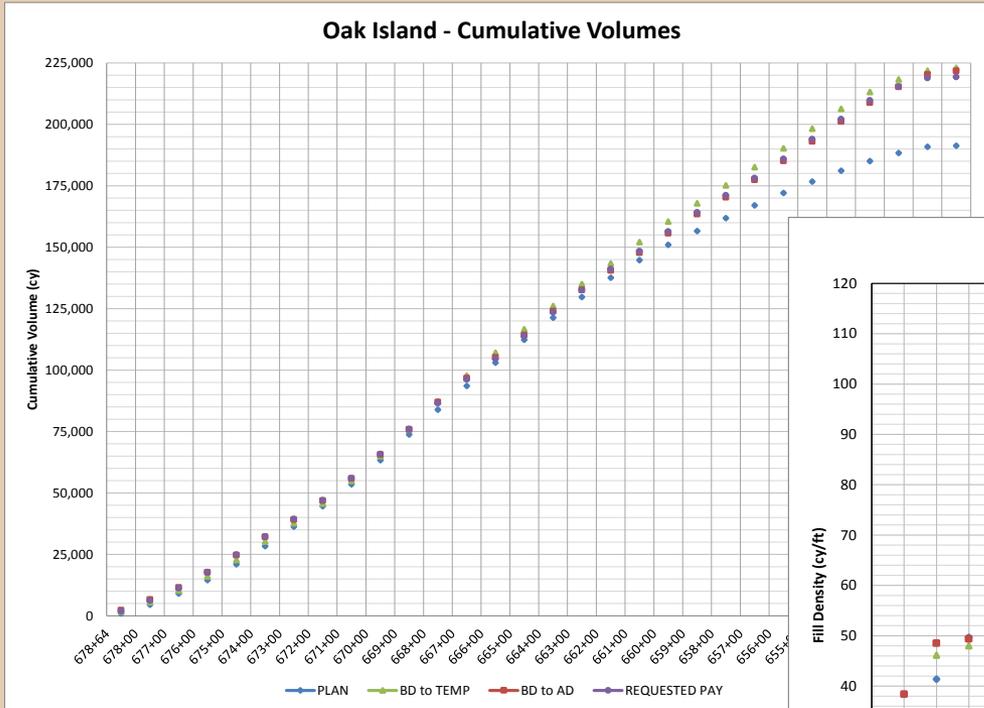
- Difference Between Pre- & Post-Construction Channel Survey



Project Summary

Project Completed Within Permit Conditions

- Beach Placement – 227,315 cy Placed (Est.) – Pay Volume – 224,617 cy – Permit Volumes – 278,950 cy (Dredged) & 226,575 cy (Placed)



Project Summary

Project Aerials – Please Note Taken After TS Ana



Some Lessons Learned

At This Time, The Project Area is a Very Dynamic Area and Subject to Significant Changes During Storms

- **Measurements Show 25,000 - 50,000 cy Changes Over Winter and During Ana**

Future Placements Should Use Transport Patterns to Our Advantage & Plan for Cleanout at Mouth ‘On Way Out’

- **Place More Material East of the Hotspot to Use as a Feeder Beach**
- **Plan to Cleanout “Plug” at Mouth While Dredge “On Way Out”**

Meetings Should Be Held With USACE to Look at Options to Tie Dredging of Mouth of Eastern Channel with AIWW Crossing Project – Every 2-3 Years

Continued (Annual) Profile Monitoring Will Give Us More Knowledge of Sediment Transport Patterns and Assist in Determining Long-term Needs



THE TOWN OF OAK ISLAND, NORTH CAROLINA



PLANNING ANALYSIS, ENGINEERING DESIGN AND ENVIRONMENTAL INVESTIGATIONS

in Support of a Comprehensive Shoreline Management Plan



Goals and Strategies

Goals

- **Long-term Beach and Shoreline Management Program**
 - Qualify for and Maintain Static-line Exception
 - Qualify for and Maintain FEMA Engineered Beach
- **Lockwoods Folly Inlet Management Plan**
- **Davis Creek Area Enhancement Plan**

Strategies

- **Develop Cost and Time Efficiencies by:**
 - Collaborate with USACE on Cape Fear Inlet Management – SMP
 - Utilize Available Data from the USACE BCB 50-yr Project
 - Partner with Town of Holden Beach on Joint Lockwoods Folly Inlet Management
 - Innovative Permitting Approaches

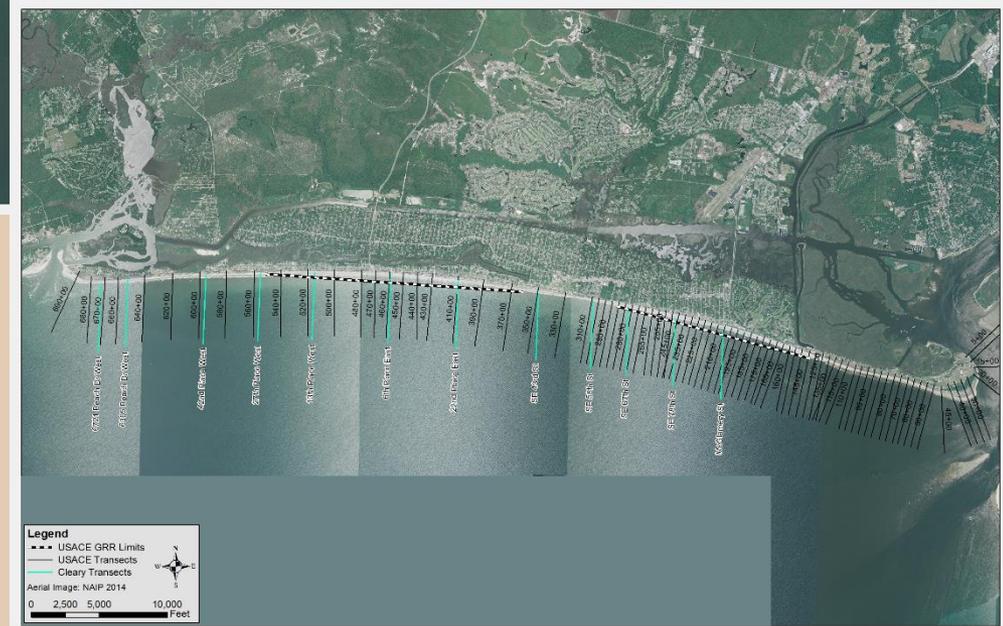
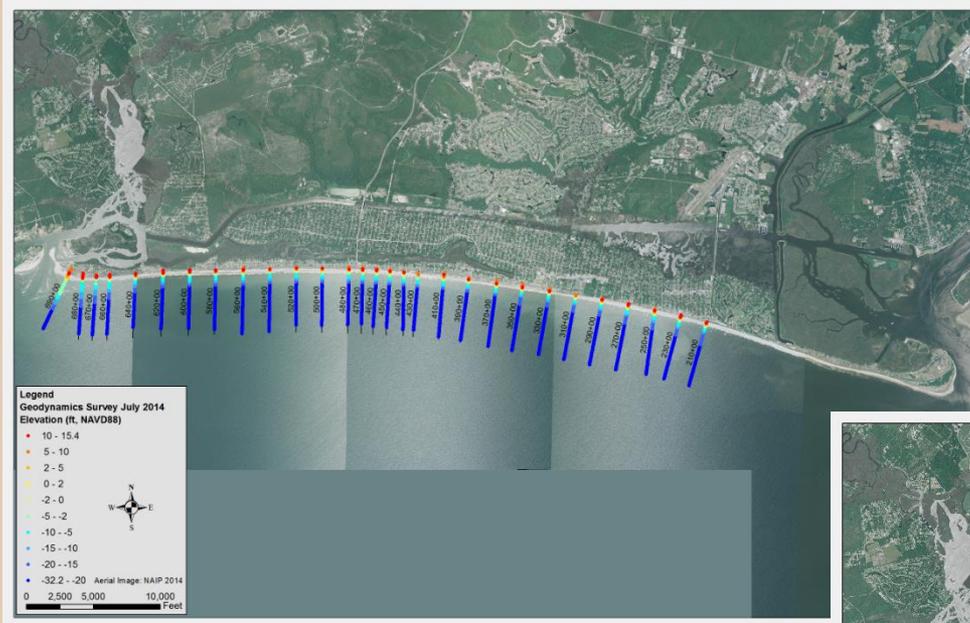
Project Scope of Work

- **Task 1 - Review Existing Data and Identify Field Data Collection Needs**
 - Use existing USACE and Town data to the extent possible (USACE, Cleary, etc.)
 - Define representative reaches based on available data (subject to change)
 - Identify data gaps for additional field work needed (topo/bathy surveys, geotechnical data) and likely permitting approaches
- **Task 2 – Field Investigations**
 - Topo/bathy surveys of representative profiles needed (~40 profiles)
 - Preliminary sediment sampling of native beach also to be completed
 - Above will provide general morphologic understanding of island, basis for limited modeling and compatibility assessment

Data Collection and Review

Profile Surveys

- **Geodynamics (2014) and Cleary (Hard Copy Reports- Topo Only)**



Data Collection and Review

Profile Surveys

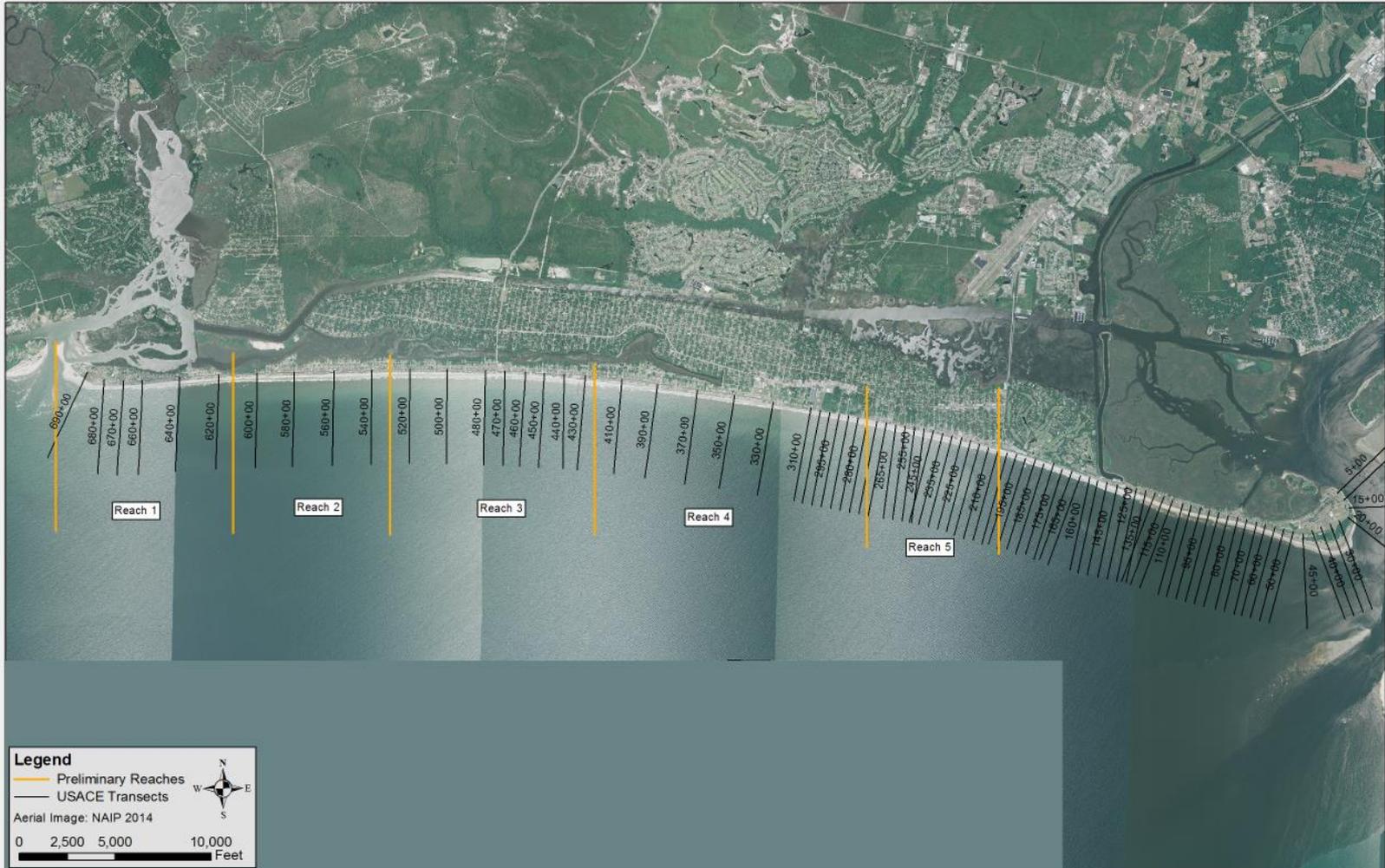
- **USACE Surveys Only Cover Eastern Part of Town to 58th Street**

Beach Surveys				
Location	Date	Source	Format	Extent
Oak Island	Jul-14	Geodynamics	BMAP, xyz	210+00 - 690-00 (10+00 and 20+00 spacing)
Oak Island	Jan-12	USACE	BMAP (LARC), 3d (LARC)	5+00 - 310+00 (5+00 spacing)
Oak Island	Sep-10	USACE	BMAP (LARC), 3D (LARC)	5+00 - 310+00 (5+00 spacing)
Oak Island	Mar-10	USACE	BMAP (LARC), 3d (LARC)	5+00 - 310+00 (5+00 spacing)
Oak Island	Mar-09	USACE	BMAP (LARC), 3d (LARC)	5+00 - 310+00 (5+00 spacing)
Oak Island	Jan-09	USACE	BMAP (LARC), 3d (LARC)	5+00 - 310+00 (5+00 spacing)
Oak Island	Apr-08	USACE	BMAP (LARC), 3d (LARC)	5+00 - 310+00 (5+00 spacing)
Oak Island	Jul-07	USACE	BMAP (LARC), 3d (LARC)	5+00 - 310+00 (5+00 spacing)
Oak Island	Jan-07	USACE	BMAP (LARC), xyz (LARC)	5+00 - 310+00 (5+00 spacing)
Oak Island	Oct-06	USACE	BMAP (LARC), 3d (LARC)	5+00 - 310+00 (5+00 spacing)
Oak Island	Mar-06	USACE	BMAP (LARC), 3d (LARC)	5+00 - 310+00 (5+00 spacing)
Oak Island	Aug-05	USACE	BMAP (LARC), 3d (LARC)	5+00 - 310+00 (5+00 spacing)
Oak Island	Feb-05	USACE	BMAP, 3d (topo)	5+00 - 310+00 (5+00 spacing)
Oak Island	Jun-04	McKim & Creed	bmap, xyz (Topo)	5+00 - 310+00 (5+00 spacing)
Oak Island	Jun-03	McKim & Creed	excel, xyz (topo)	5+00 - 310+00 (5+00 spacing)
Oak Island	Feb-03	McKim & Creed	excel, xyz (topo)	5+00 - 310+00 (5+00 spacing), 434+00 - 486+00 (5+00 spacing)
Oak Island	Nov-02	USACE	BMAP, xyz (topo)	5+00 - 310+00 (5+00 spacing)
Oak Island	Dec-01	USACE	BMAP, xyz (topo/LARC)	10+00 - 310+00 (10+00 spacing)
Oak Island	Dec-00	USACE	BMAP, xyz (topo/bathy)	10+00 - 310+00 (10+00 spacing)
Oak Island	Aug-00	USACE	BMAP (LARC), xyz (topo/LARC), 3DF (LARC)	5+00 - 310+00 (5+00 spacing)

Data Collection and Review

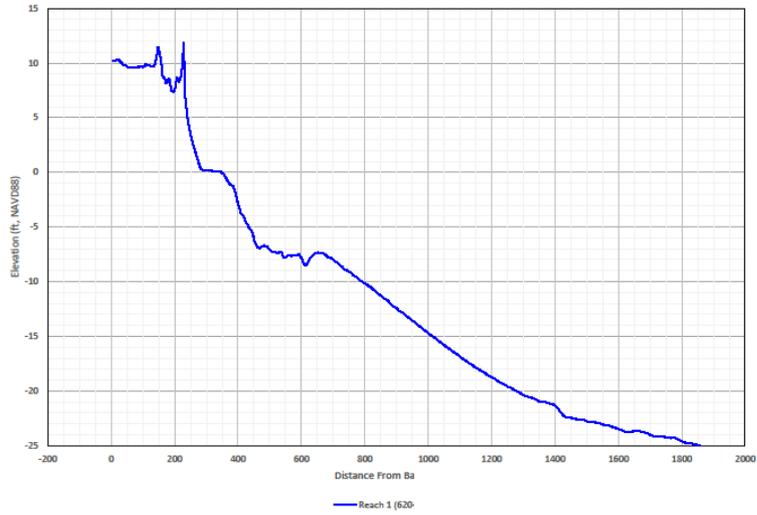
Preliminary Reach Development

- Based on Dune/Berm Elevations/Shape & NCDPCM Erosion Rates

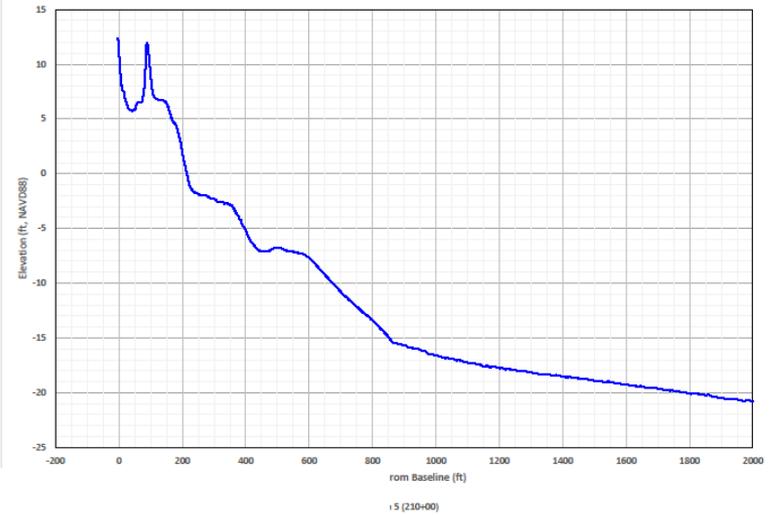


Data Collection and Review

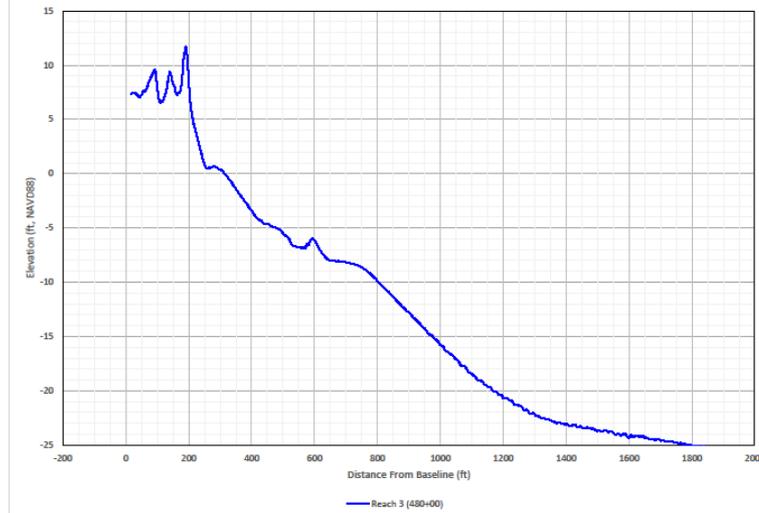
Reach 1 (620+00)



Reach 5 (210+00)



Reach 3 (480+00)



Data Collection and Review

Preliminary Sediment Resources

- Based on NCBIMP, USACE and NCGS Datasets



Data Collection and Review

Preliminary Sediment Resources

- Eastern Channel Project

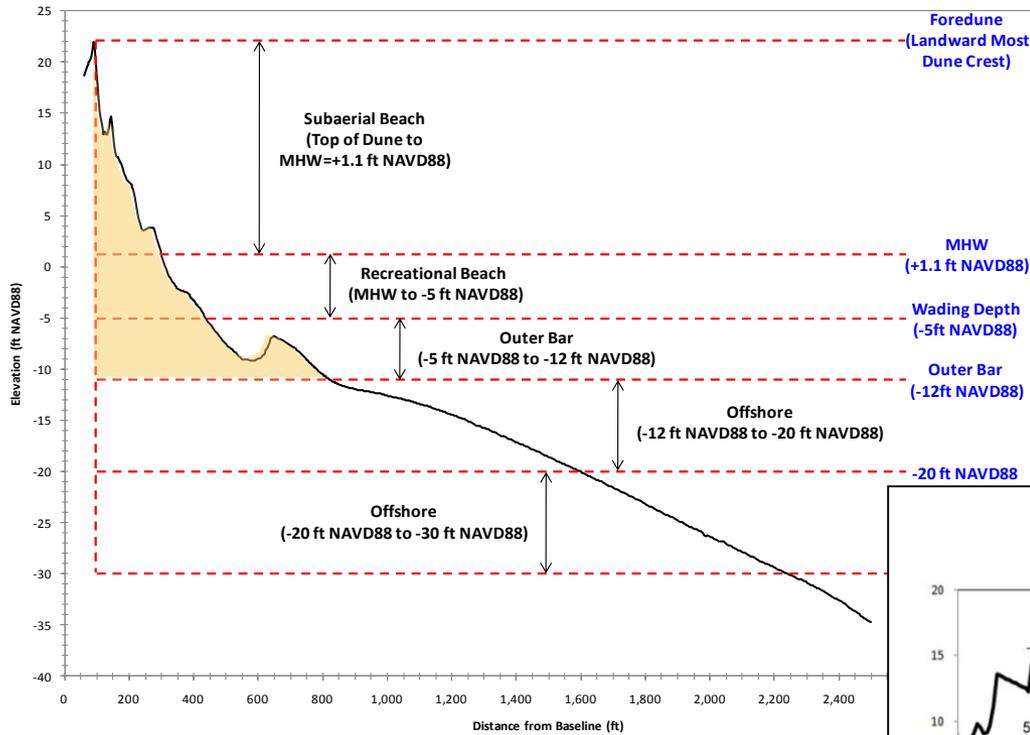


Project Scope of Work

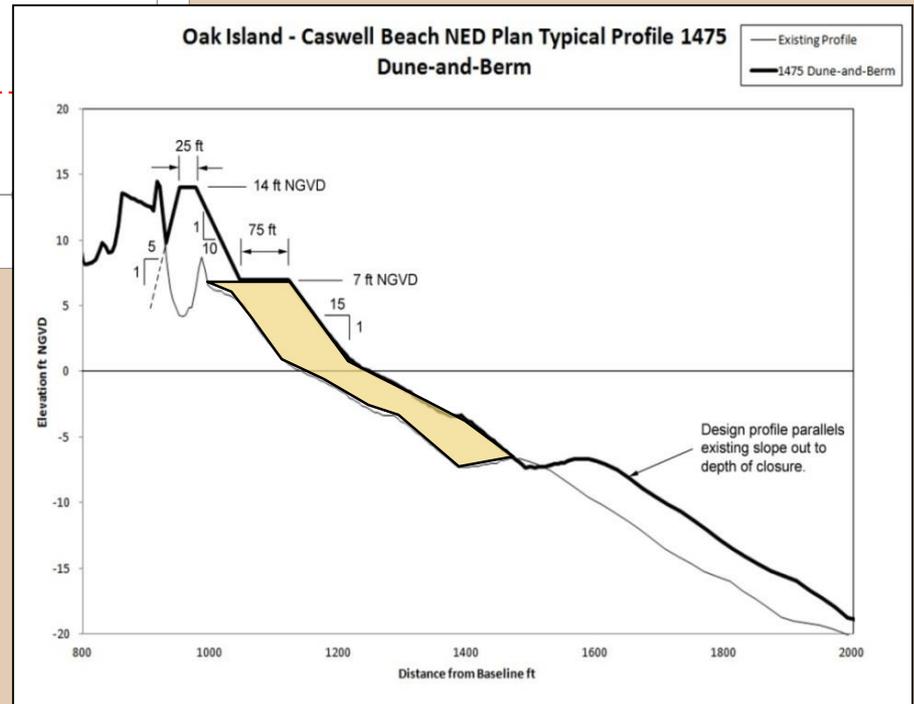
- **Task 3 – Coastal Engineering/Geology and Planning Evaluation**
 - Analytical analysis to develop preliminary estimates of sand need
 - Build on USACE vulnerability analysis in the GRR and use DCM shoreline and USACE profile change data to develop estimates of sand need
 - Sand source assessment
 - Build on USACE GRR work (including Yellow Banks, inlet and offshore locations)
 - Reassess the potential use of multiple sources
 - Leverage beneficial use as possible (Eastern Channel, Lockwoods Folly Inlet) and complete analytical assessments of these options (increased flushing, water quality improvement, improved navigation) with expanded/optimal permitted dimensions
 - Storm protection assessment
 - Complete SBEACH modeling of representative sections to determine level of protection provided and likely templates needed to provide additional storm protection
 - Short-term and long-term strategies will be developed as well as resulting funding needs/potential funding sources
 - Incorporate static line exception and FEMA engineered beach criteria

Analytical Work to Determine Sand Need

Profile Volume Analysis-Profile Calculation Lenses



Oak Island - Caswell Beach NED Plan Typical Profile 1475 Dune-and-Berm

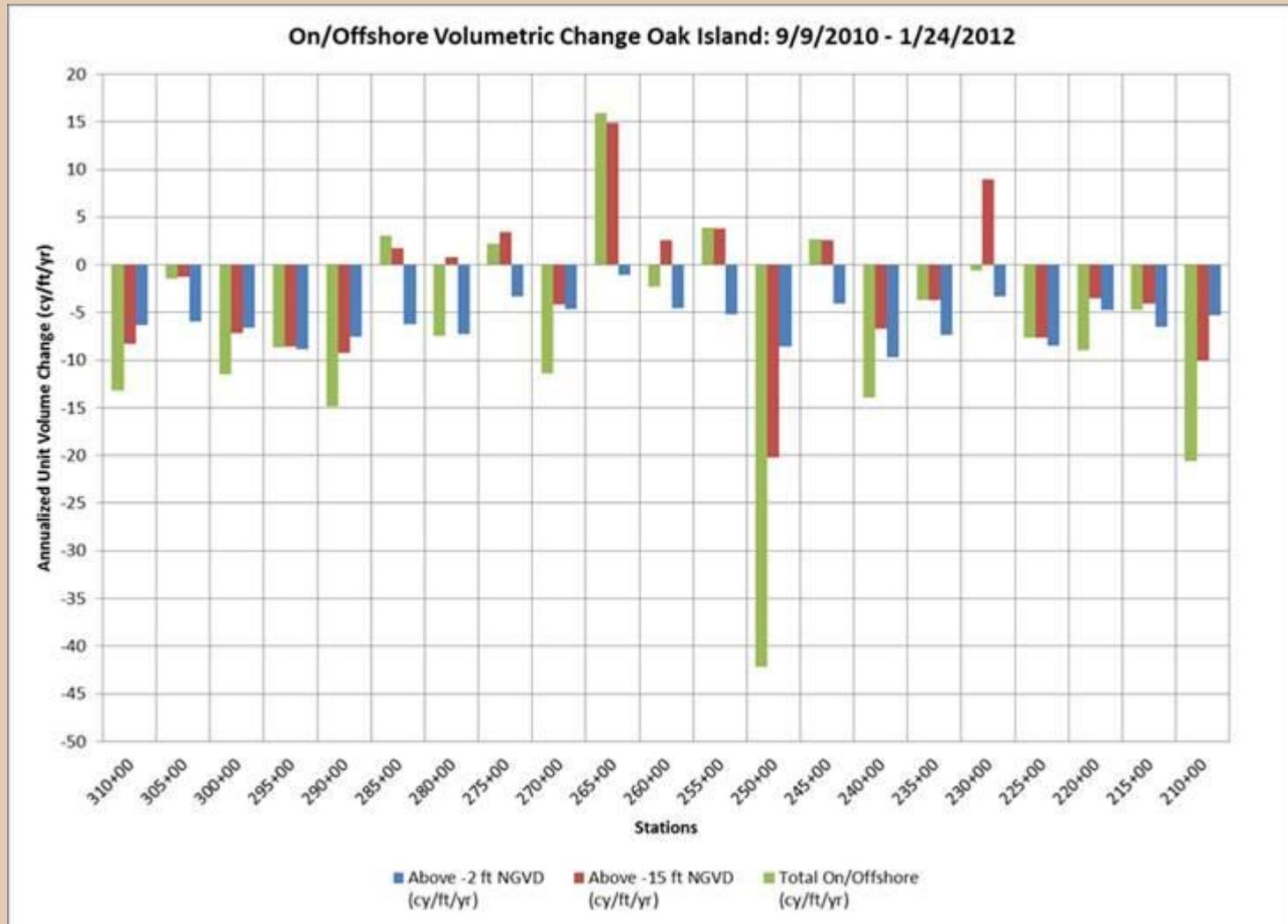


Analytical Work to Determine Sand Need

- **Investigate Existing Studies and Datasets - PRELIMINARY**
 - **USACE – Dune and Berm Project** To Optimize Benefits for Storm Protection – Costs Depend Greatly on Borrow Source Location
 - 4 MCY Initial Project - \$50 – \$75M Project
 - 1.2 MCY Project Every 3 Years – \$6 - \$8M Annually
 - **NCDCM/NCBIMP – Berm Only Project** to Maintain What You Have Based on Long Term Erosion Rates
 - 1.2 MCY Project Every 8 Years - \$2 - \$3M Annually
 - **Estimate Based on Recent USACE Profile Data – Berm Only Project** to Maintain What You Have Based on Recent Profile Changes
 - 1.4 MCY Project Every 6 Years - \$3 - \$4.5M Annually
 - **Outcome of Sand Management Plan and Tie of Eastern Channel to AIWW**
Also Very Important

Analytical Work to Determine Sand Need

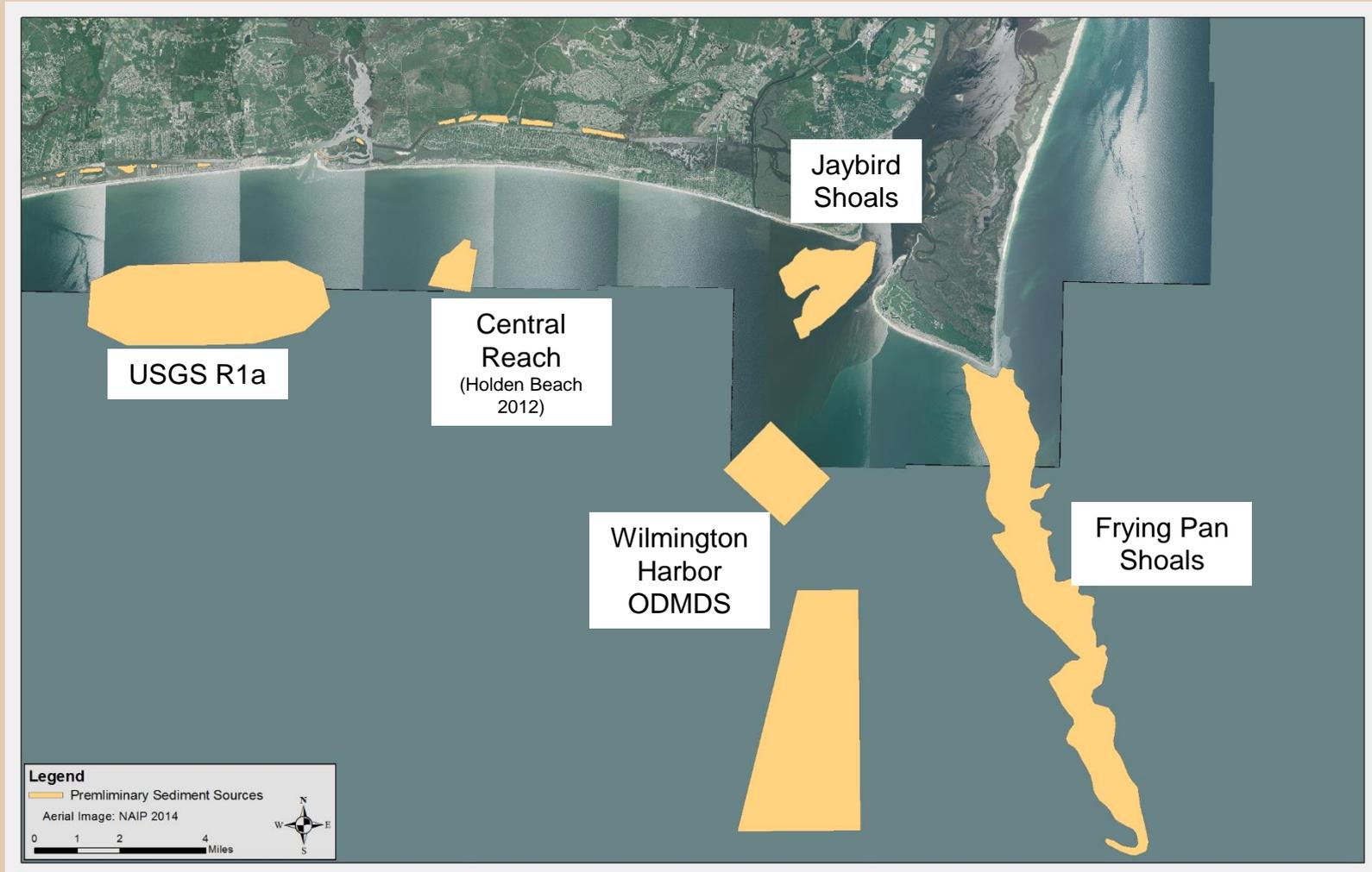
- Investigate Existing Studies and Datasets - PRELIMINARY



Sand Source Assessment

Preliminary Off Shore Sediment Resources

- Based on NCBIMP, USACE and NCGS Datasets



Sand Source Assessment

Preliminary Off Shore Sediment Volumes

- Based on USACE GRR Brunswick County Beaches (2012); USACE GRR Progress Report (2011); ATM Holden Beach East End SPP Report (August 2013); BIMP (2009)

Location	Est. Volume	Mean Grain Size (mm)	% Fines
Frying Pan Shoals	35 MCY	0.20 mm	3.8 %
Jaybird Shoals	8 MCY	0.30 mm	5 %
Wilmington Harbor ODMDS	166 MCY	-	Est. to exceed DCM Standards
Central Reach	3.3 MCY	-	-
USGS R1a	-	0.25 – 0.50 mm	-

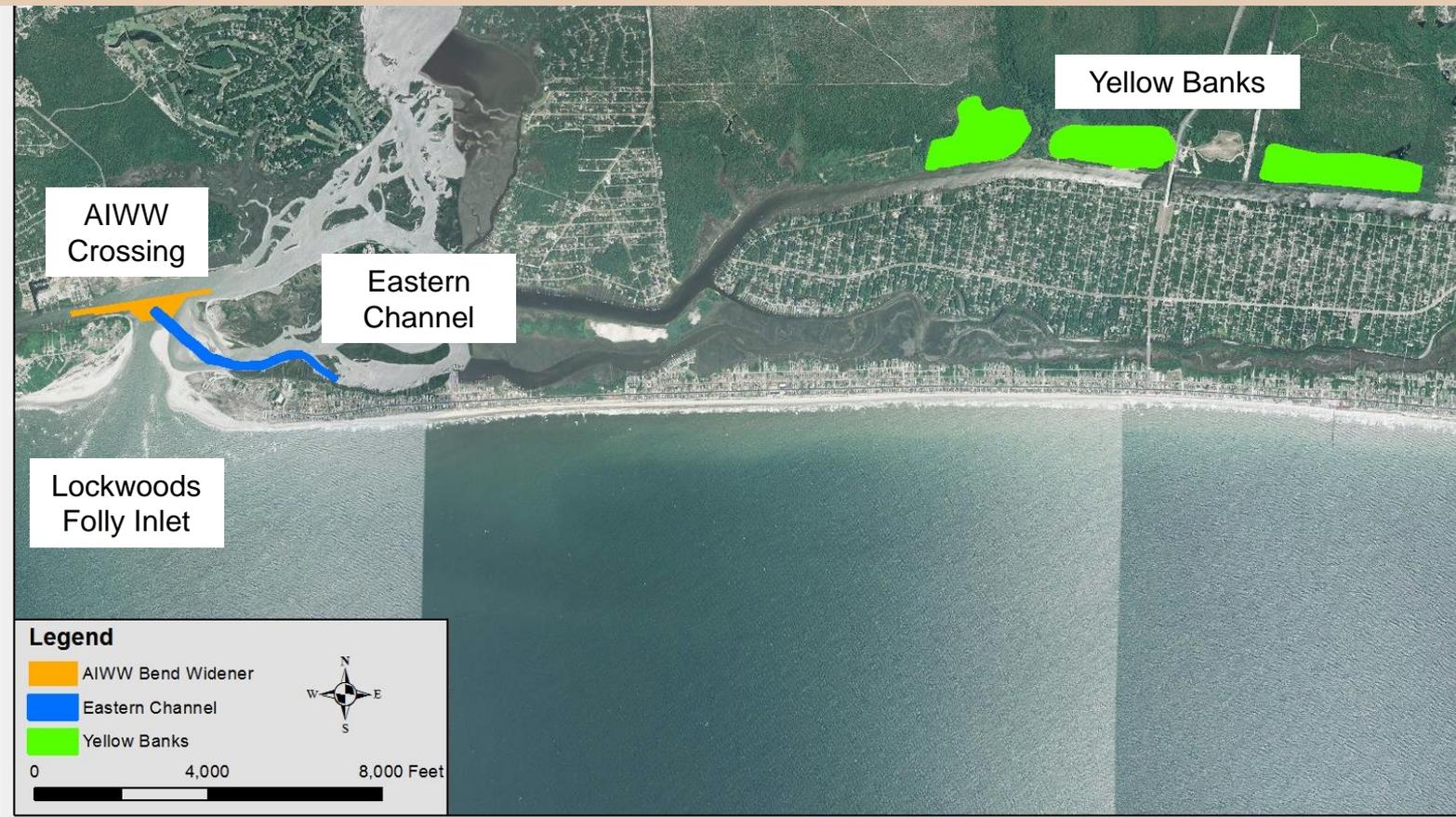
Notes:

- Approximately 1.3 MCY may have been removed from Central Reach Borrow Area in 2012 by Holden Beach.
- Fines determined by % weight of sample passing #200 sieve.

Sand Source Assessment

Preliminary Upland & Nearshore Sediment Resources

- Based on NCBIMP, USACE and NCGS Datasets



Sand Source Assessment

Preliminary Off Shore Sediment Volumes

- Based on USACE GRR Brunswick County Beaches Progress Report (2011); Holden Beach 2014 Annual Beach Monitoring Report (2014); Oak Island 2015 Habitat Restoration Project

Location	Est. Volume	Mean Grain Size (mm)	% Fines
Lockwoods Folly Inlet	1.3 MCY	-	-
Eastern Channel	20,000 cy/yr	0.35 mm	-
AIWW Crossings	30,000 cy/yr	-	-
Yellow Banks	4.2 MCY	0.24 mm	6 %

Notes:

1. Volumes for Eastern Channel and AIWW crossings estimated from dredge records reported from recent projects.

Sand Source Assessment

Additional Data (Sieve Analysis) Requested From USACE

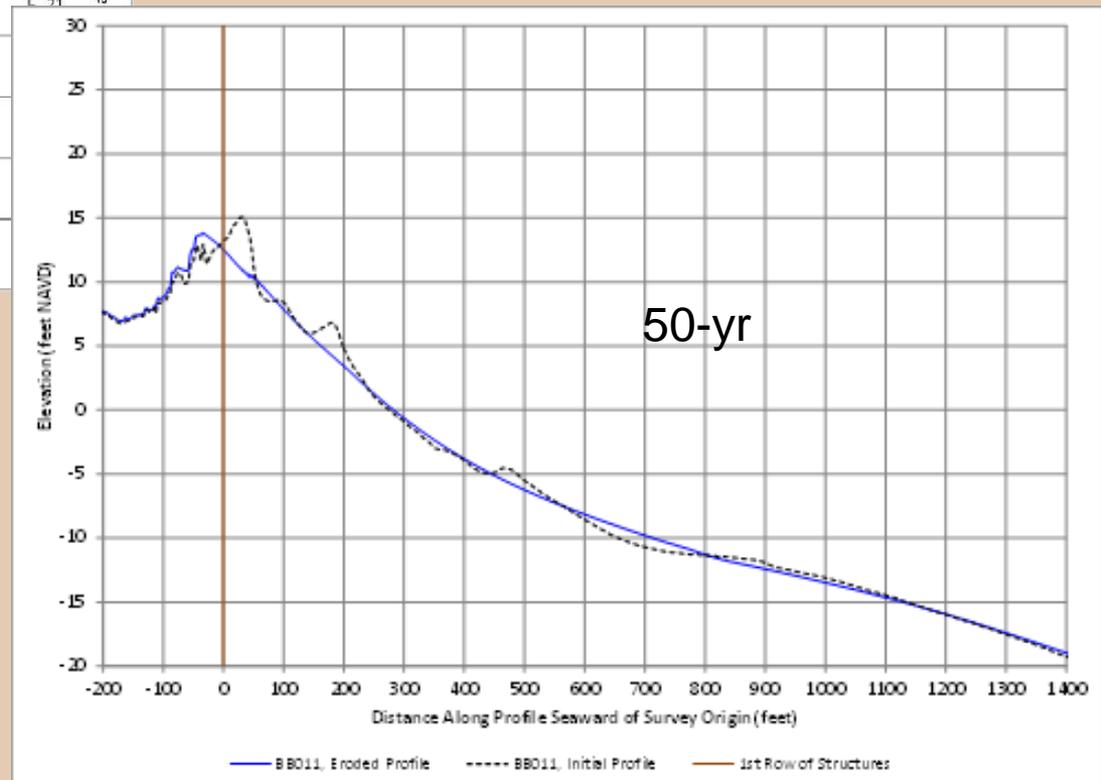
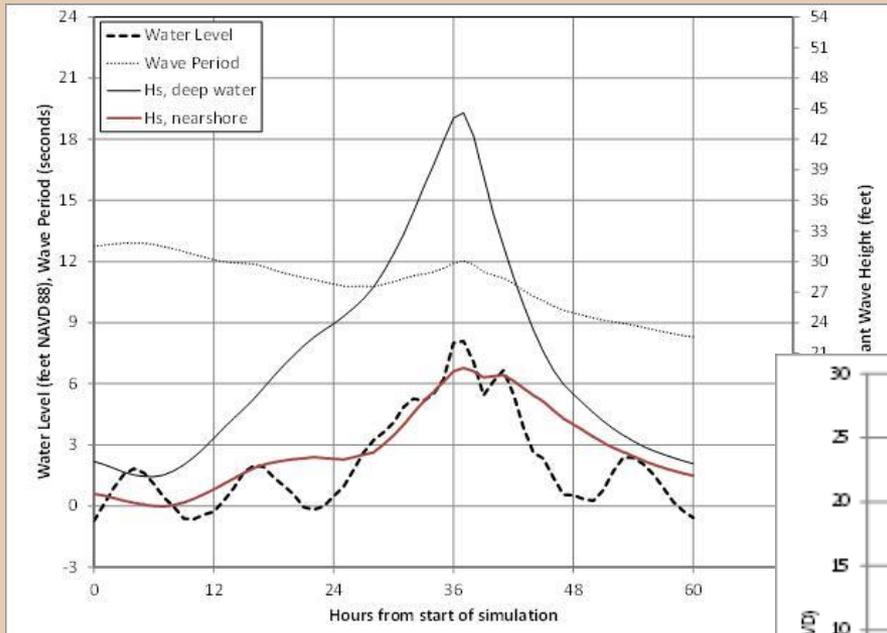
(Data expected late October)

- 68 samples covering offshore of Ocean Isle collected in 1994.
- 15 samples covering offshore of Holden Beach collected in 1998.
- 21 samples covering Jaybird Shoals collected in 1998.
- 20 samples covering Yellow Banks collected in 2001 & 2002.
- 38 samples covering Lockwoods Folly Inlet collected in 2002.
- 10 samples covering Lockwoods Folly River collected in 2002.
- 22 samples covering offshore Oak Island collected in 2003.
- 92 samples covering offshore Oak Island and Holden Beach collected in 2003.
- 31 samples covering Frying Pan Shoals collected in 2009.

317 total sample sieve analysis results requested.

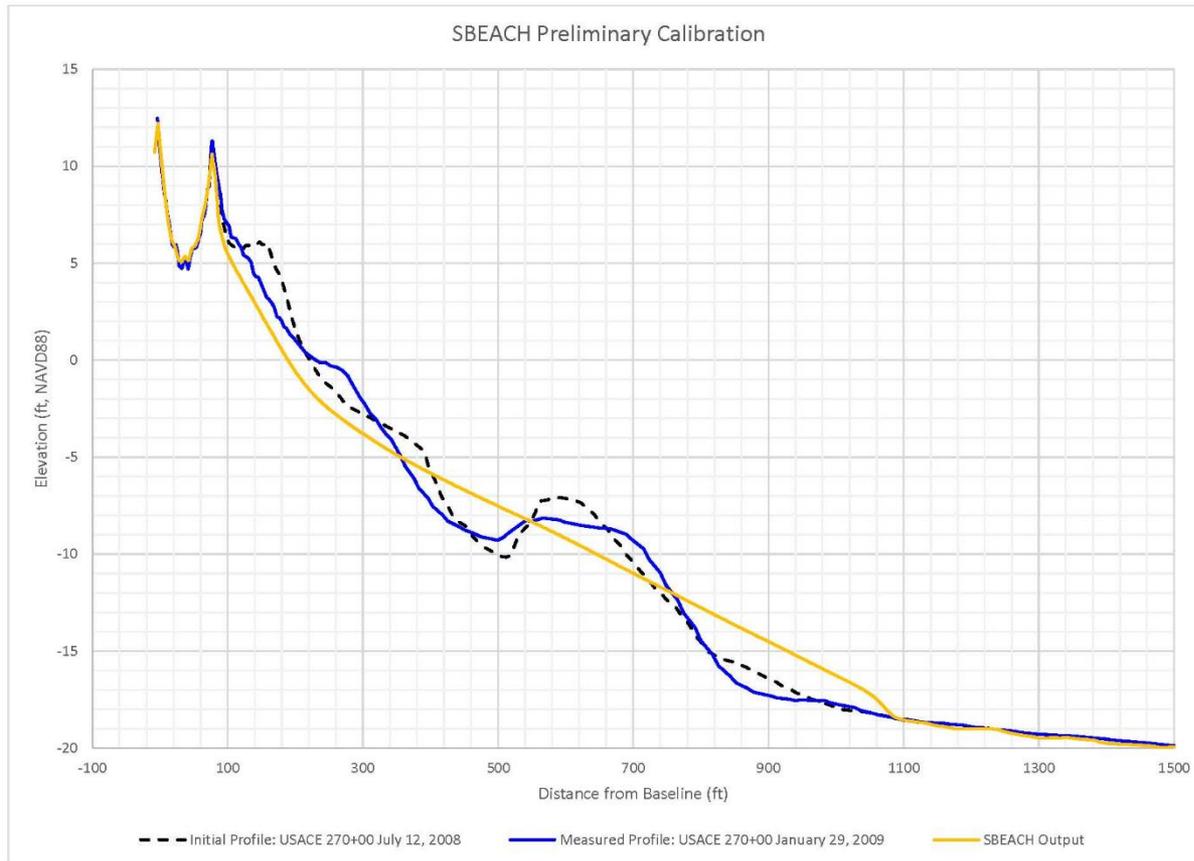
Project Scope of Work

• Task 3 – Coastal Engineering/Geology and Planning Evaluation



Project Scope of Work

- **Task 3 – Coastal Engineering/Geology and Planning Evaluation**
 - TS Hanna Used for Calibration – **Only One Profile Available**



Project Scope of Work

- **Task 3 – Coastal Engineering/Geology and Planning Evaluation**
 - Environmental planning and permitting evaluation
 - Agency meetings
 - Review of existing data and identify data gaps for future data collection
 - Identify permitting options (USACE GP291, EA, Supplemental EIS to GRR)
 - Assess potential regulatory/mitigation/monitoring requirements
 - Environmental planning and permitting evaluation
 - Draft and final feasibility report



Project Scope of Work

- **Task 4 – Davis Canal Management**

- Review existing surveys and prior investigations
- Identify additional data collection efforts needed for design and permitting
 - Bathymetric surveys, water quality and other environmental data
- Develop conceptual dredging plan and potential funding options
- Develop permitting path in conjunction with Task 3
 - Review original permit and investigate USACE GP291 option
 - Assess potential variance for dredging in Primary Nursery Area
 - Investigate/Document historical navigation use

- **Task 5 – Project Management**

- Town/Regulatory Coordination, Four (4) Meetings

- **Additional Services Under Separate Authorization**

- Represent Town of Oak Island in USACE SMP, USACE GRR and meetings concerning Lockwoods Folly Inlet Management

Project Fee

- Task 1 – Review Data/Identify Data Collection Needs - \$12,960
- Task 2 – Field Investigations - \$18,220
- Task 3 – Coastal Engineering/Environmental Evaluation - \$98,230
- Task 4 – Davis Canal Management - \$6,960
- Task 5 – Meetings/Public Involvement - \$12,500
- Incidentals – \$1,030
- Additional Services Under Separate Authorization – TBD

- TOTAL PROJECT - \$149,900

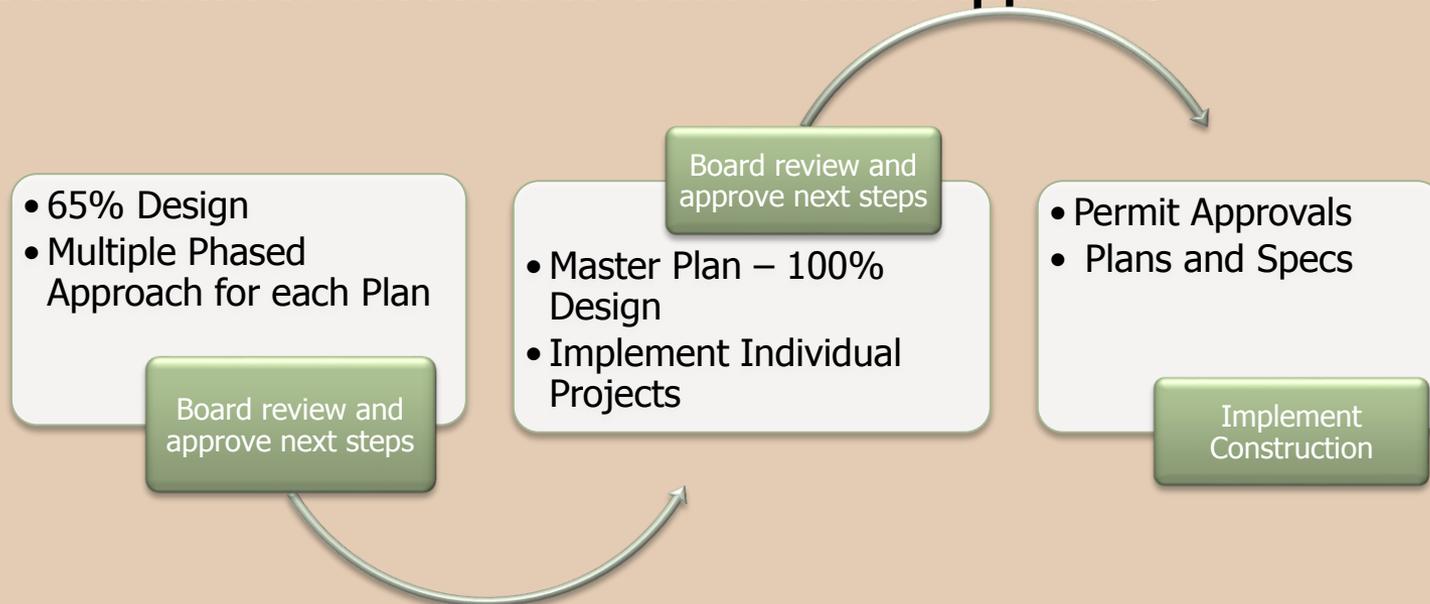
Current Scope Allows for Tiered Approach

A. Complete a Feasibility Level Study to Determine Estimates of Project Needs and Costs (“65% Answer”)

- 1) Beach Protection and Shoreline Needs
- 2) Lockwoods Folly Inlet Management
- 3) Davis Creek Enhancement
- 4) Determine if Feasible to Move Forward with a Small Investment



B. If Town Desires, Move to Next Steps with a Detailed Study and Documentation Needed to Gain Permit Approval



Next Steps After Feasibility Plan Finished

- **If Town Decides to Move Forward with Full Beach & Shoreline Master Plan**
 - Detailed Engineering & Environmental Work to Design Project and Get Required Environmental Approvals
 - Engineered Beach
 - Static Line/Development Line Exception
 - Lockwoods Folly Inlet Management
 - Significant Sand Search Efforts to Verify Compatibility and Meet Current Rules for Vibracore Spacing
- **If Town Decides to Move Forward with Davis Creek Enhancement Plan**
 - Detailed Engineering & Environmental Work to Design Project and Get Required Environmental Approvals
 - Past Navigation Use
 - Water Quality Monitoring and Significant Modeling Effort

Discussion

Thank You!

