



THE TOWN OF OAK ISLAND, NORTH CAROLINA



PLANNING ANALYSIS, ENGINEERING DESIGN AND ENVIRONMENTAL INVESTIGATIONS

in Support of a Comprehensive Shoreline Management Plan

February 15, 2016 Presentation



Project Objectives

Objectives

- **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**

Task 1 & 2 - Data Collection and Review

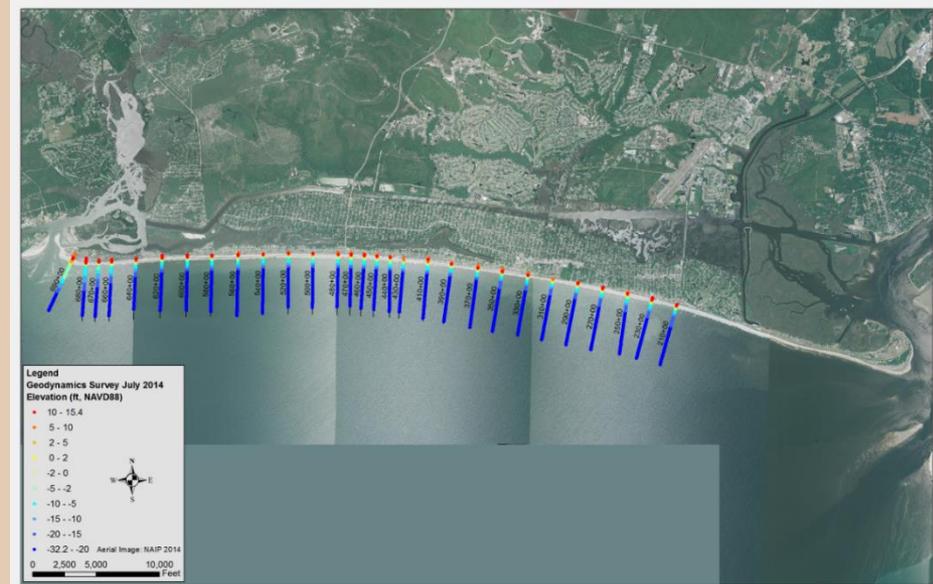
Existing Data Collected

- 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)

New Data Collected

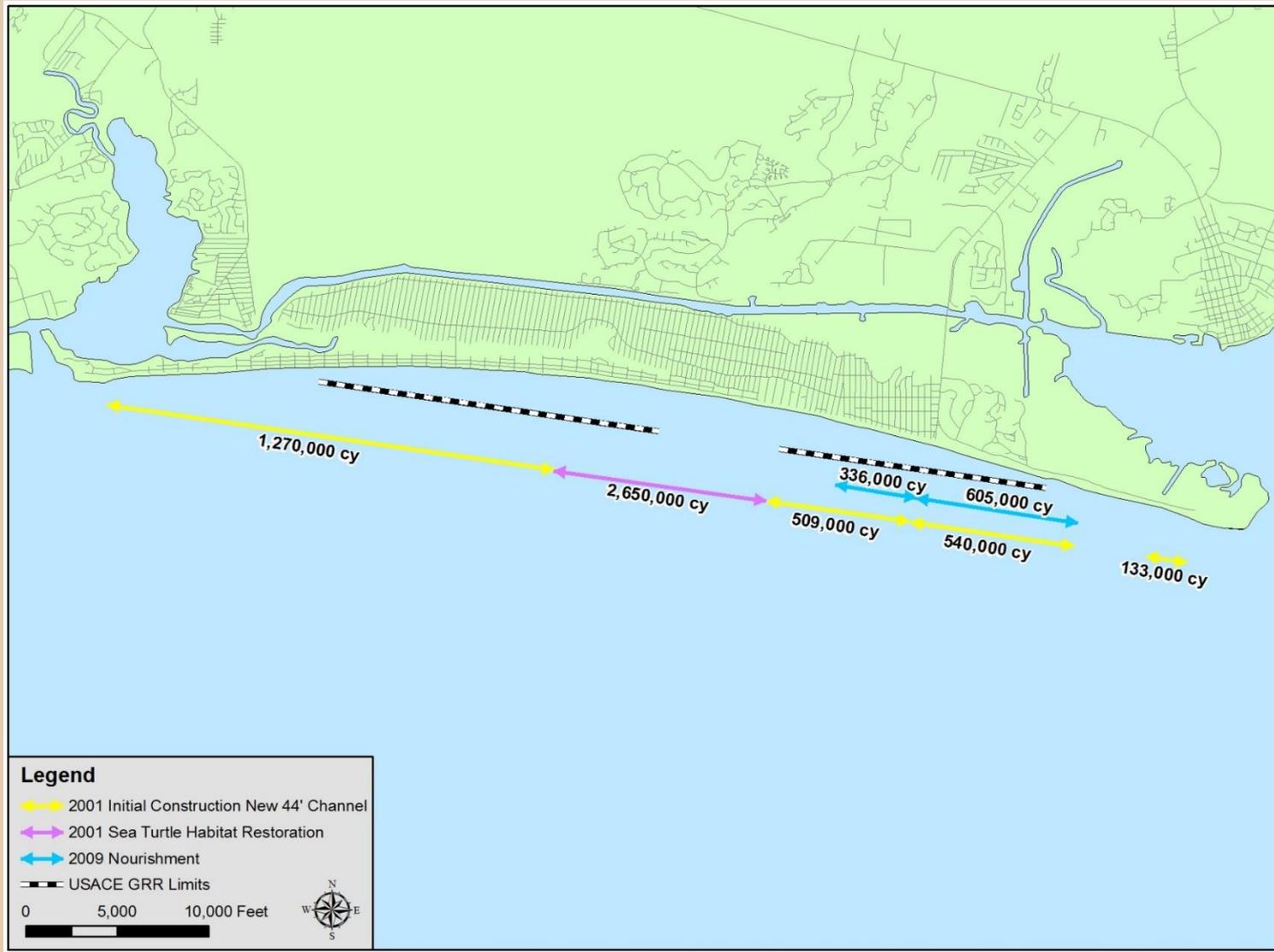
- Town Wide Beach Profile Survey (2014) Conducted by Geodynamics
- Native Sediment Samples (13 Samples along 5 Profiles)

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



Task 1 & 2 - Data Collection and Review

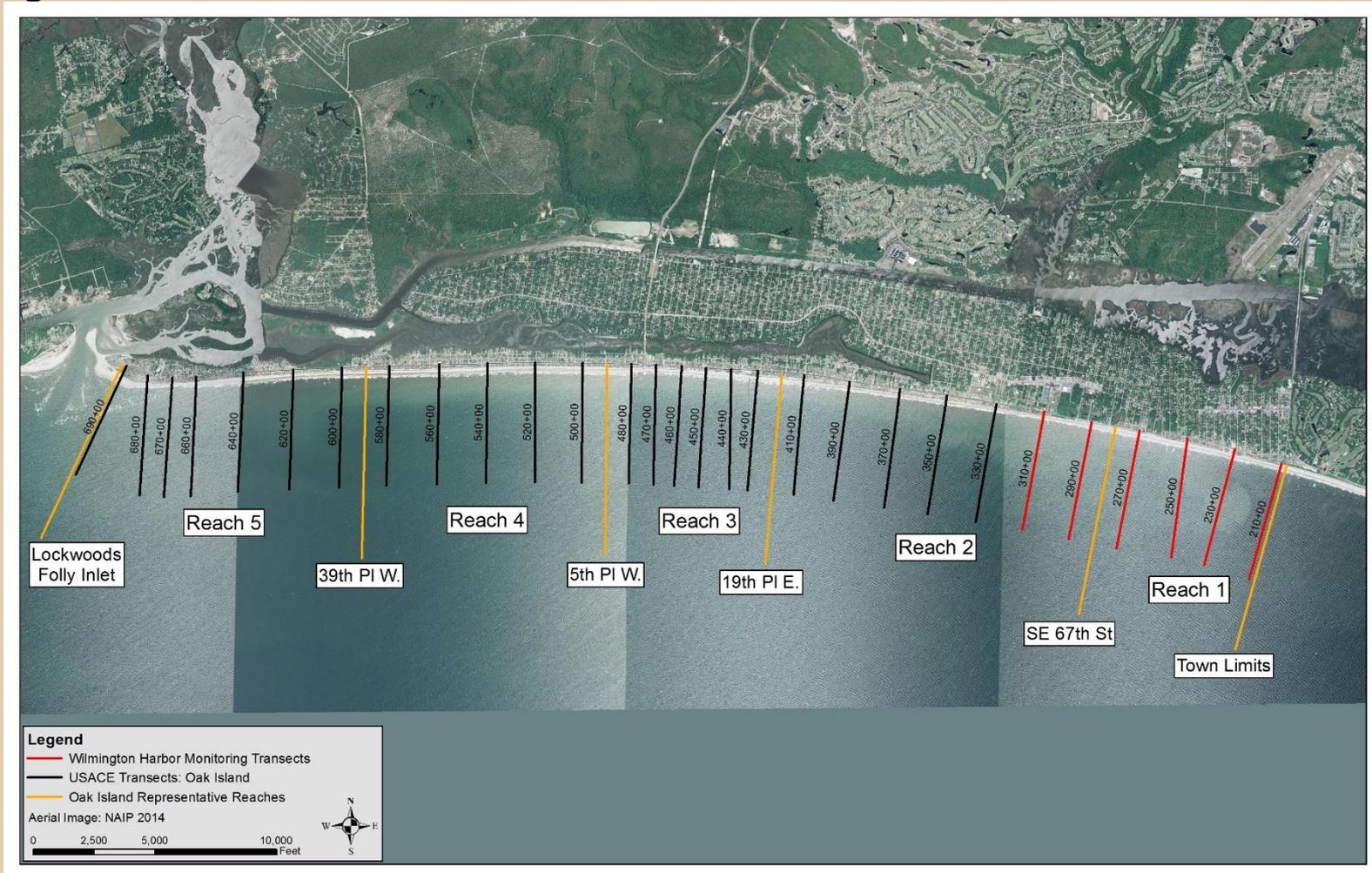
Historical Beach Nourishment Projects



Task 3 – Coastal Engineering/Planning Evaluation

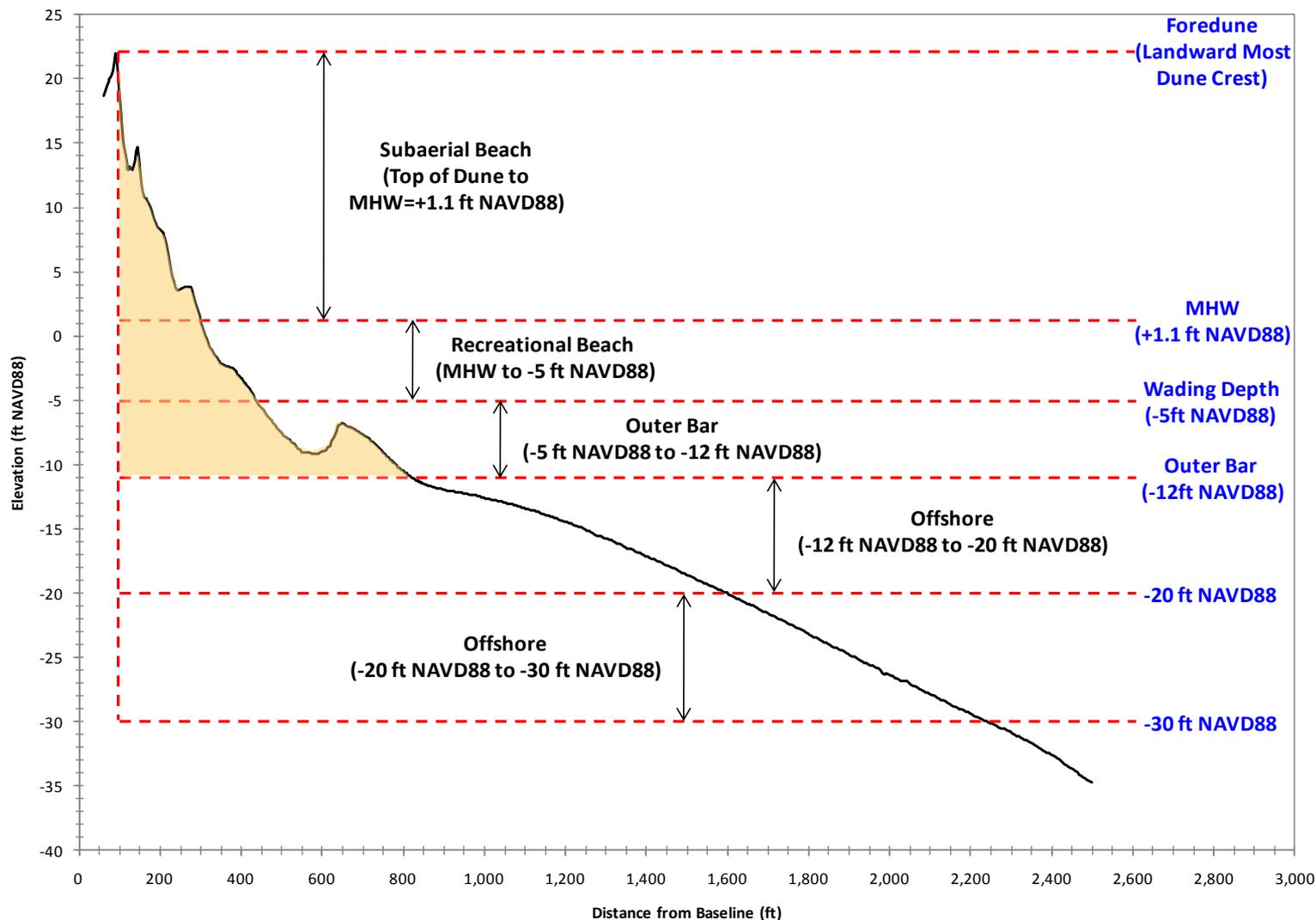
Preliminary Reach Development

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



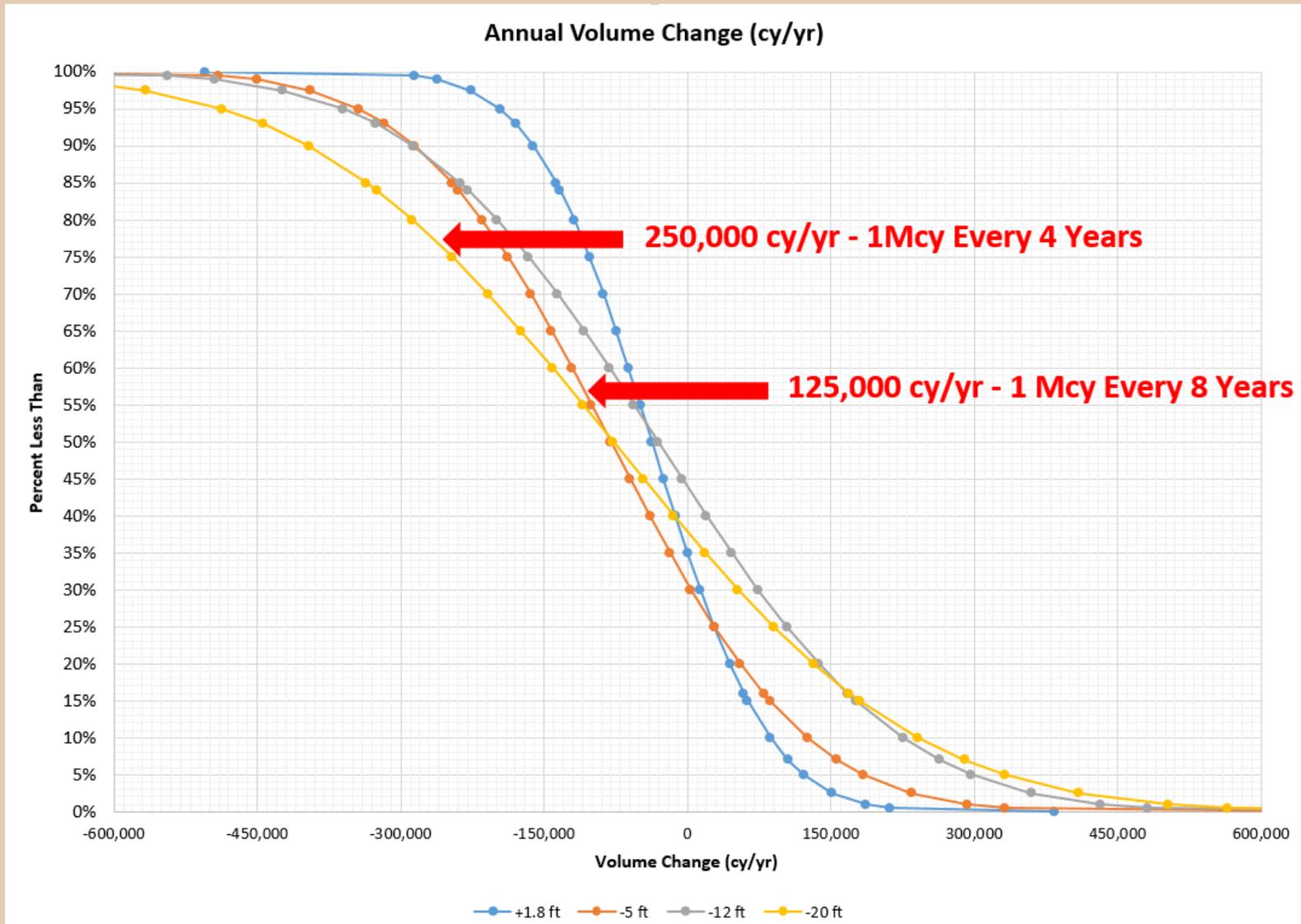
Task 3 – Coastal Engineering/Planning Evaluation

Profile Volume Analysis-Profile Calculation Lenses



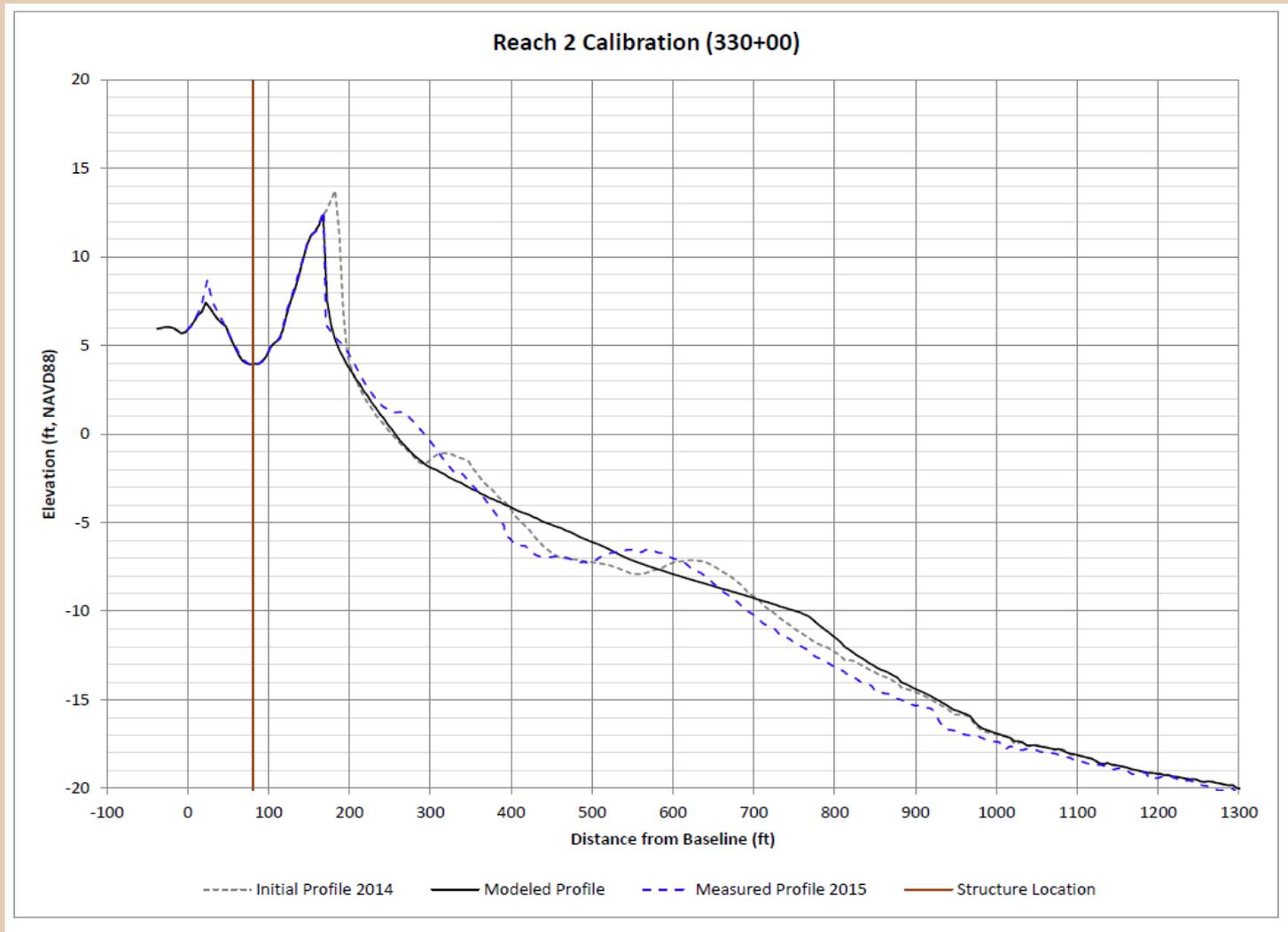
Task 3 – Coastal Engineering/Planning Evaluation

- Preliminary Determination of Annual Sand Need – Monte Carlo Simulation**



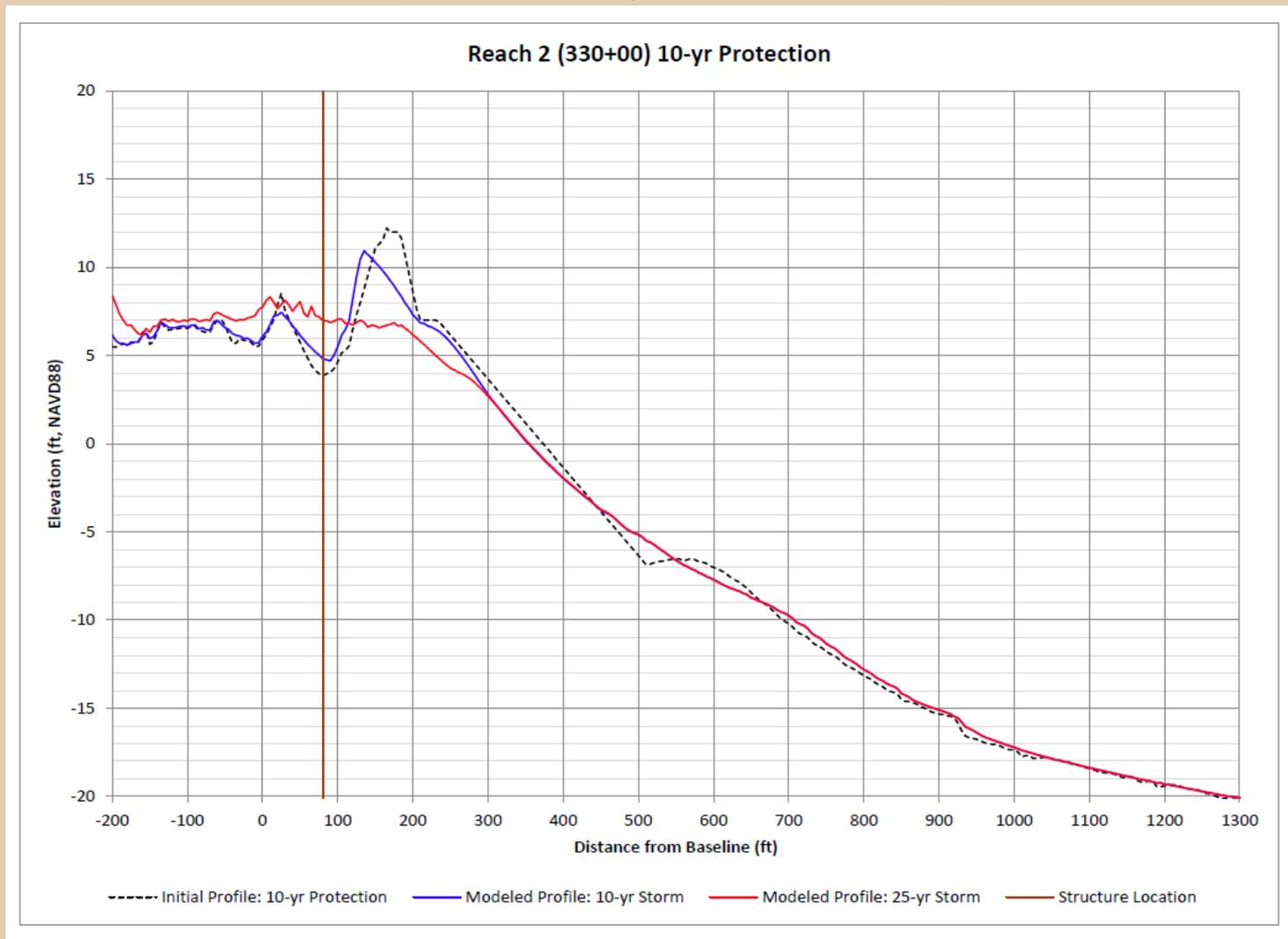
Task 3 – Coastal Engineering/Planning Evaluation

- **Preliminary Determination of Initial Project Sand Need – Engineered Beach**
 - **SBEACH Model Calibration – Hurricane Joaquin / Validation for Hanna**



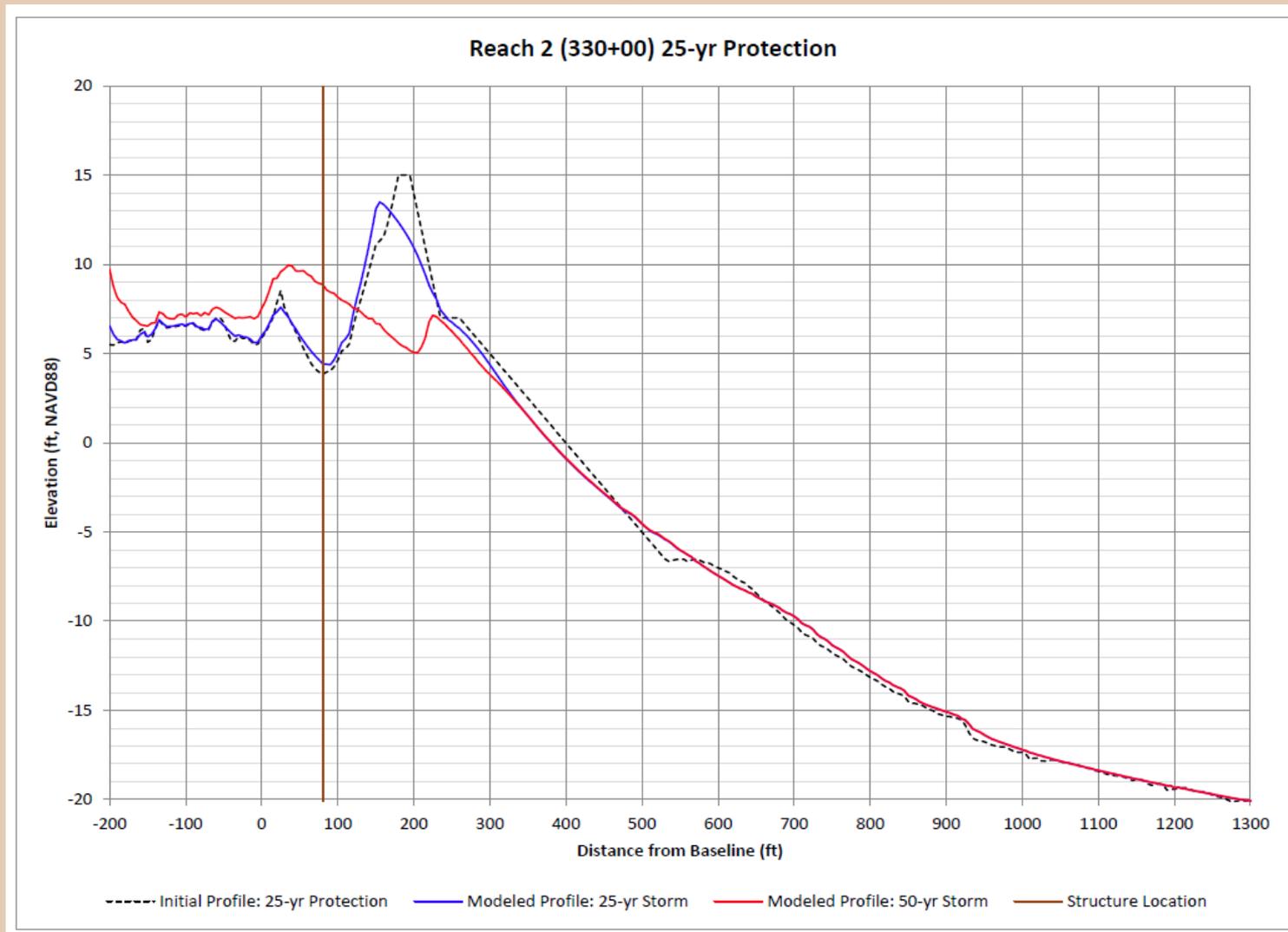
Task 3 – Coastal Engineering/Planning Evaluation

- Preliminary Determination of Initial Project Sand Need – Engineered Beach
 - SBEACH 10-yr Storm Results



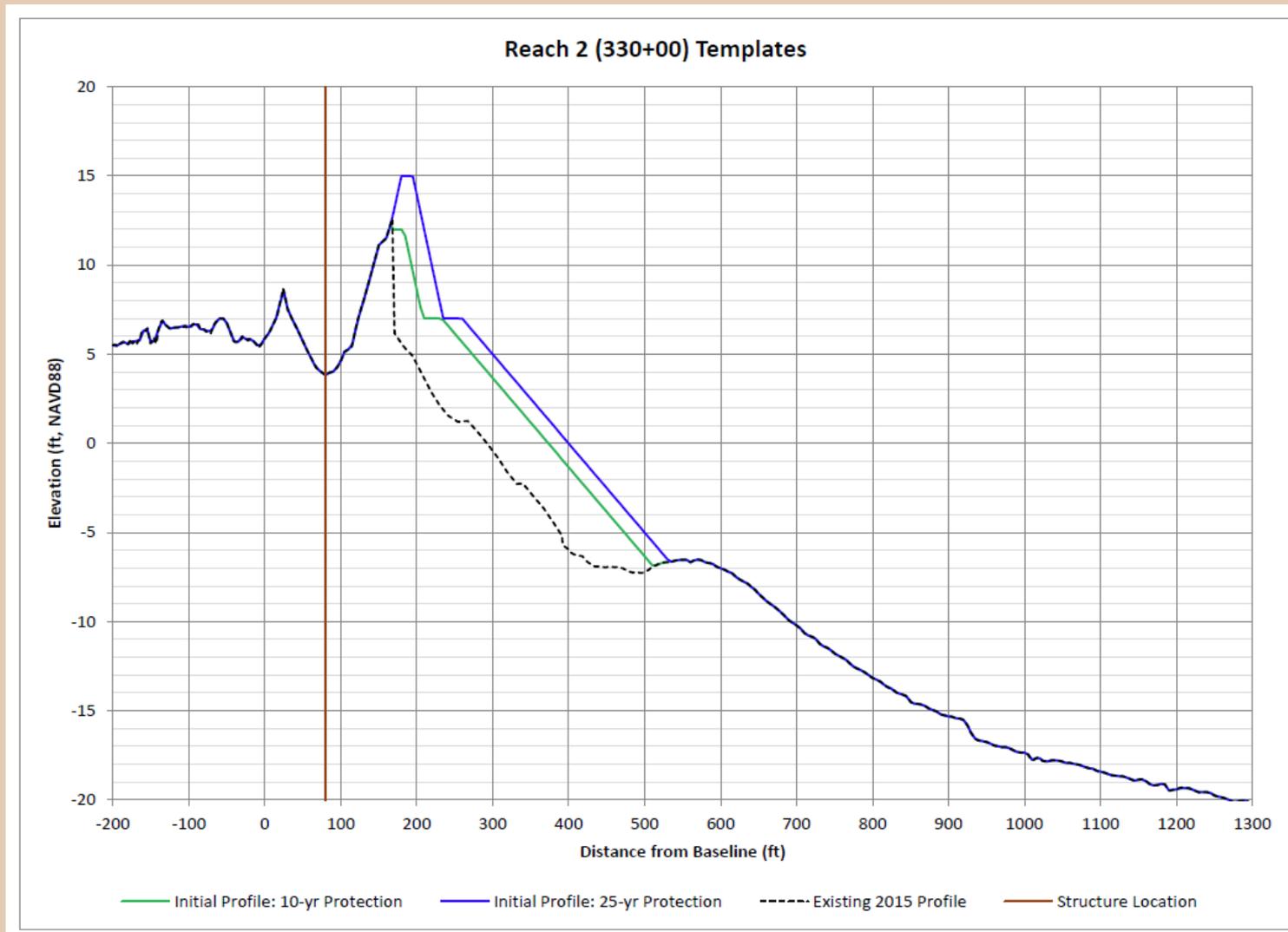
Task 3 – Coastal Engineering/Planning Evaluation

- Preliminary Determination of Initial Project Sand Need – Engineered Beach
 - SBEACH 25-yr Storm Results



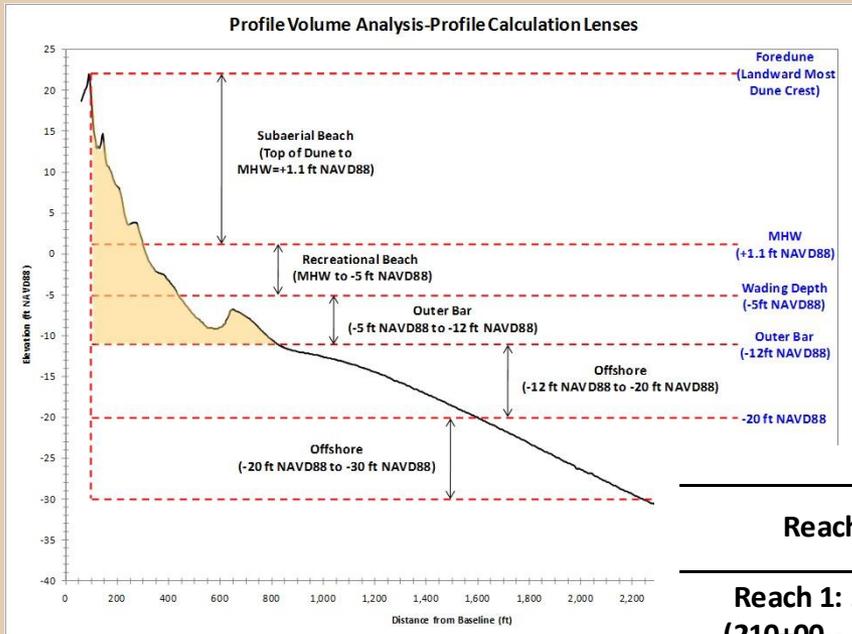
Task 3 – Coastal Engineering/Planning Evaluation

- Preliminary Determination of Initial Project Sand Need – Engineered Beach
 - Template Need for Various Storm Events



Task 3 – Coastal Engineering/Planning Evaluation

- Preliminary Triggers for Engineered Beach – (TO BE FURTHER REFINED AT NEXT PROJECT STAGE)**

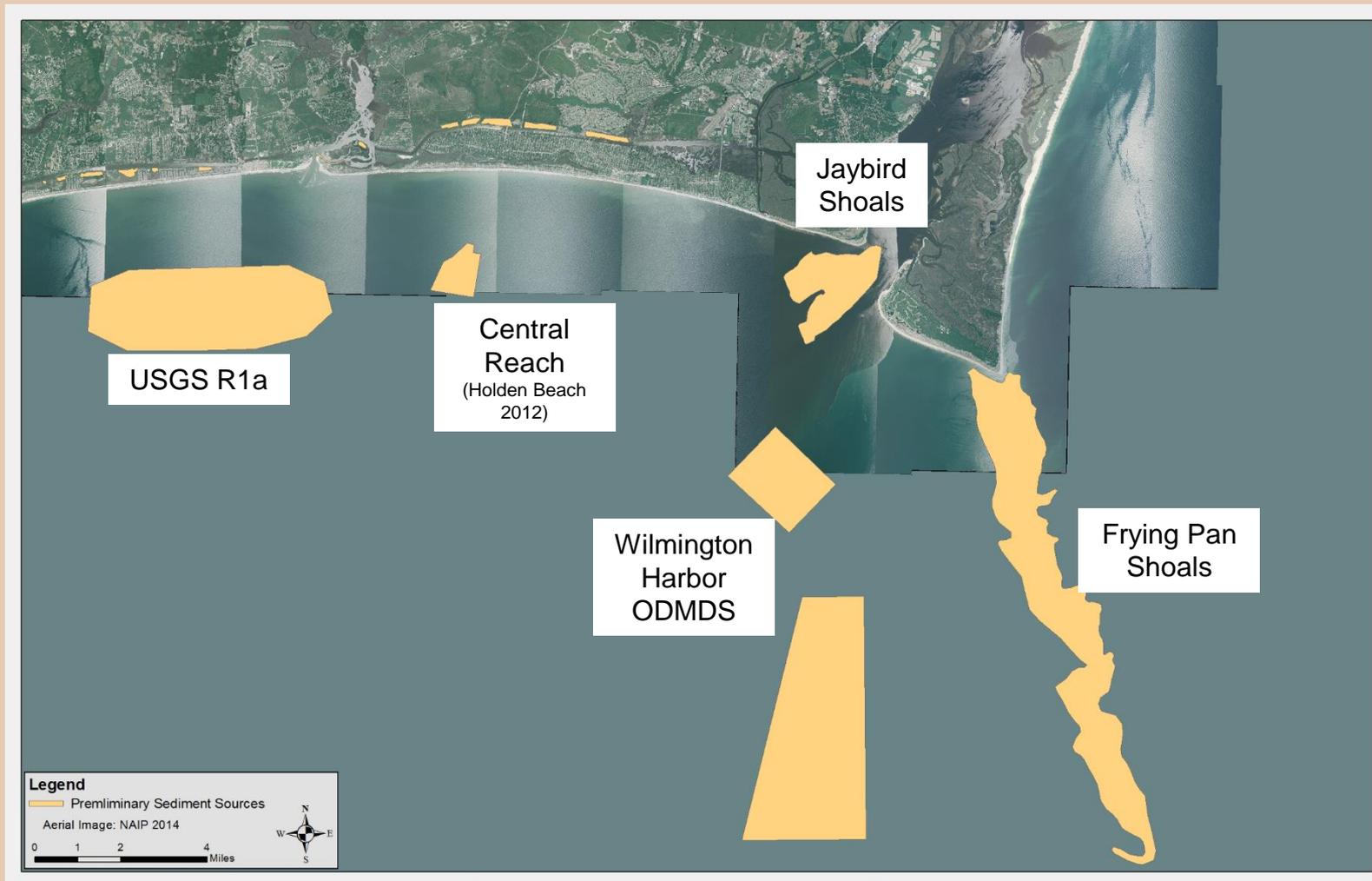


Reaches	2015 Volume (cy)	10-yr, -12 ft Trigger (cy)	25-yr, -12 ft Trigger (cy)	50-yr, -12 ft Trigger (cy)
Reach 1: 210+00 (210+00 - 270+00)	191.3	191.3	228.9	255.3
Reach 2: 330+00 (290+00 - 410+00)	158.5	207.5	229.3	256.6
Reach 3: 470+00 (430+00 - 480+00)	186.3	219.1	231.1	257.7
Reach 4: 540+00 (500+00 - 580+00)	176.0	223.0	223.0	273.1
Reach 5: 600+00 (600+00 - 690+00)	168.6	214.0	214.0	285.6

Task 3 – Coastal Engineering/Planning Evaluation

Preliminary Off Shore Sediment Resources

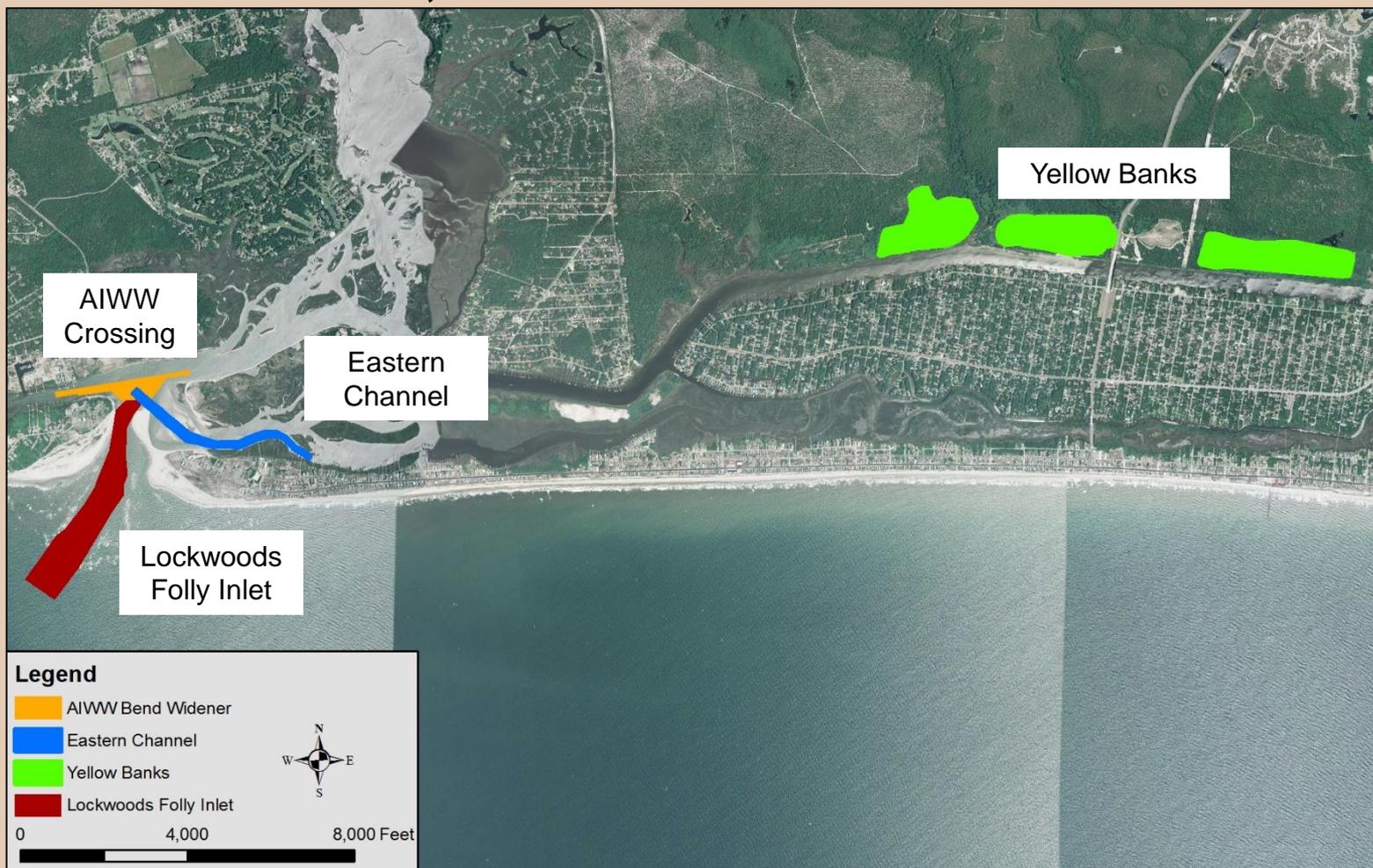
- Based on NCBIMP, USACE and NCGS Datasets



Task 3 – Coastal Engineering/Planning Evaluation

Preliminary Upland & Nearshore Sediment Resources

- Based on NCBIMP, USACE and NCGS Datasets



Task 3 – Coastal Engineering/Planning Evaluation

Preliminary Costs – Lower End (Dependent on Borrow Source)

Preliminary Calculation for Oak Island - Yellow Banks-Initial Project & Jaybird Shoals-Maintenance Projects

	<u>Dredge Type</u>	<u>Mob/Demob - Lump Sum (\$)</u>	<u>Unit Cost (\$/CY)</u>					
Initial Project	Pipeline	\$ 3,000,000	\$ 10.00					
Maintenance Project	Hopper	\$ 4,000,000	\$ 11.75					
				<u>Level of Protection to Be Maintained for Engineered Beach</u>				
				<u>10-yr RP</u>	<u>25-yr RP</u>	<u>50-yr RP</u>	<u>USACE</u>	
Item 1	Full 50-yr Master Plan & Engineered Beach							
	Sand Search			\$1,500,000	\$1,500,000	\$1,500,000	\$1,500,000	
	Engineering			\$750,000	\$750,000	\$750,000	\$750,000	
	Environmental			\$500,000	\$500,000	\$500,000	\$500,000	
				\$2,750,000	\$2,750,000	\$2,750,000	\$2,750,000	
Item 2	Annual Monitoring							
	Surveys and Shoreline/Volume Change Analyses			\$75,000	\$75,000	\$75,000	\$75,000	
	Bird Monitoring			\$50,000	\$50,000	\$50,000	\$50,000	
				\$125,000	\$125,000	\$125,000	\$125,000	
Item 3	Initial Project							
	Project Initial Volumes Include Volumes to Provide Protection for First Row Of Structures Up to a Given Return Period Event As Well As 1 MCY Advance Fill So That Immediate Renourishment Is Not Required			2,350,000	3,000,000	#N/A	4,000,000	
				\$23,500,000	\$30,000,000	#N/A	\$40,000,000	
				\$3,000,000	\$3,000,000	\$3,000,000	\$3,000,000	
				\$26,500,000	\$33,000,000	#N/A	\$43,000,000	
Item 4	Maintenance Projects (Annual Costs)							
	Low - Assume 125,000 cy/yr Based on Analyses and BIMP (1 Mcy Project Every 8 years) Cycle (Assume mob/demob cost split over 8 yr)			\$1,468,750	\$1,468,750	\$1,468,750	\$1,468,750	
				\$500,000	\$500,000	\$500,000	\$500,000	
				\$1,968,750	\$1,968,750	\$1,968,750	\$1,968,750	
	High - Assume 250,000 cy/yr Based on Analyses (1 Mcy Project Every 4 years) Cycle (Assume mob/demob cost split over 4 yr)			\$2,937,500	\$2,937,500	\$2,937,500	\$2,937,500	
				\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	
				\$3,937,500	\$3,937,500	\$3,937,500	\$3,937,500	
Total Annual Costs (Items 2 & 4)				Low	\$2,093,750	\$2,093,750	\$2,093,750	\$2,093,750
				High	\$4,062,500	\$4,062,500	\$4,062,500	\$4,062,500
				Avg	\$3,078,125	\$3,078,125	\$3,078,125	\$3,078,125
Total One Time Costs (Items 1 & 3)					\$29,250,000	\$35,750,000	#N/A	\$45,750,000

Depending on Outcome of SMP - Wilmington Harbor May Provide 40 - 50k of Sand per Year for Eastern Side of Town Which Would Reduce Above Costs

Depending on Outcome for Eastern Channel tie to AIWW & Bend Widener - May Provide 70k of Sand per Year for Western Side of Town Which Would Reduce Above Costs

Task 3 – Coastal Engineering/Planning Evaluation

Preliminary Costs – Higher End (Dependent on Borrow Source)

Preliminary Calculation for Oak Island - Frying Pan Shoals Only

	<u>Dredge Type</u>	<u>Mob/Demob - Lump Sum (\$)</u>	<u>Unit Cost (\$/CY)</u>	<u>Level of Protection to Be Maintained for Engineered Beach</u>				
				<u>10-yr RP</u>	<u>25-yr RP</u>	<u>50-yr RP</u>	<u>USACE</u>	
Initial Project	Hopper	\$ 4,000,000	\$ 15.00					
Maintenance Project	Hopper	\$ 4,000,000	\$ 15.00					
Item 1	Full 50-yr Master Plan & Engineered Beach							
	Sand Search			\$1,500,000	\$1,500,000	\$1,500,000	\$1,500,000	
	Engineering			\$750,000	\$750,000	\$750,000	\$750,000	
	Environmental			\$500,000	\$500,000	\$500,000	\$500,000	
				\$2,750,000	\$2,750,000	\$2,750,000	\$2,750,000	
Item 2	Annual Monitoring							
	Surveys and Shoreline/Volume Change Analyses			\$75,000	\$75,000	\$75,000	\$75,000	
	Bird Monitoring			\$50,000	\$50,000	\$50,000	\$50,000	
				\$125,000	\$125,000	\$125,000	\$125,000	
Item 3	Initial Project							
	Project Initial Volumes Include Volumes to Provide Protection for First Row Of Structures Up to a Given Return Period Event As Well As 1 MCY Advance Fill So That Immediate Renourishment Is Not Required			2,350,000	3,000,000	4,750,000	4,000,000	
				\$35,250,000	\$45,000,000	\$71,250,000	\$60,000,000	
				\$4,000,000	\$4,000,000	\$4,000,000	\$4,000,000	
				\$39,250,000	\$49,000,000	\$75,250,000	\$64,000,000	
Item 4	Maintenance Projects (Annual Costs)							
	Low - Assume 125,000 cy/yr Based on Analyses and BIMP (1 Mcy Project Every 8 years) Cycle (Assume mob/demob cost split over 8 yr)			\$1,875,000	\$1,875,000	\$1,875,000	\$1,875,000	
				\$500,000	\$500,000	\$500,000	\$500,000	
				\$2,375,000	\$2,375,000	\$2,375,000	\$2,375,000	
	High - Assume 250,000 cy/yr Based on Analyses (1 Mcy Project Every 4 years) Cycle (Assume mob/demob cost split over 4 yr)			\$3,750,000	\$3,750,000	\$3,750,000	\$3,750,000	
				\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	
				\$4,750,000	\$4,750,000	\$4,750,000	\$4,750,000	
Total Annual Costs (Items 2 & 4)				Low	\$2,500,000	\$2,500,000	\$2,500,000	\$2,500,000
				High	\$4,875,000	\$4,875,000	\$4,875,000	\$4,875,000
				Avg	\$3,687,500	\$3,687,500	\$3,687,500	\$3,687,500
Total One Time Costs (Items 1 & 3)					\$42,000,000	\$51,750,000	\$78,000,000	\$66,750,000

Depending on Outcome of SMP - Wilmington Harbor May Provide 40 - 50k of Sand per Year for Eastern Side of Town Which Would Reduce Above Costs

Depending on Outcome for Eastern Channel tie to AIWW and Bend Widener - May Provide 70k of Sand per Year for Western Side of Town Which Would Reduce Above Costs

Task 3 – Coastal Engineering/Planning Evaluation

Permitting Approach for Potential Master Plan

- **Environmental Impact Statement to evaluate comprehensive approach**
- **2 – 4 year timeframe**
- **30 – 50 year USACE Section 404/10 permit; 5 year Major CAMA permit**
- **Potential need for lease agreement for borrow sources beyond 3 miles (BOEM)**
- **Section 408 review for use of ODMDS**

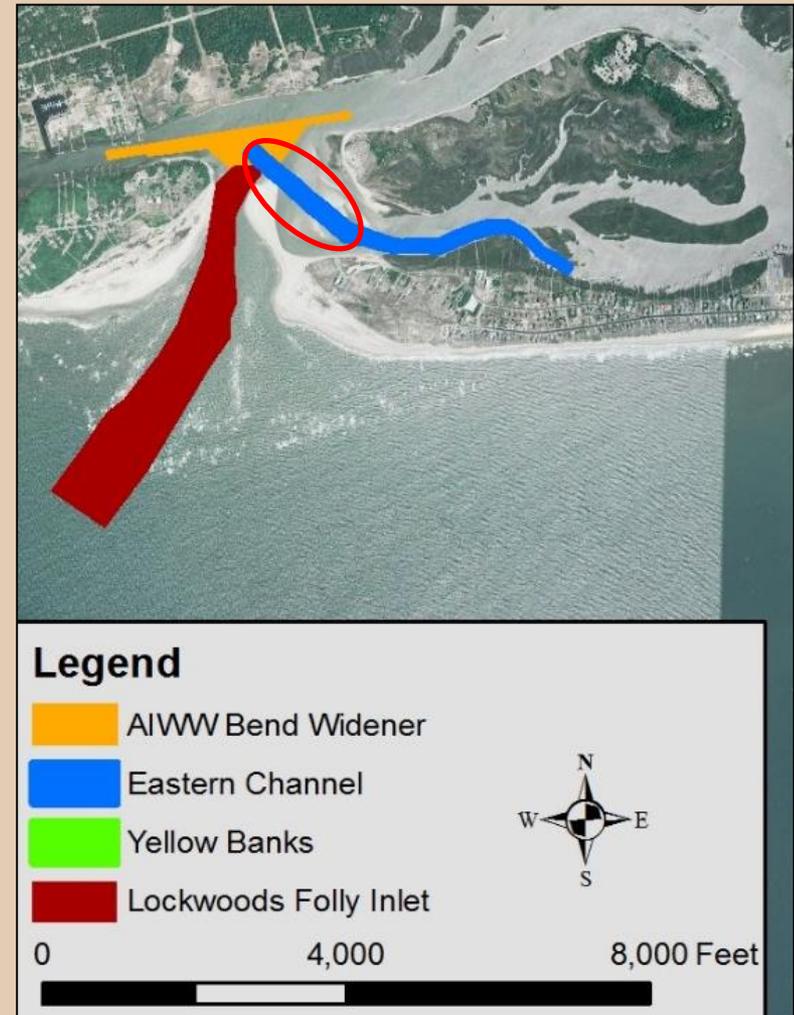
Environmental Factors for Potential Master Plan

- **Federal Threatened and Endangered Species**
- **Hardbottom buffer and cultural resources**
- **Updated sediment characterization**
- **Federal formal consultation with NMFS and USFWS**

Task 3 – Coastal Engineering/Planning Evaluation

Lockwoods Folly/Eastern Channel Management Plan

- Develop Plan with USACE/Holden Beach for Lockwoods Folly Inlet/Eastern Channel Maintenance to Better Utilize this Material for Everyone's Benefit
 - Small Hopper Nearshore Placement for Lockwoods Folly Inlet and Piggyback AIWW Bend Widener and Eastern Channel Mouth Dredging
 - May Provide Up to 70k cy/yr with Placements Every 2-3 Years



Task 3 – Coastal Engineering/Planning Evaluation

Permitting Approach for Lockwoods Folly/ Eastern Channel Management

- USACE General Permit 291 – authorize multiple events?
- Major CAMA permit
- 1 – 2 year timeframe
- USACE Consent Agreement for CDF
- USFWS Section 7 formal consultation and informal with NMFS

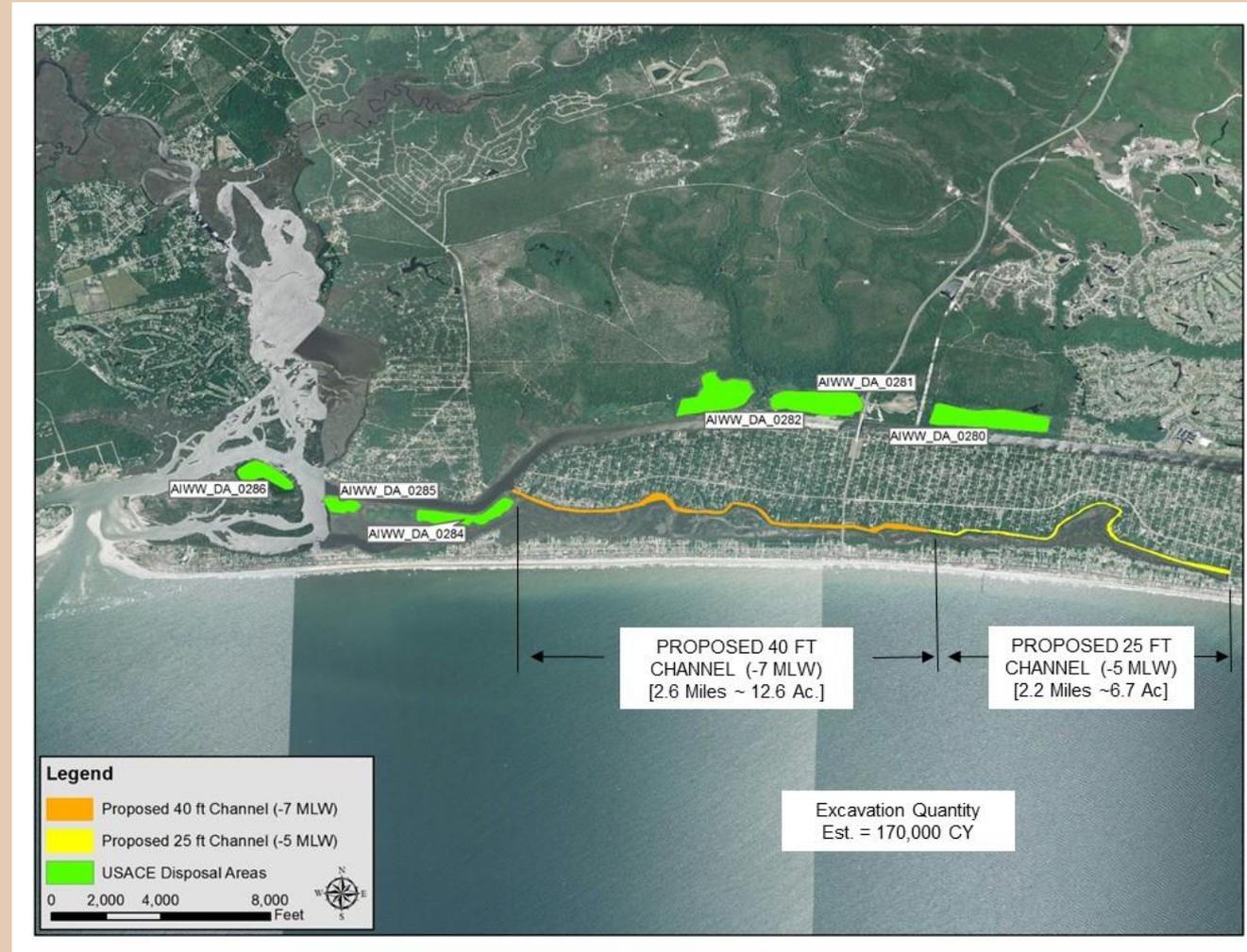
Environmental Factors

- Piping plover wintering critical habitat (intertidal shoals)
- Shorebird monitoring
- Seabeach amaranth habitat presence along inlet shoreline
- Larval fish transport
- Underwater cultural resources (LFI and Eastern Channel)
- Upland disposal area capacity

Task 4 – Davis Canal Management Plan

Preliminary Plan

- Provide Navigation and Water Quality Benefits by Improving Tidal Flushing
 - Budgetary Estimate = **\$6-6.5M** for Mob/Demob, Booster Pumps, USACE Fees and Likely Disposal Area Improvements



Task 4 – Davis Canal Management Plan

Permitting Approach for Davis Canal Management Plan

- **Environmental Assessment or General Permit 291**
- **Major CAMA permit – Coastal Resources Commission Variance Process**
- **2 – 3 year timeframe**
- **USACE Consent Agreement for CDF**
- **USFWS and NMFS Section 7 informal consultation**

Environmental Factors

- **Primary Nursery Area – update benthic substrate map**
- **Salt marsh and potential oyster reef impacts**
- **Upland disposal area capacity**
- **Sufficiency of baseline water quality data**
- **Required mitigation (no standard ratio)**

What's Next?

- **Potential Next Steps**

- **Begin Annual Monitoring Program** to Track Beach Shoreline and Volume Changes to Aid in Future Master Planning and Maintain Engineered Beach
 - Estimated to Cost Between \$75k Annually – Additional Profiles Needed
- **Develop Plan with USACE/Holden Beach for Lockwoods Folly Inlet/Eastern Channel Maintenance & Monitor SMP for Wilmington Harbor** to Better Utilize this Material for Everyone's Benefit
 - Small Hopper Nearshore Placement and Piggyback AIWW Bend Widener and Eastern Channel Mouth Dredging/Keep Eye on SMP for Wilmington Harbor and Potential Improvements – Utilize Navigation Projects Wherever Possible
- **Develop Funding Plan** to Determine Level of Protection Desired and Begin Detailed Master Planning Effort (Engineering/Geotechnical/Permitting)
 - Initiative with Peter Ravella
- **Begin Master Plan Effort** to Develop Detailed Engineered Beach Plan, Conduct Geotechnical Field Investigations, and Develop EA/EIS and Permits As Required