



THE TOWN OF OAK ISLAND, NORTH CAROLINA



PLANNING ANALYSIS, ENGINEERING DESIGN AND ENVIRONMENTAL INVESTIGATIONS

in Support of a Comprehensive Shoreline Management Plan

November 10, 2015 Project Update



Shoreline Management Plan

- **Review of Project Goals & Scope**
- **Assessment of Current Progress**
- **Action Items for Project Completion**

Post Joaquin Shoreline Monitoring

- **Status of USACE Report to FEMA for Eligible Damages**
 - Guidelines for FEMA Public Assistance (PA)
 - Potential Areas Considered for Restoration
 - Timeline for Expected Disaster Declaration
- **Shoreline Monitoring**
 - Volumetric & Shoreline Change
 - Anticipated Completion

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

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

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

Task 1 & 2 - Data Collection and Review

Existing Data Collected

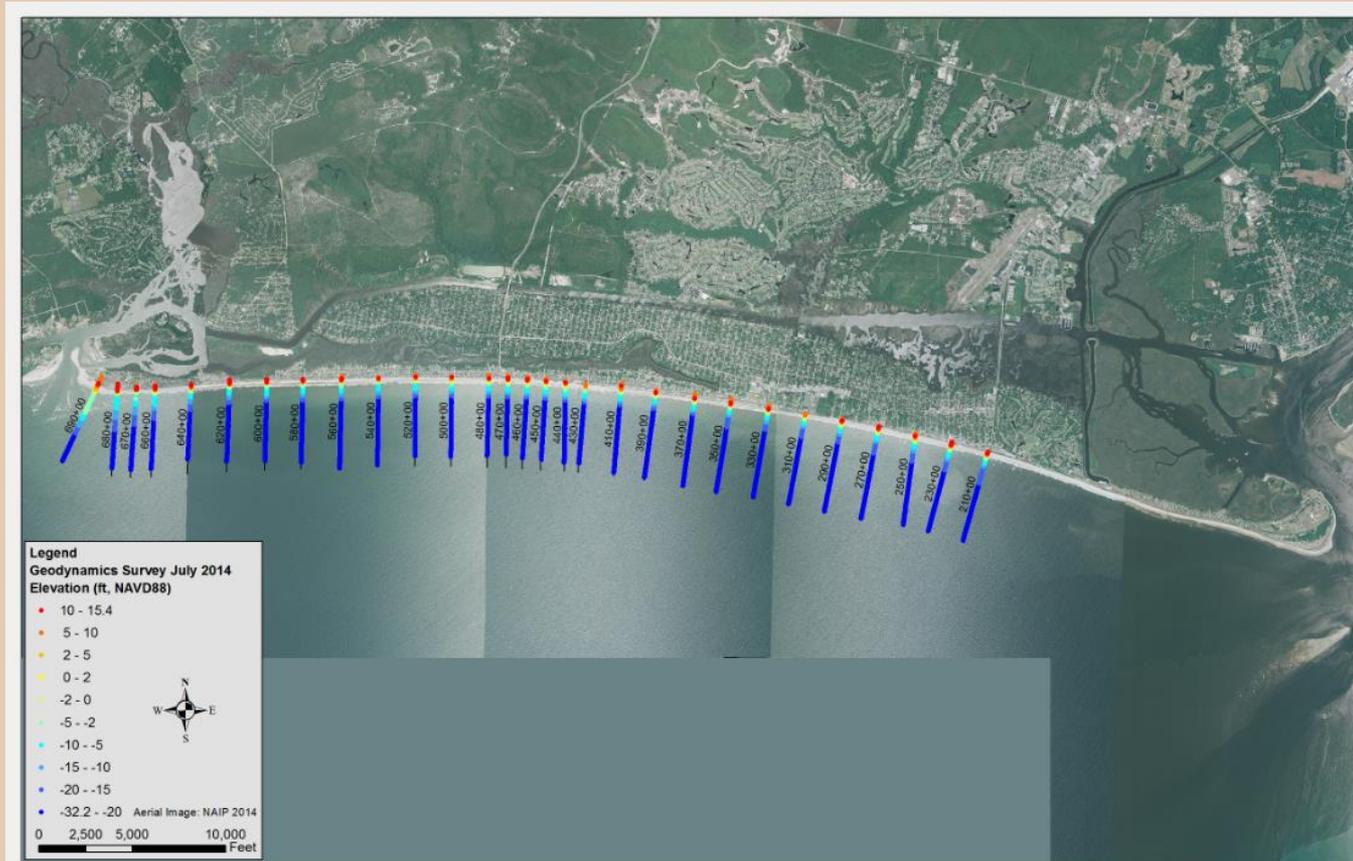
- **38 Monitoring Surveys Conducted between 2000 & 2012 (USACE & McKim & Creed)**
- **27 Engineering Reports & Assessments (USACE, Cleary, CSE, CRC, Holden Beach)**
- **Approx. 400 Core Logs Collected for Potential Sediment Sources (USACE)**



Task 1 & 2 - Data Collection and Review

New Data Collected

- Town Wide Beach Profile Survey (2014) Conducted by Geodynamics
- Native Sediment Samples (13 Samples along 5 Profiles)

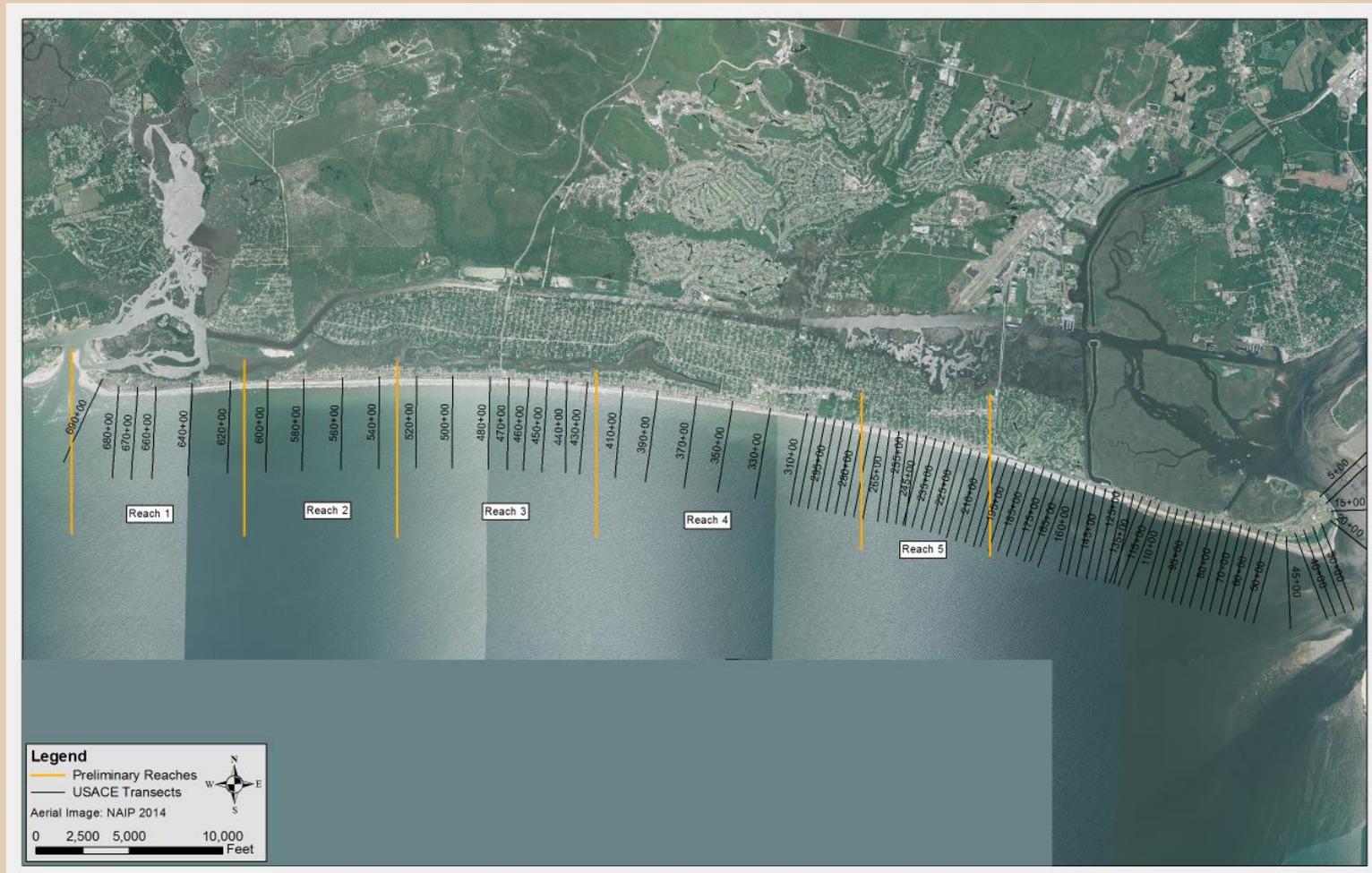


Native Beach
Characteristics
 $D_{50} = 0.27$ mm

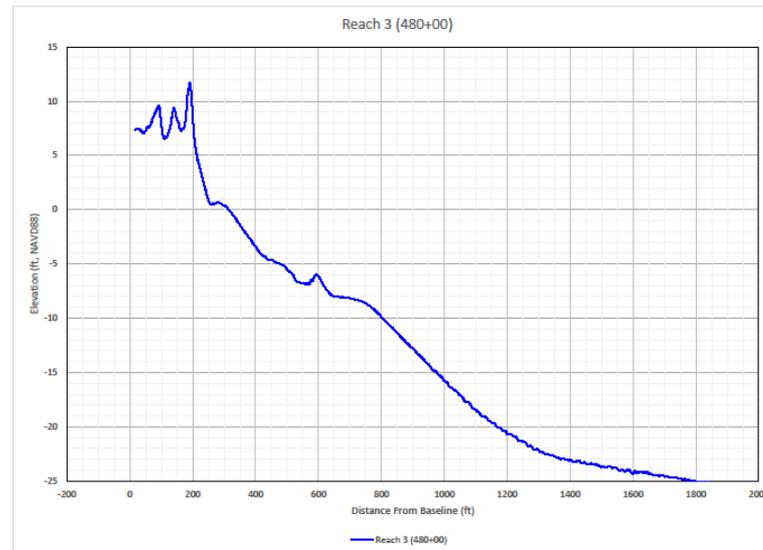
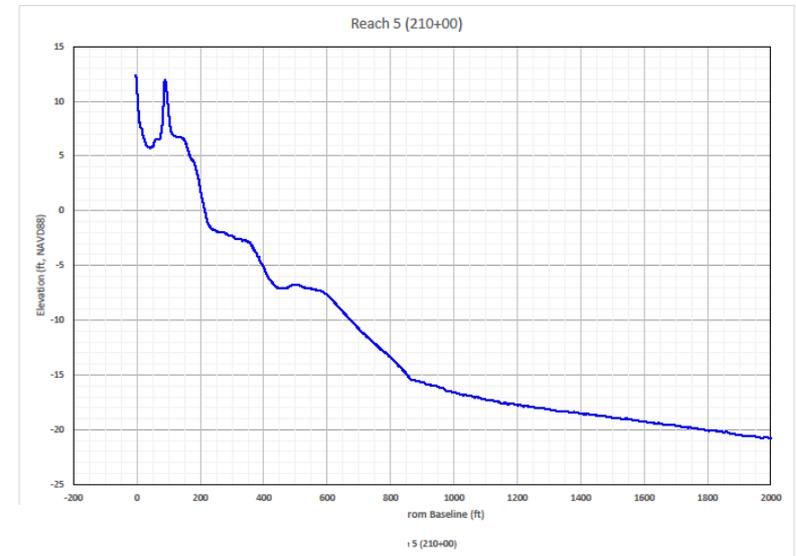
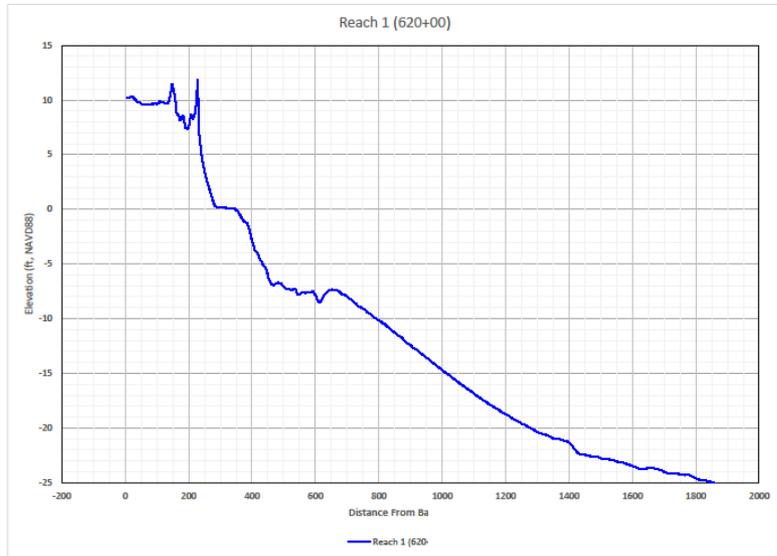
Task 1 & 2 - Data Collection and Review

Preliminary Reach Development

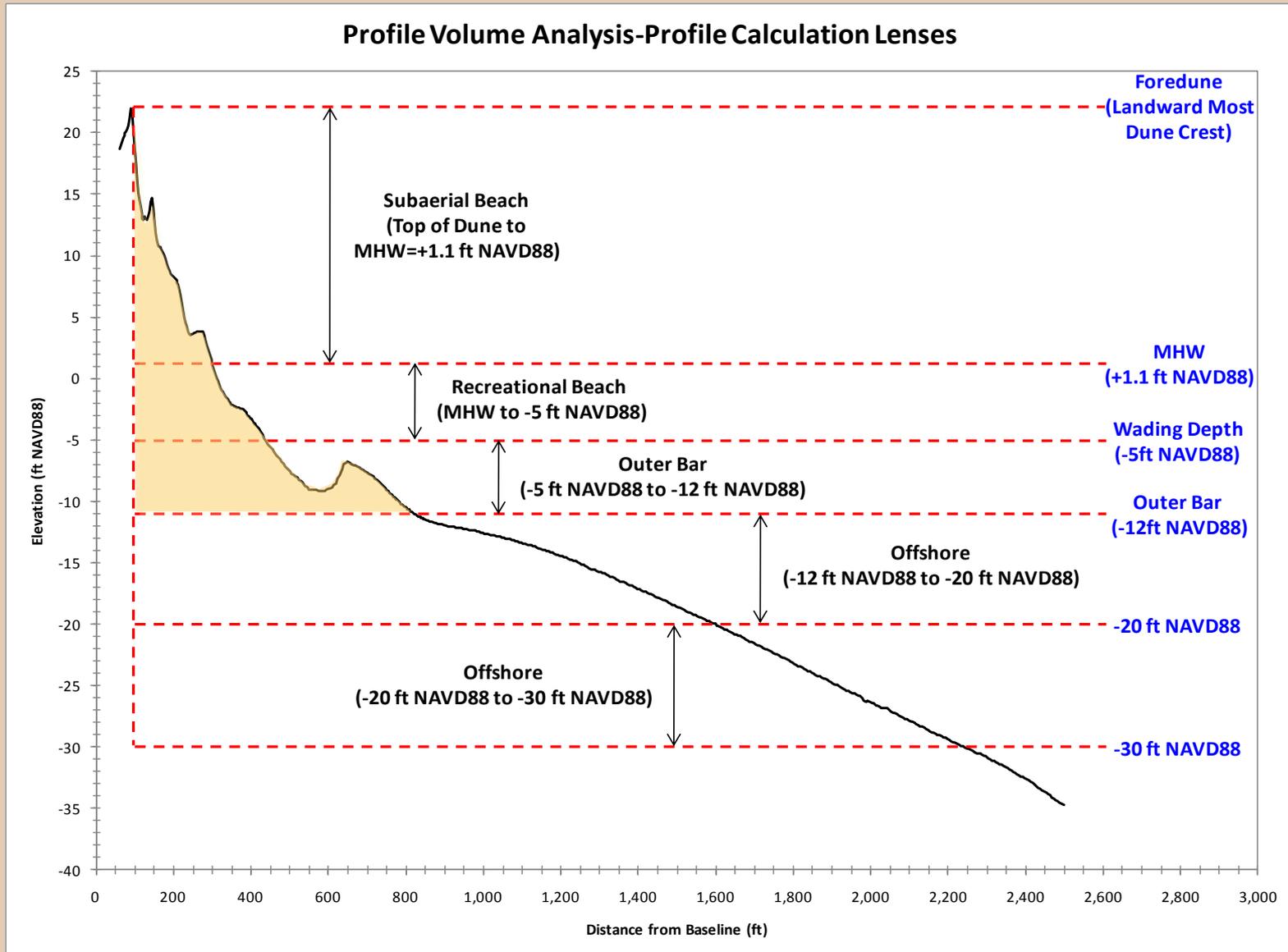
- Based on Dune/Berm Elevations/Shape, NCDPCM Erosion Rates, Static Vegetation Line Location, Linear Shoreline Distance



Task 1 & 2 - Data Collection and Review

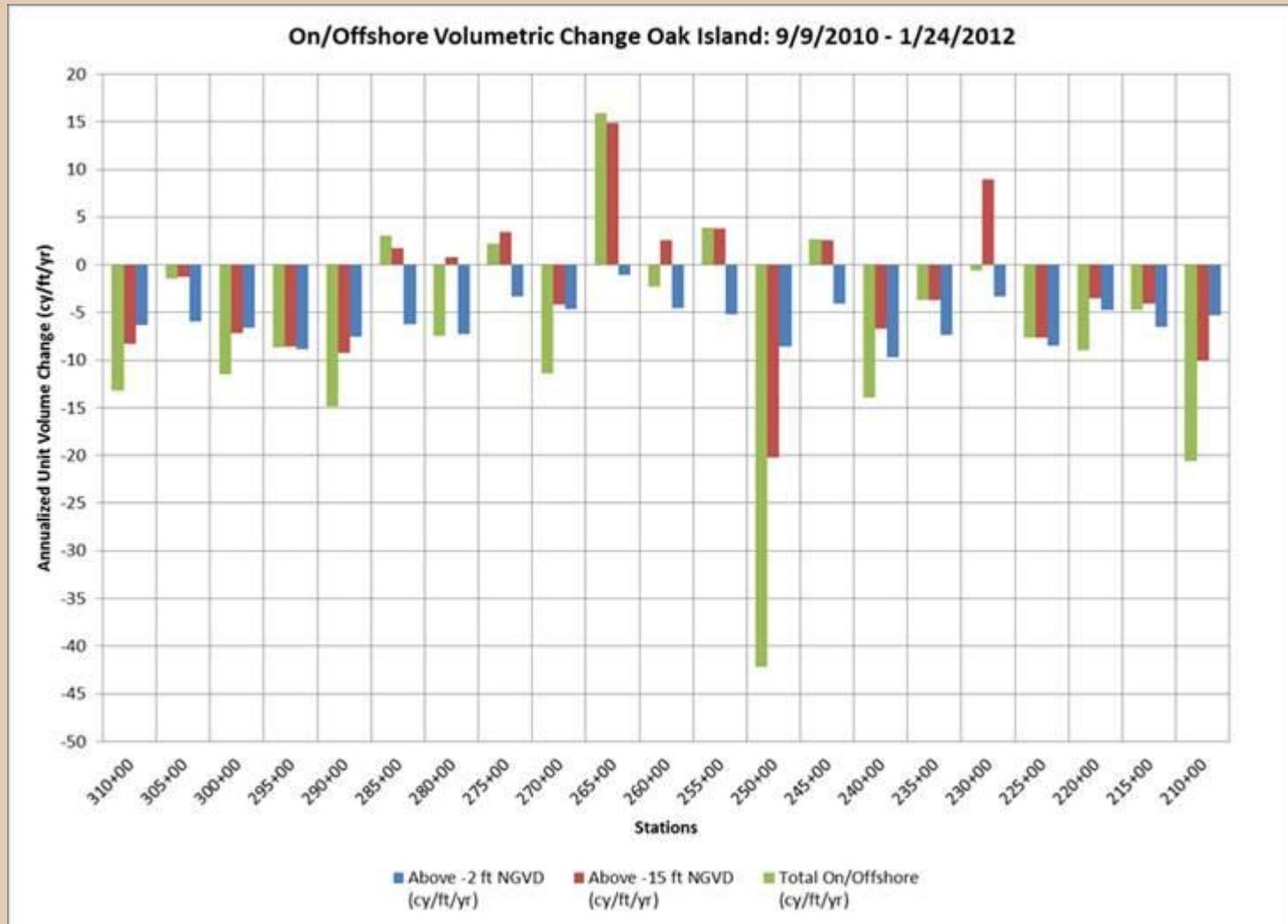


Task 3 - Analytical Work to Determine Sand Need



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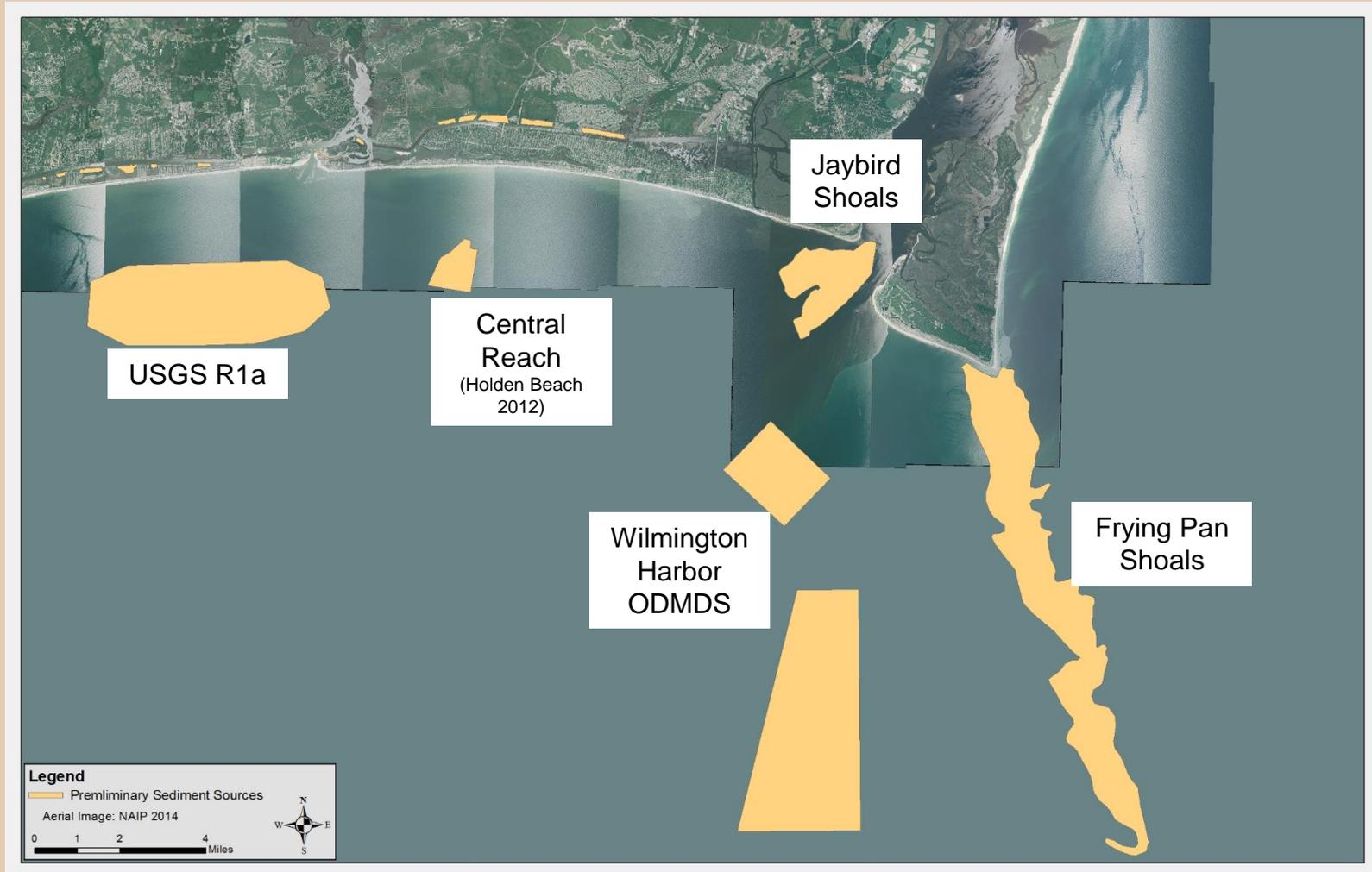
- Investigate Existing Studies and Datasets - PRELIMINARY



Task 3 - Sand Source Assessment

Preliminary Off Shore Sediment Resources

- Based on NCBIMP, USACE and NCGS Datasets



Task 3 - 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	-

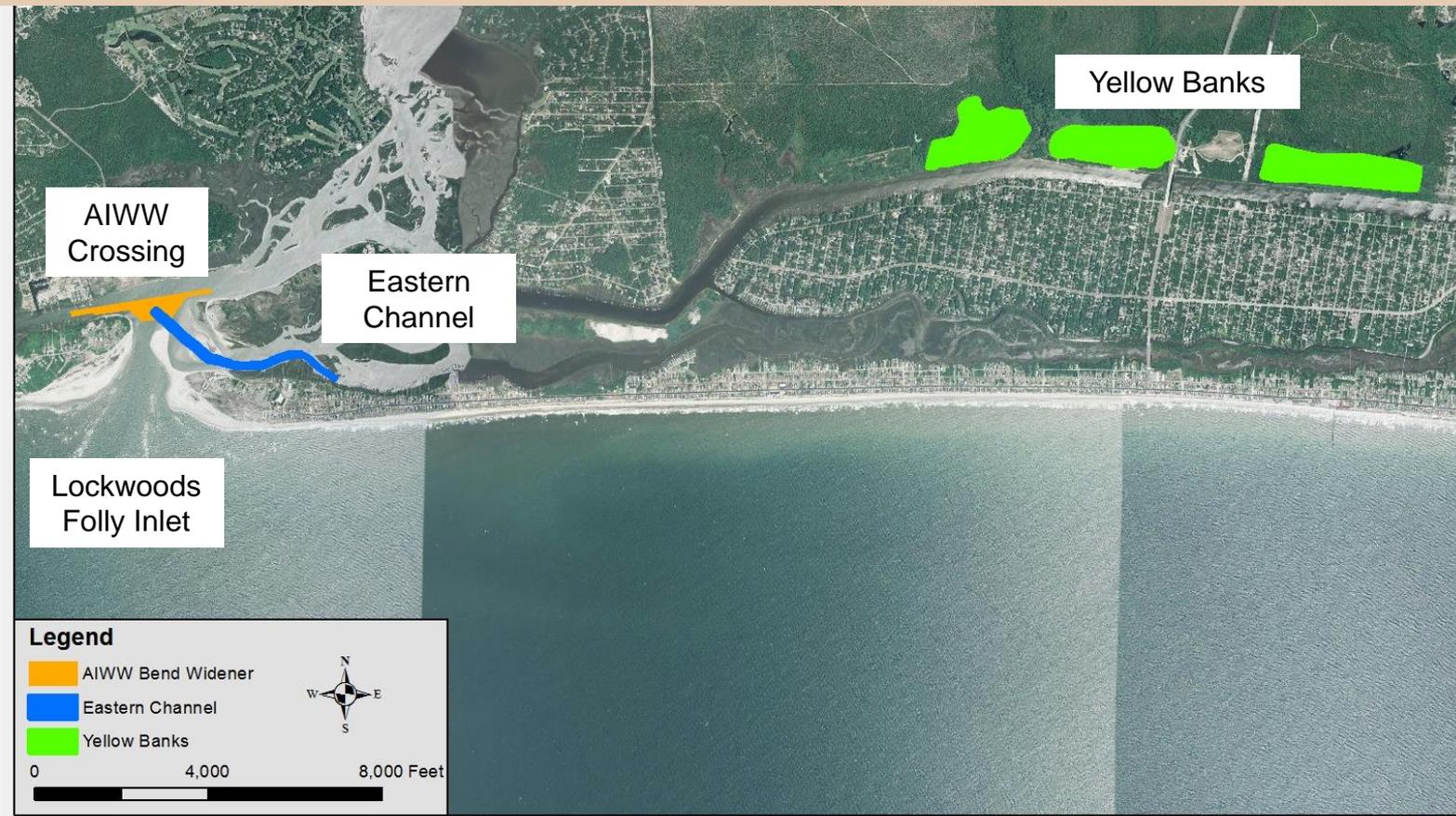
Notes:

- 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.

Task 3 - Sand Source Assessment

Preliminary Upland & Nearshore Sediment Resources

- Based on NCBIMP, USACE and NCGS Datasets



Task 3 - 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

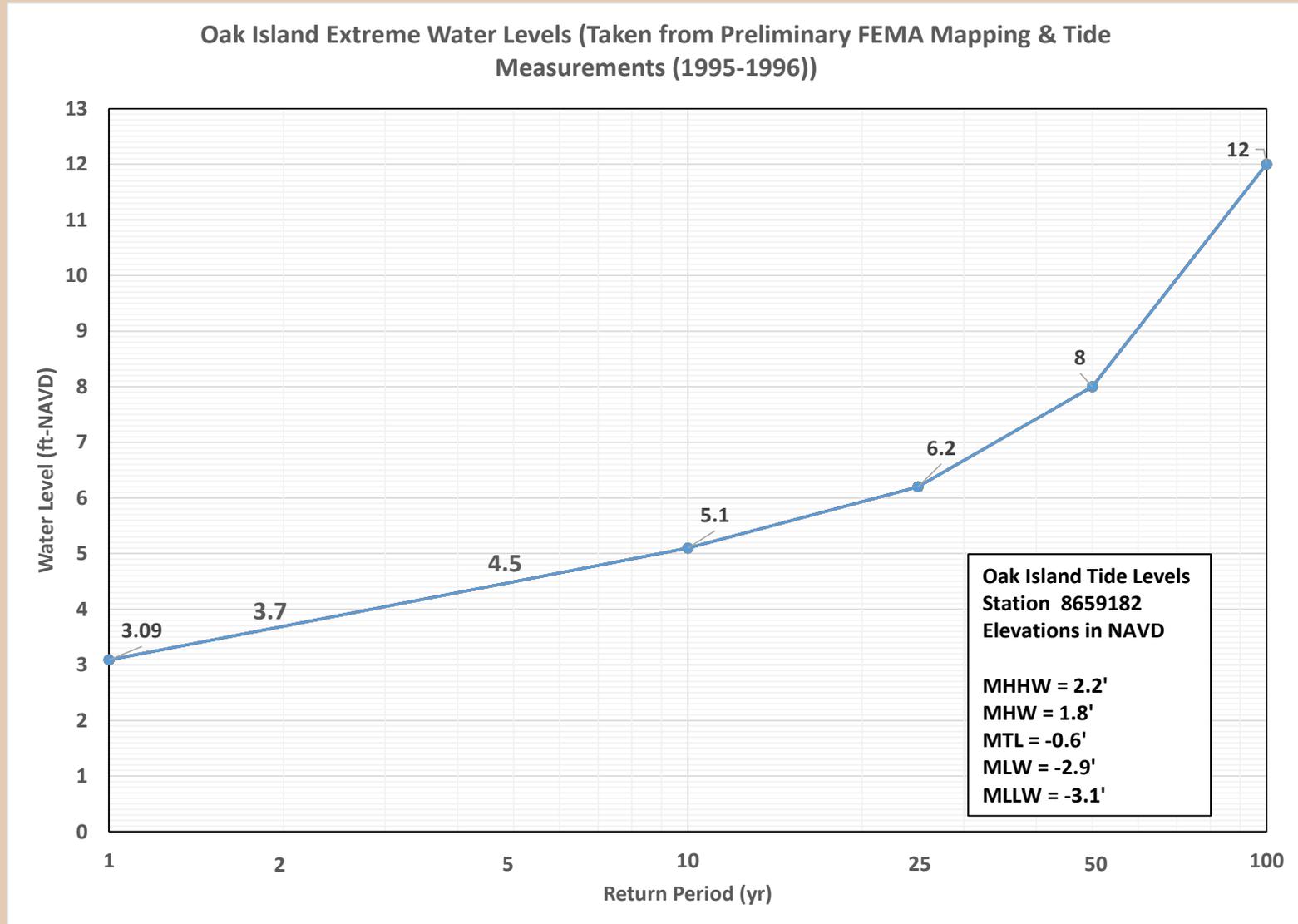
Location	Est. Volume	Mean Grain Size (mm)	% Fines
Lockwoods Folly Inlet	1.3 MCY	-	-
Eastern Channel	20,000 cy/yr	0.35 mm	-
AIWW Crossings	30,000 cy/yr	-	-
Yellow Banks	4.2 MCY	0.24 mm	6 %

Notes:

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

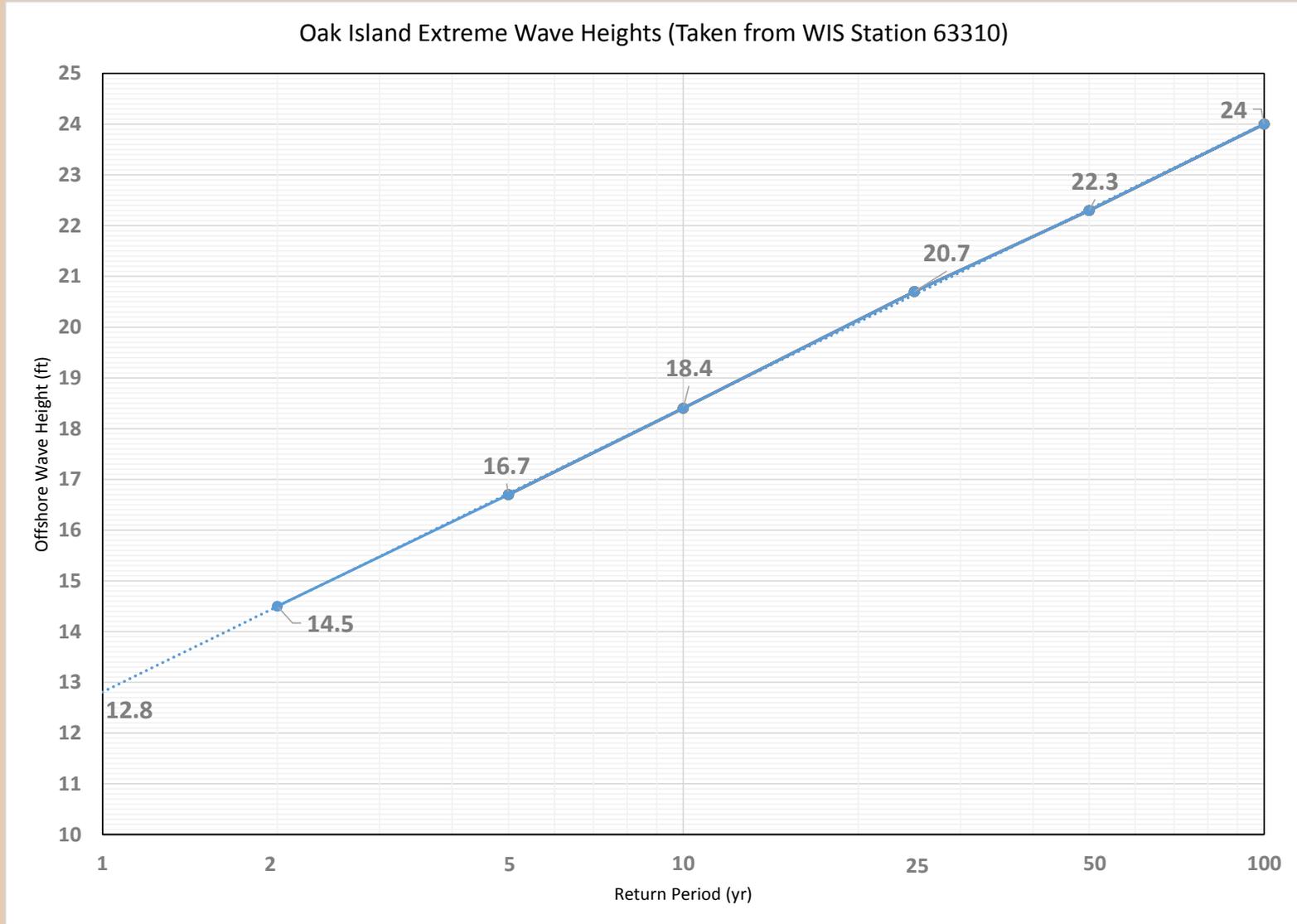
Task 3 – Storm Protection Assessment

- Determination of Extreme Water Level Return Periods (SBEACH)**



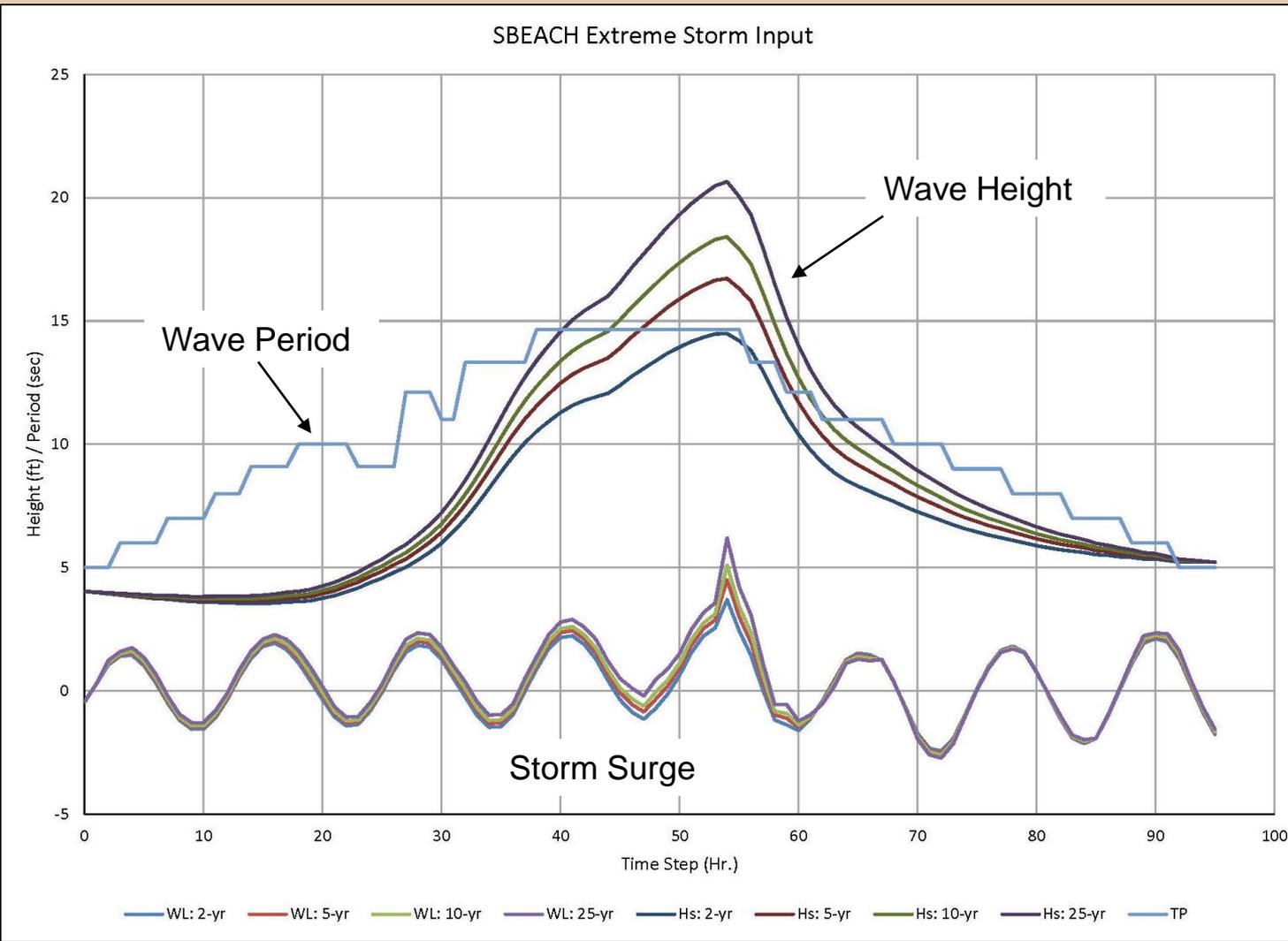
Task 3 – Storm Protection Assessment

- **Determination of Extreme Wave Height Return Periods (SBEACH)**



Task 3 – Storm Protection Assessment

- SBEACH Storm Input for Damage Assessment**



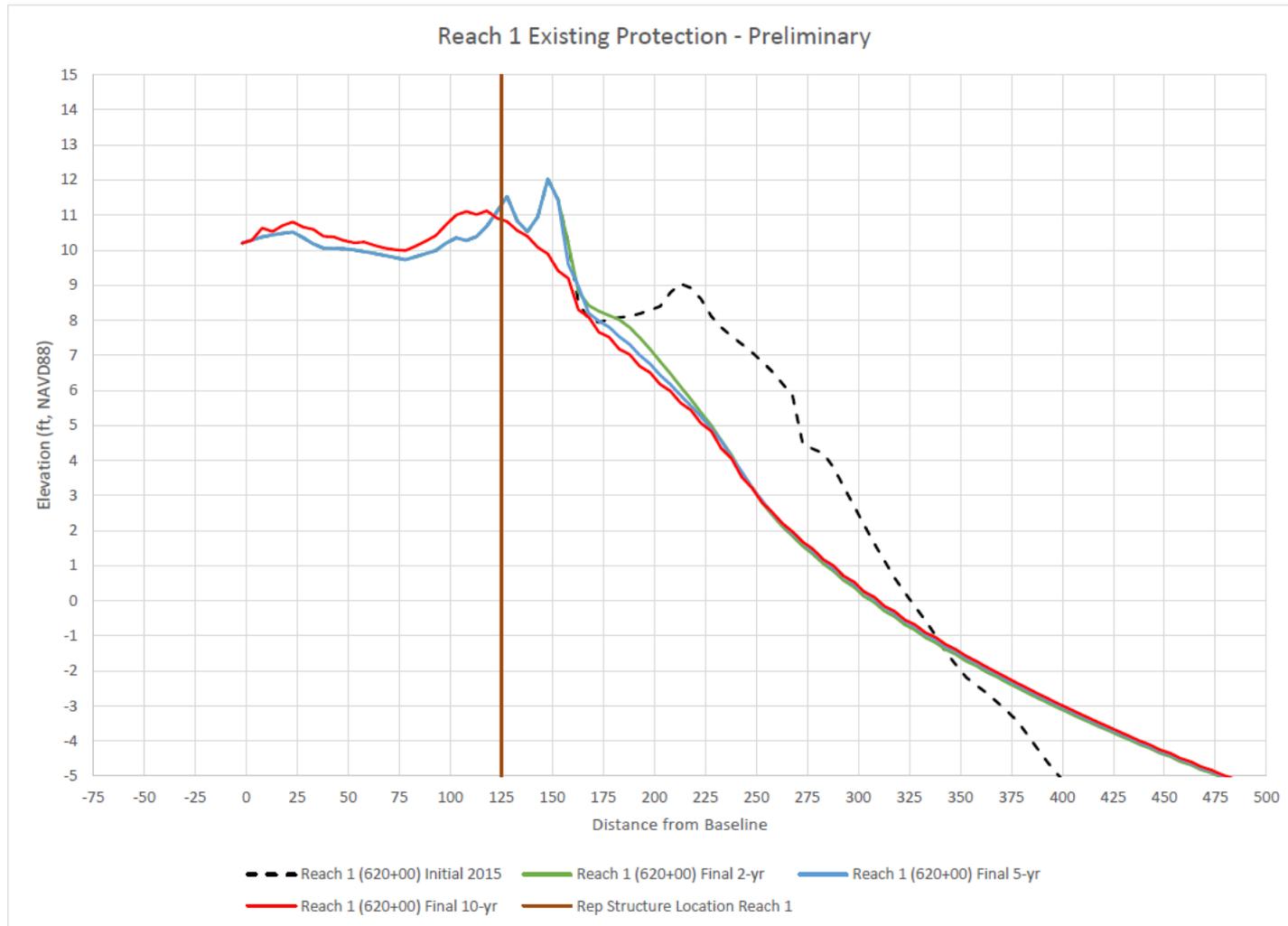
Storm Characteristics
Wave Height – Hurricane
Hanna (2008)

Wave Period – Hurricane
Hanna (2008)

Water Level – T. S.
Josephine
(1996)

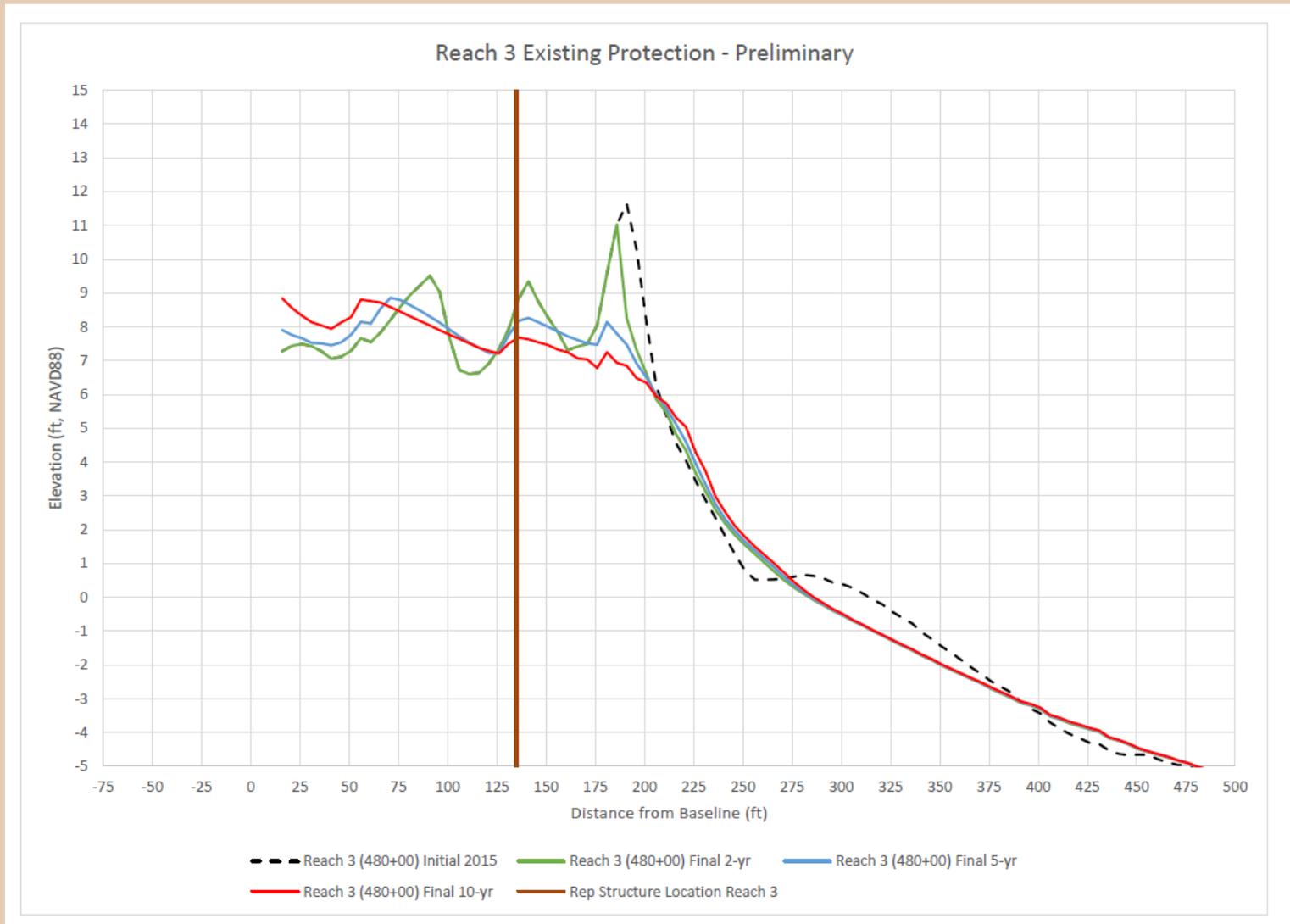
Task 3 – Storm Protection Assessment

- **SBEACH Storm Input for Damage Assessment**



Task 3 – Storm Protection Assessment

- **SBEACH Storm Input for Damage Assessment**

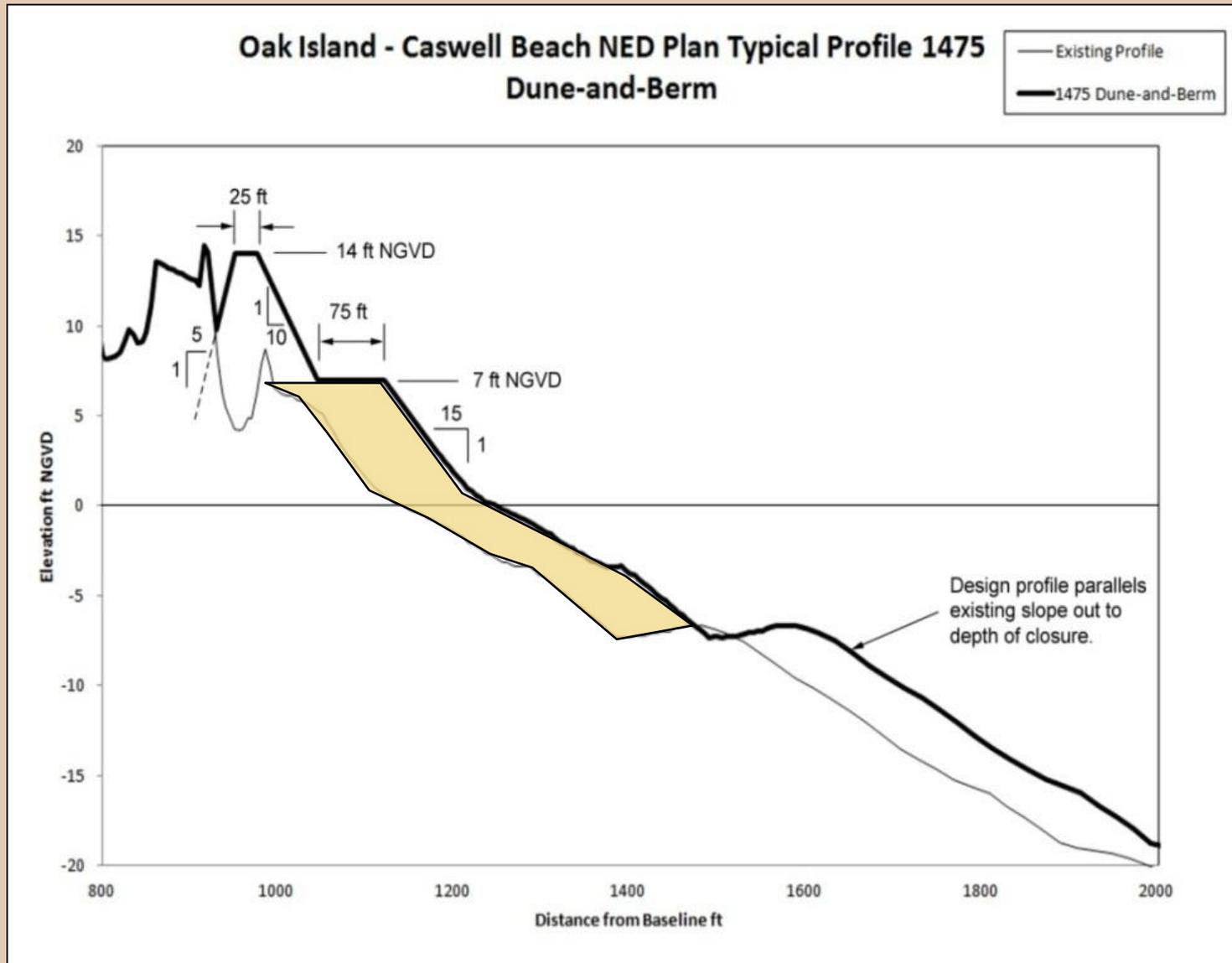


Task 3 – Storm Protection Assessment

- SBEACH Storm Input for Damage Assessment**



Task 3 – Preliminary Results



Task 3 – Preliminary Results

- **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



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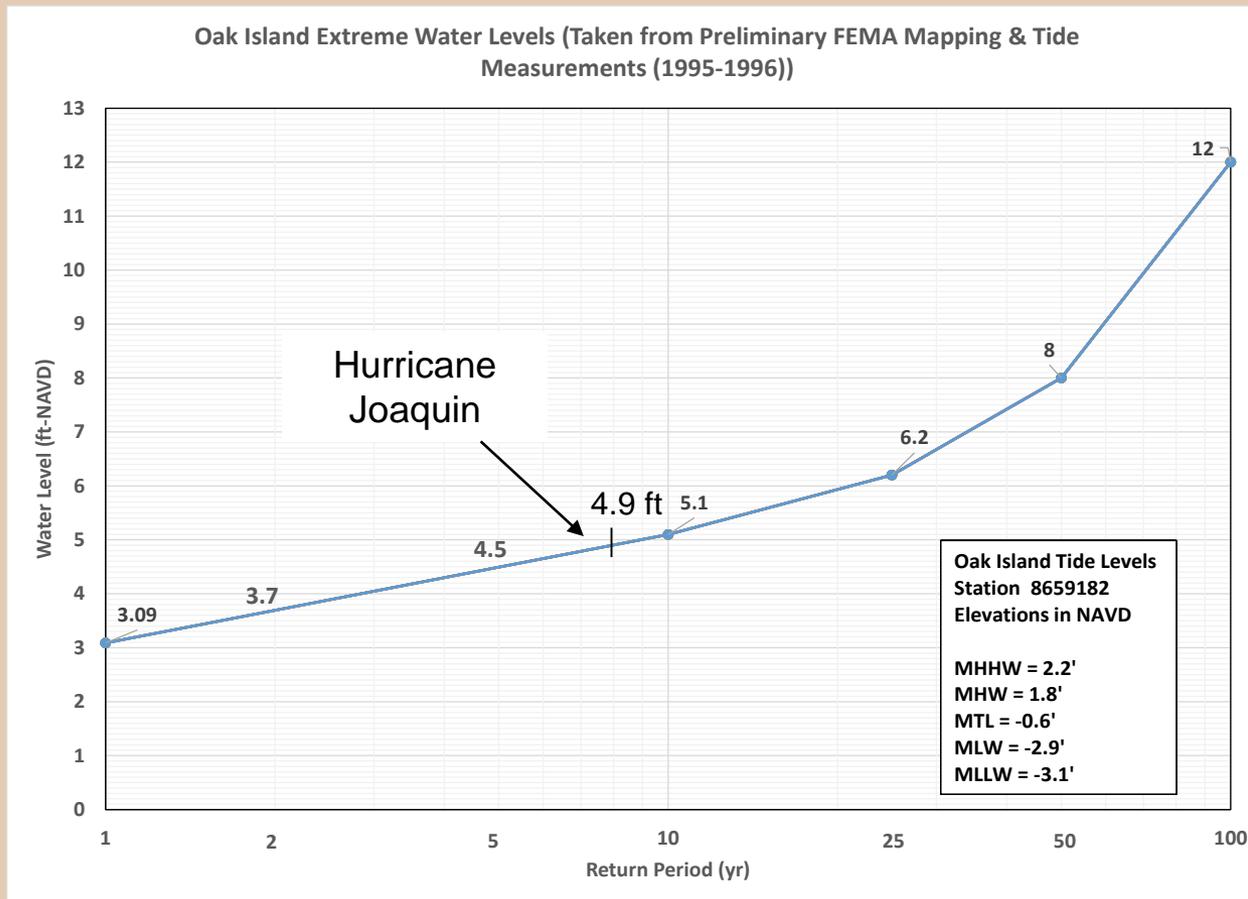
Post Hurricane Joaquin Shoreline Monitoring



USACE Report to FEMA for Eligible Damages

Guidelines for FEMA Public Assistance Program

- Non-Engineered Beach
- Beach has Eroded to a Point Where a 5-Year Storm / Flood Event will Damage Improved Property (FEMA, 2009).



USACE Report to FEMA for Eligible Damages

Potential Areas Considered For Restoration

- USACE Along with Staff from NCDEM Toured Oak Island on October 19.
- USACE Noted Storm Damage in Several Areas but Not Confident the Areas Would Qualify for Federal Assistance Based on Damage Expected from a 5-Year Flood Event.

Location	Potential Shoreline Length (ft)	Damage Description
Approx. 55th St. SE	100	Over-washed dune / dune erosion
32nd PI SE to Approx. 29th PI SE	800	Over-washed dune / dune erosion
2nd PI SW	380	Over-washed dune / dune erosion
7th PI SW	600	Dune erosion
12th PI SW (Approx.)	290	Dune erosion
66th PI SW (Approx.)	100	Dune erosion
Total	2,270	

Restoration Volume Estimated at 13,620 CY (USACE Post Joaquin Beach Report for Oak Island)

Preliminary Estimated Cost \$ \$408,600 (Assumes \$30 /CY)

USACE Report to FEMA for Eligible Damages

Potential Areas Considered For Restoration

- Approx. 55th Street SE (100 ft)



Photo Provided by USACE- Wilmington District

USACE Report to FEMA for Eligible Damages

Potential Areas Considered For Restoration

- 32 PI SE to Approx. 29th PI SE (800 ft)



USACE Report to FEMA for Eligible Damages

Potential Areas Considered For Restoration

- 2nd PI SW (380 ft)



Photos Provided by USACE- Wilmington District

USACE Report to FEMA for Eligible Damages

Potential Areas Considered For Restoration

- 7th PI SW (600 ft)



USACE Report to FEMA for Eligible Damages

Potential Areas Considered For Restoration

- 12th PI SW (290 ft)



USACE Report to FEMA for Eligible Damages

Potential Areas Considered For Restoration

- Approx. 66th PI SW (100 ft)



Shoreline Monitoring

Volumetric & Shoreline Change

- Comparison of July 2014 Beach Conditions w. October 2015 (Post Joaquin)

Volumetric Loss Above +4.5 NAVD88 (5-Yr. Flood Elevation) : -14,500 CY (0.3 cy/ft)

Volumetric Loss Above -20 NAVD88 (Apparent DOC): -500,000 CY (-10.4 cy/lf)



Note: Station 450+00 Located at Approx. SE 9th Street

Discussion

Thank You!

