THE "BIGGEST," THE "BADDEST," AND THE "BESTEST" – COASTAL RESTORATION CAJUN STYLE

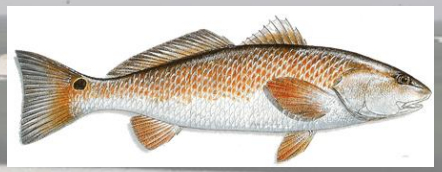
Presentation for:
Florida Shore and Beach Preservation Association
February 10, 2017

Presented by:
Coastal Engineering Consultants, Inc.

COASTAL ENGINEERING CONSULTANTS INC.

Welcome to Coastal Louisiana

- 5th largest river delta in the world
- 40~45% of the coastal wetlands in the nation
- 400 miles of coastline/ 7,700 miles of tidal shoreline
- 80% of coastal wetland / marsh loss in the nation
- 25% of the nation's seafood



- 20% of entire continent's water bird population winter in coastal Louisiana (5 Million waterfowl)

- Source: 2017 Coastal Master Plan (Draft)

http://coastal.la.gov/a-common-vision/2017-draft-coastal-master-plan/

Welcome to Coastal Louisiana

- **Asset Value of Mississippi River Delta = $237 Billion ~ $4.7 Trillion**

- **# 1 export state in the U.S.**
- **90% of nation's outer continental shelf oil and gas**
- **20% of all domestic natural gas production**
- **20% of nation's annual waterborne commerce**
- **2nd highest commercial fishing landings in U.S. (26%)**

- **Source: 2017 Coastal Master Plan (Draft)**

http://coastal.la.gov/a-common-vision/2017-draft-coastal-master-plan/

Restoration Programs

- **Coastal Wetlands Planning, Protection and Restoration Act (CWWPRA)**
  - Federally enacted in 1990, commonly referred to as Breaux Act, First Major Program to Fund Barrier Island Restoration

- **Louisiana Coastal Area (LCA)**
  - LCA Ecosystem Restoration Study (2004~2012)
  - To date has only funded studies

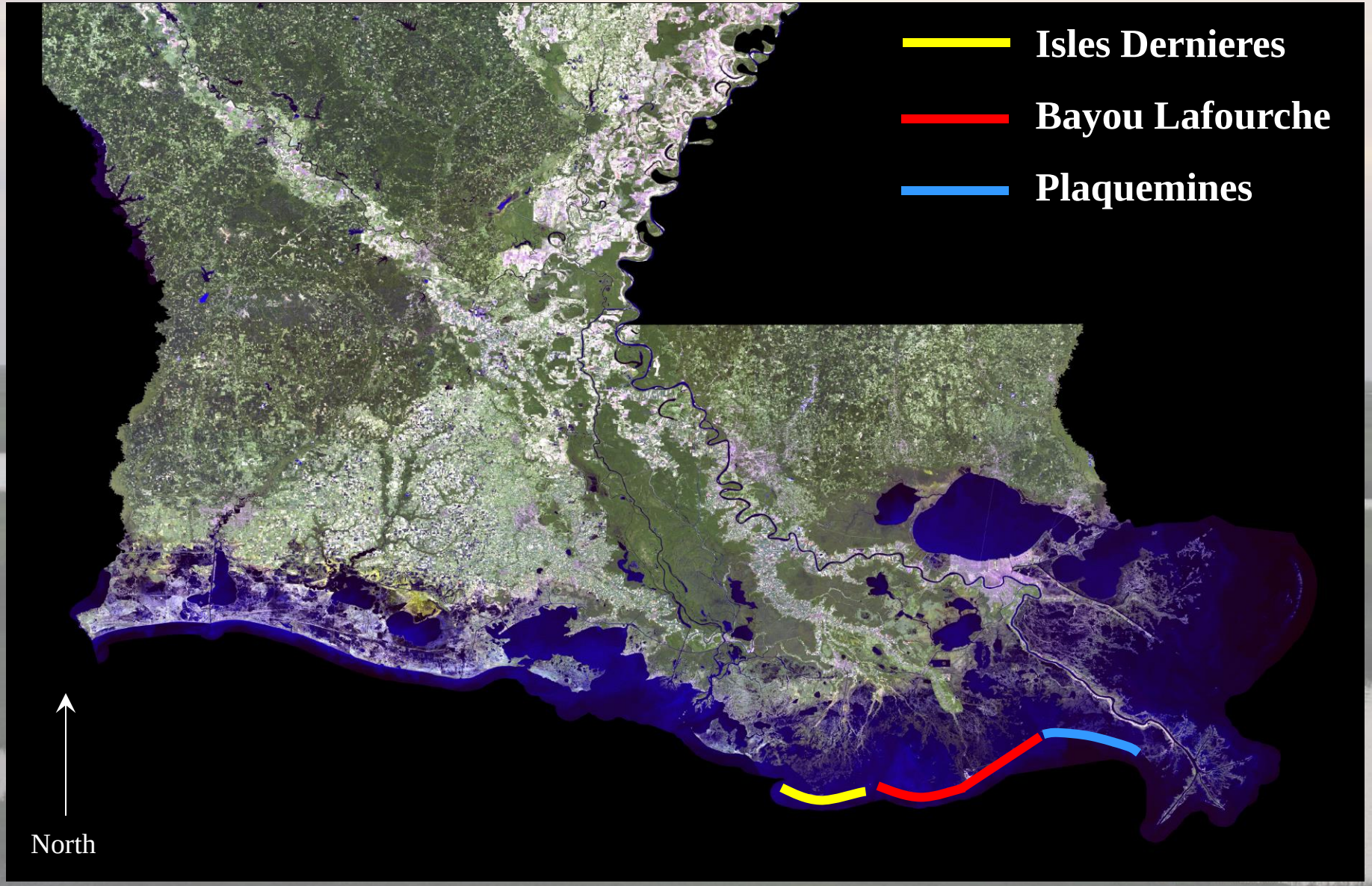
- **Coastal Impact Assistance Program (CIAP)**
  - Established by Section 384 of Energy Policy Act of 2005
  - Purpose is to assist oil & gas producing States in mitigating impacts from Outer Continental Shelf oil & gas production

- **Water Resources Development Act (WRDA)**
  - The Water Resources Development Act of 2007, Public Law 110-114.
    - Title VII – Louisiana Coastal Area. Addresses Louisiana's coastal ecosystem, need for long-term restoration program, and State's Coastal Master Plan.
    - Dependent on USACE projects approved by Chief Engineer, availability of federal funds, and political support

Restoration Programs

- **Natural Resources Damage Assessment (NRDA)**
  - Consent Decree for Deepwater Horizon Oil Spill Settlement Funds (2016)
  - Global Settlement of $20 Billion over 15 year period (LA ~ $5 Bil)
- **National Fish and Wildlife Foundation (NFWF)**
  - Administers the Gulf Environmental Benefit Fund
  - Supports barrier island and diversion projects for Coastal Louisiana to remedy harm caused by the Deepwater Horizon Oil Spill (LA ~ $1.27 Bil)
- **RESTORE Act**
  - Signed into Law July 2012
  - Gulf Coast Ecosystem Restoration Council
  - 80% of Deepwater Horizon Oil Spill Civil penalties (Clean Water Act)
  - Restore long-term health of Gulf Coast region's ecosystems and economy
  - 15-year period through April 2031 (LA~ $787 Million)
- **Gulf of Mexico Energy and Security Act (GOMESA)**
  - Dedicated Funding Stream for coastal restoration and risk reduction to Gulf States that permit OCS exploration
  - Louisiana set to receive ~ 39% of total

Restoration History



Isles Dernieres Barrier System Restoration Projects

TE-20 Isle Dernieres Restoration – East Island

TE-24 Isle Dernieres Restoration – Trinity Island

TE-27 Whiskey Island Restoration

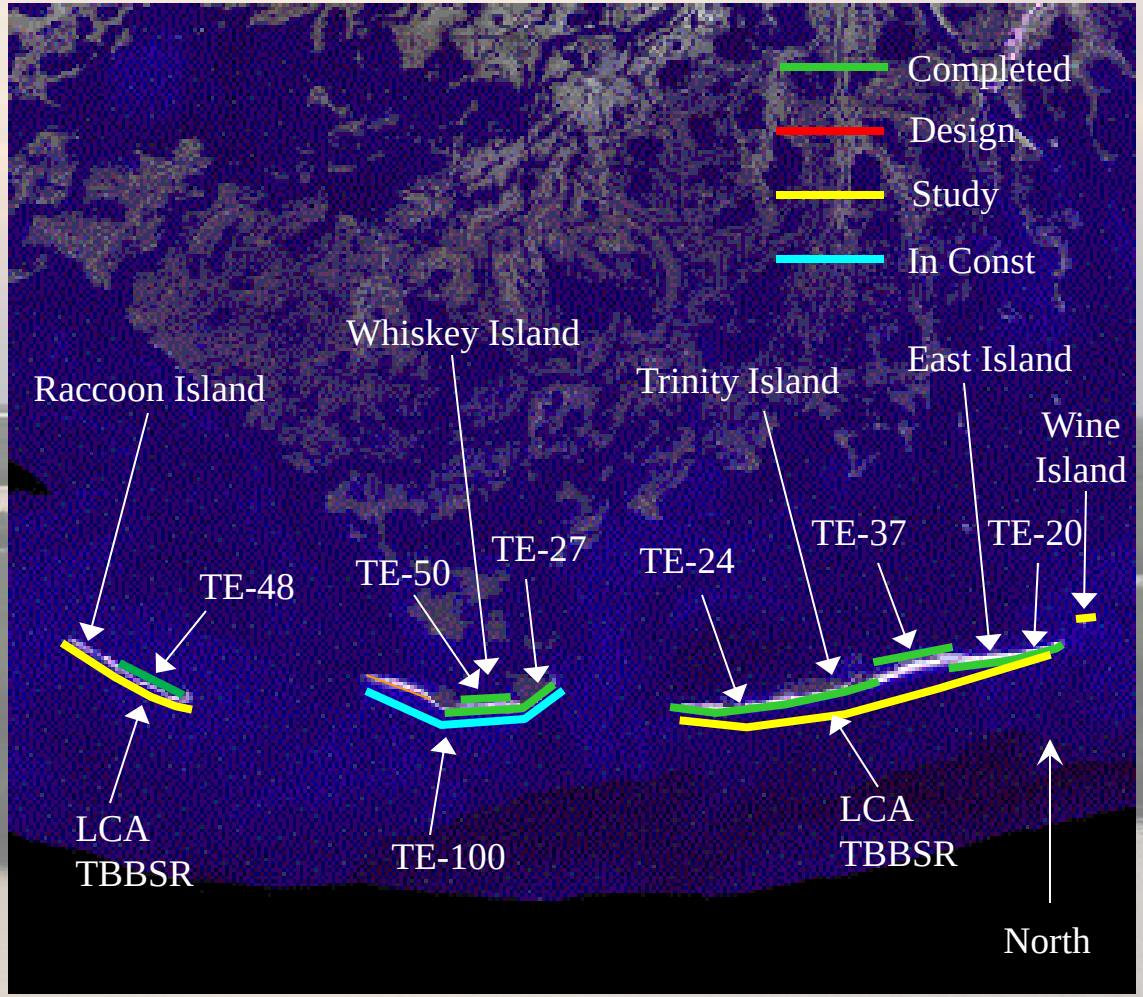
TE-37 New Cut Dune and Marsh Restoration

TE-48 Raccoon Island Shoreline Protection / Marsh Creation

TE-50 Whiskey Island Back Barrier Marsh Creation

LCA Terrebonne Basin Barrier Shoreline Restoration

TE-100 NRDA Caillou Lake Headlands



Restoration History

Bayou Lafourche Barrier System Restoration Projects

TE-25 East Timbalier Island Segment, Phase 1

TE-30 East Timbalier Island Segment, Phase 2

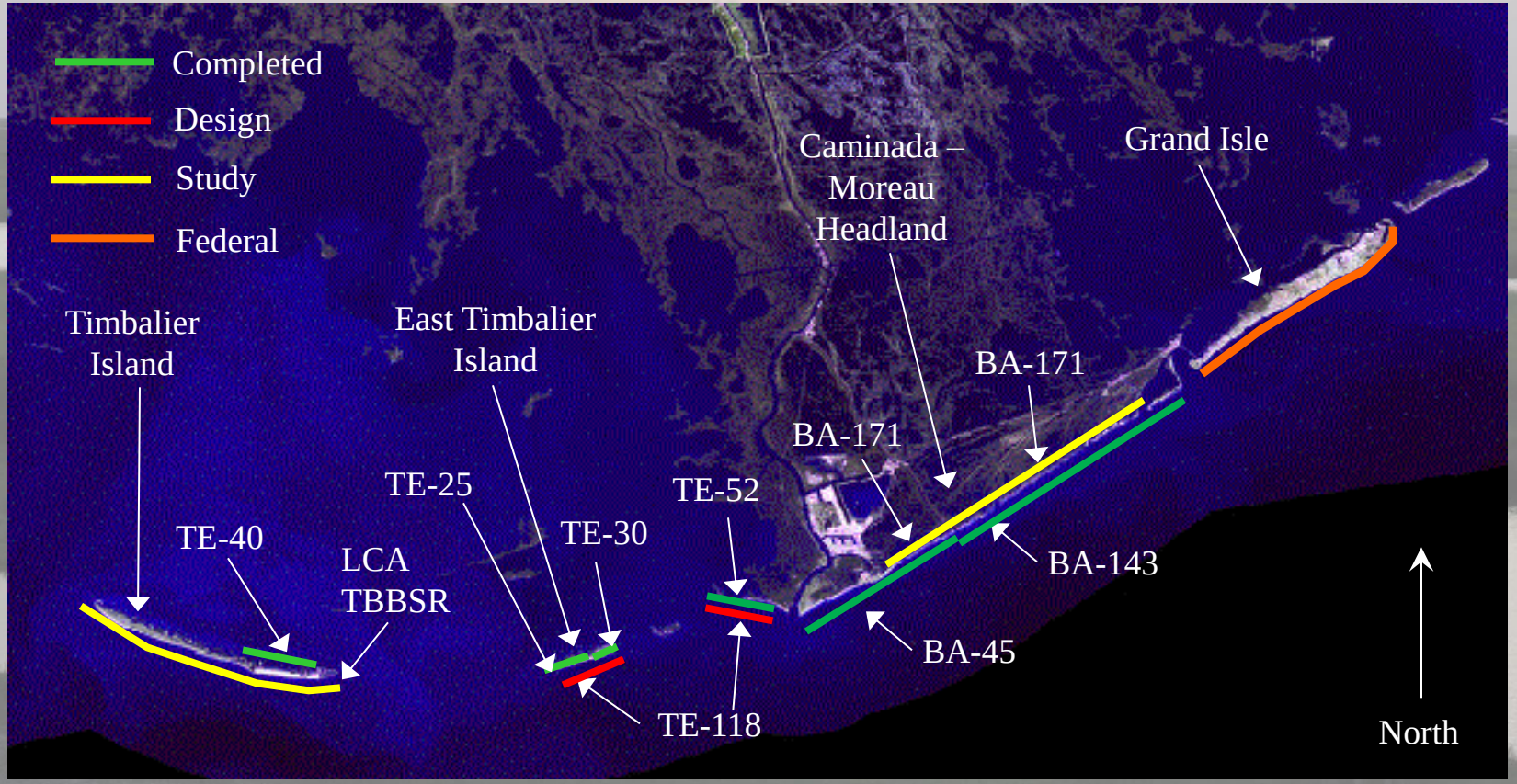
TE-40 Timbalier Island Dune and Marsh Restoration

TE-52 West Belle Pass Barrier Headland Restoration

TE-118 East Timbalier / West Belle Headland Restoration

BA-45 / BA-143 / BA-171 Caminada Headland Restoration

Grand Isle Shore Protection Project



Plaquemines Barrier System Restoration Projects

BA-30 East Grand Terre Island Restoration

BA-35 Pass Chaland to Grand Bayou Pass Restoration (aka Bay Joe Wise)

BA-38-1 Pelican Island Restoration

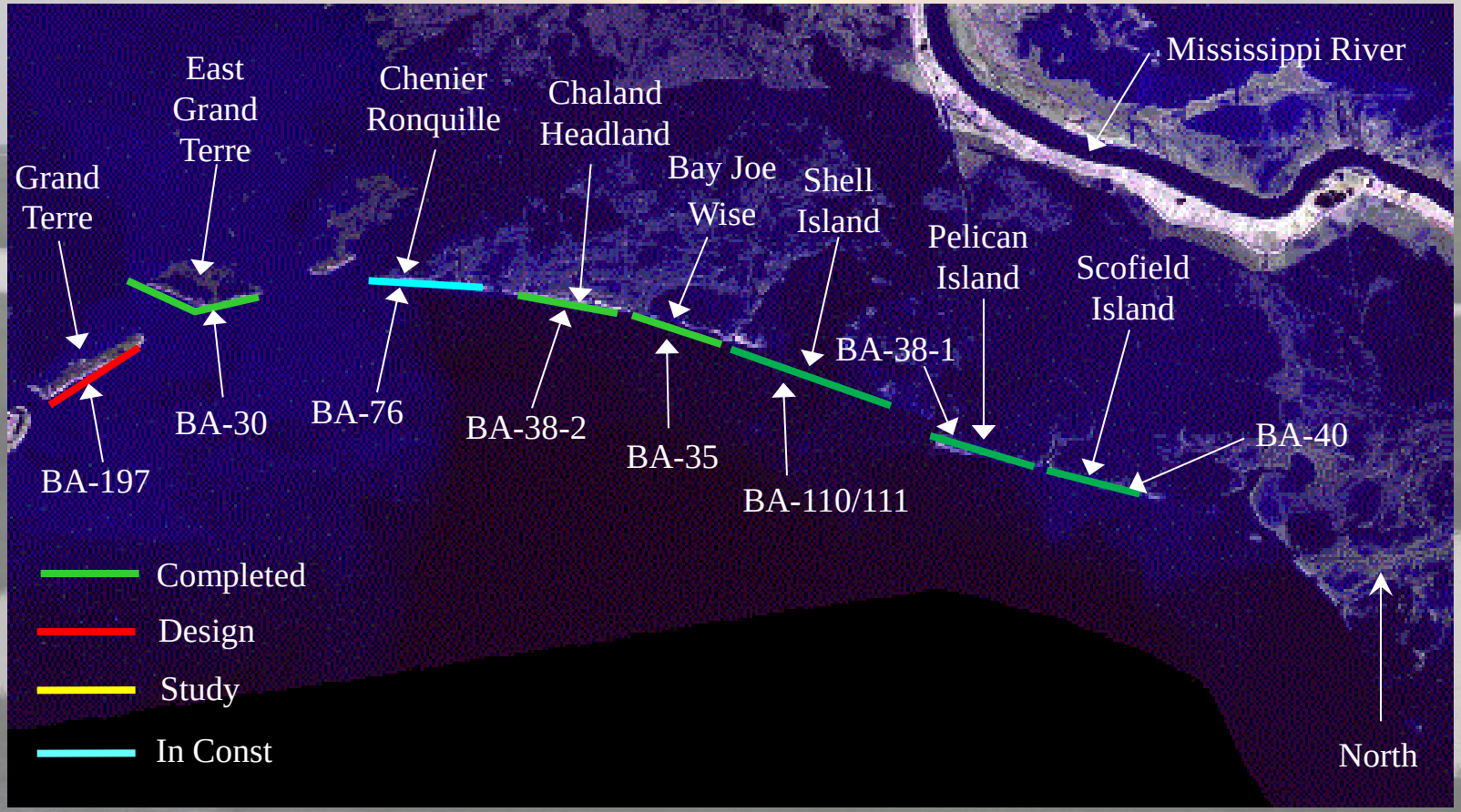
BA-38-2 Chaland Headland Restoration

BA-40 Scofield Island Restoration

BA-76 Chenier Ronquille Restoration

BA-110/111 Shell Island Restoration (East / West)

BA-197 West Grande Terre Restoration



Restoration History

Summary of Project Features

Project	Length (FT)	Acres	Volume (MCY)	Density (CY/LF)
TE-24 Trinity Island (1999)	22,170	306	3.94	178
TE-20 East Island (1999)	19,000	280	4.85	255
TE-25-30 East Timbalier (2000)	28,860	241	2.70	94
TE-27 Whiskey Island (2000)	12,250	367	2.85	233
TE-40 Timbalier Island (2006)	16,100	306	3.60	224
TE-37 New Cut (2007)	8,300	156	0.83	100
BA-38-1 Chaland Headland (2007)	14,000	390	1.90	136
BA-35 Bay Joe Wise (2009)	14,000	420	2.96	211
BA-30 East Grand Terre (2010)	14,400	778	3.34	232
BA-38-2 Pelican Island (2012)	12,670	586	4.51	356
TE-48 Raccoon Island (2013) *	3,900	58	0.74	190
TE-52 West Belle Headland (2013)	9,300	487	4.00	430
BA-40 Riverine-Scofield (2013)	12,670	510	3.52	278
BA-45-143 Caminada Headland (2016) **	65,800	1,060	8.84	134
BA-110-111 Shell Island (2016)	19,000	958	6.20	326
BA-76 Chenier Ronquille (Const)	7,200	500	10.45	361
TE-118 Caillou Lake Headlands (Const)	23,700	932	10.45	441

Restoration History

*** Marsh Fill Only ** Beach/Dune Fill Only**

The " Honorable Mention "

- **You Always Remember Your First !**
- **CWPPRA (PPL11)**
- **NMFS –Federal Sponsor**
- **Kick-Off in Jan 2003**
- **Completed in June 2009**
- **Fun Facts**
  - **Hurricane Katrina breached island (2005)**
  - **Oyster Leases had to be cleared**
  - **Private Property Owner refused to Grant Access Rights**
  - **Dredge "Water Exchange Channel" through existing wetlands**
  - **Hurricanes Gustav and Ike (2008) impacted project**
  - **Hurricane Impacts ~ 1 MCY of sediment (2005-2008)**

Bay Joe Wise Headland Restoration

The "*B I G G E S T*"

- "Webster's" Definitions
  - Largest in quantity or dimension
  - Of greatest scope or expanse
  - Exceeding that which is common to its class

- Attributes of a Barrier Island Restoration Project
  - Project Length
  - Volume
  - Benefits (Habitat Acres, Storm Damage Reduction)
  - Benefit to Cost Ratio

- Selection ~ ***DENSITY***

CAILLOU LAKE HEADLANDS RESTORATION

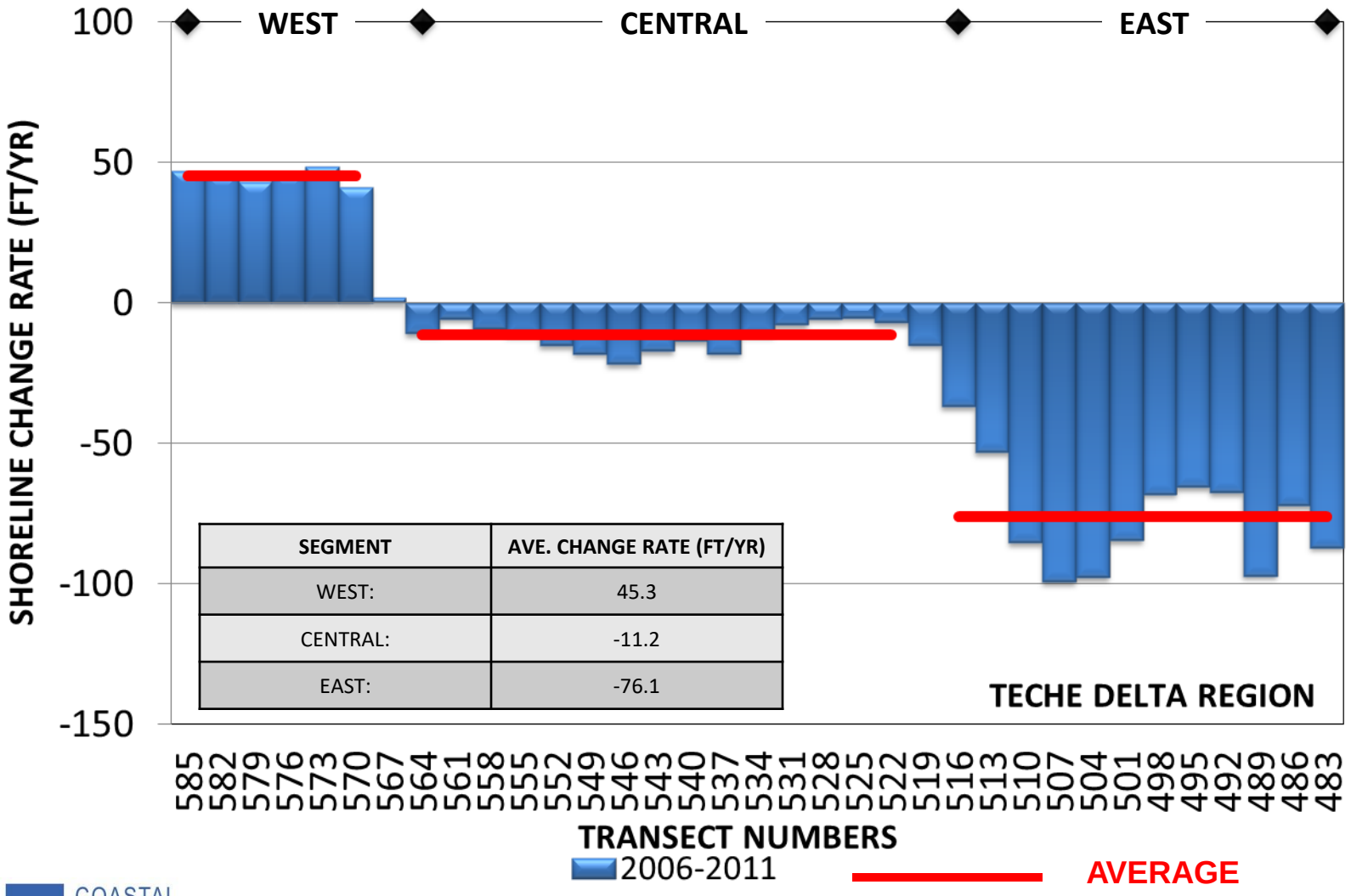
Fun Facts

- **Originally part of the four-island National Ecosystem Restoration Plan in LCA Terrebonne Basin Barrier Shoreline Feasibility Study: Whiskey Island recommended as first component of construction**
- **Project reformulated into Caillou Lake Headlands Restoration**
- **Construction Cost**
  - **Engineer's Opinion of Cost = $99.5 Million**
  - **Construction Bid Range**
    - **Low = $103,184,700**
    - **High = $103,176,805**
    - **Under Construction…**

$7,385 (<0.01% Diff)

- **Construction Elements**
  - **Beach/Dune Fill:** **9.44 MCY(Cut) ~ 754 Acres**
  - **Marsh Creation:** **1.01 MCY(Cut) ~ 178 Acres**
  - **Project Length:** **23,700 Feet**
  - **PROJECT DENSITY:** **441 CY/ LF**

Near-Term Shoreline Change Rates



SEGMENT	AVE. CHANGE RATE (FT/YR)
WEST:	45.3
CENTRAL:	-11.2
EAST:	-76.1

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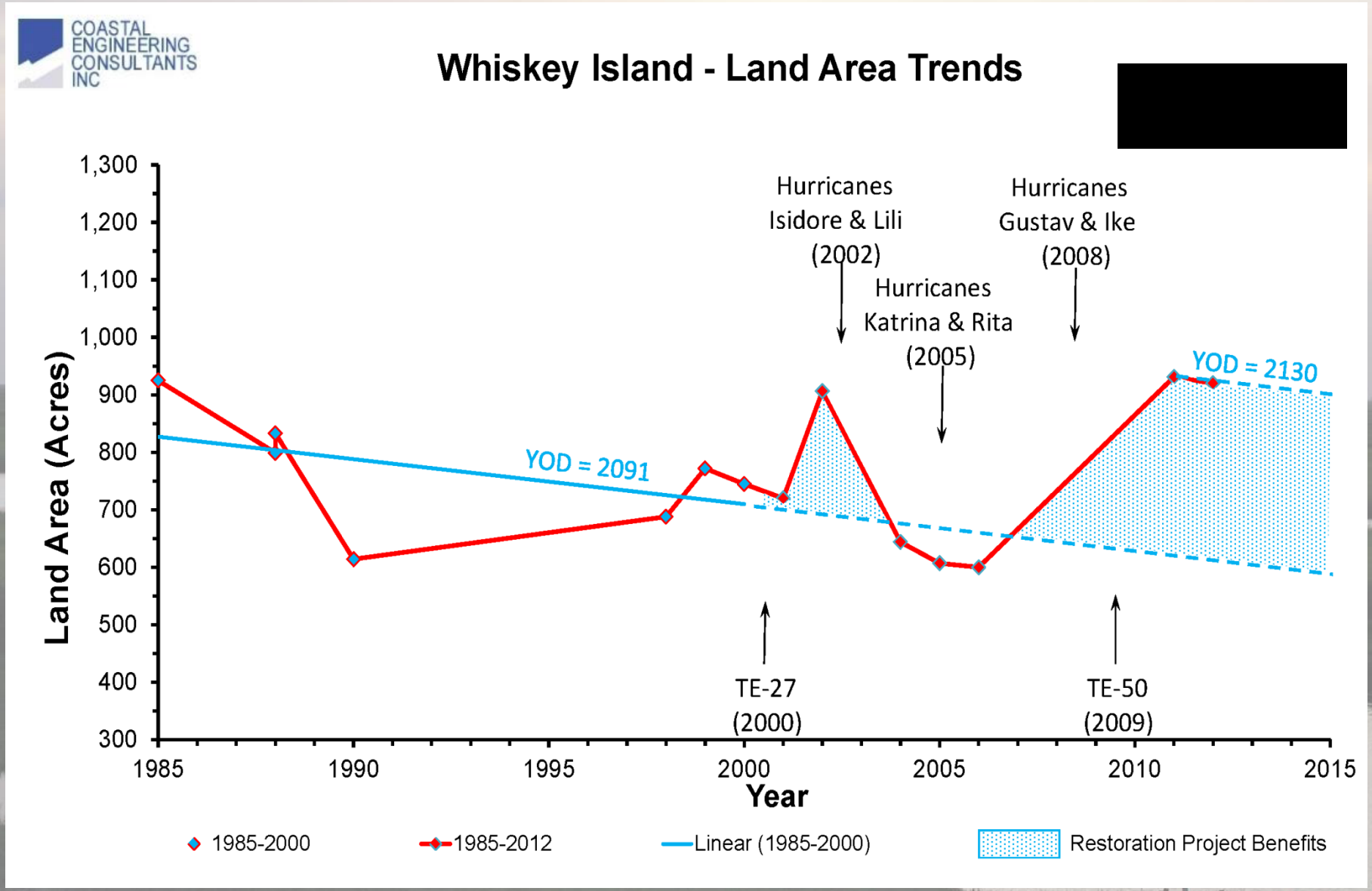
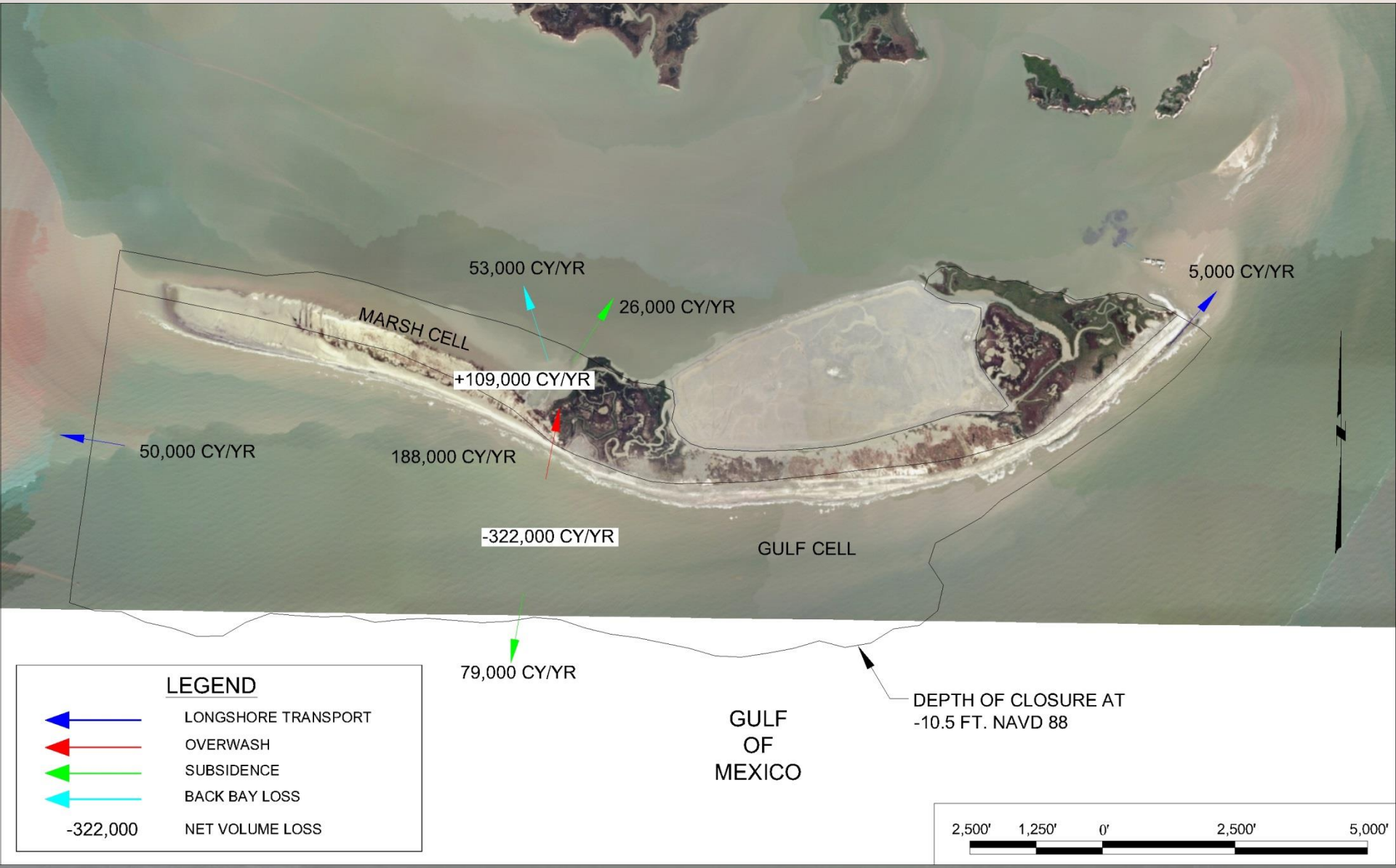
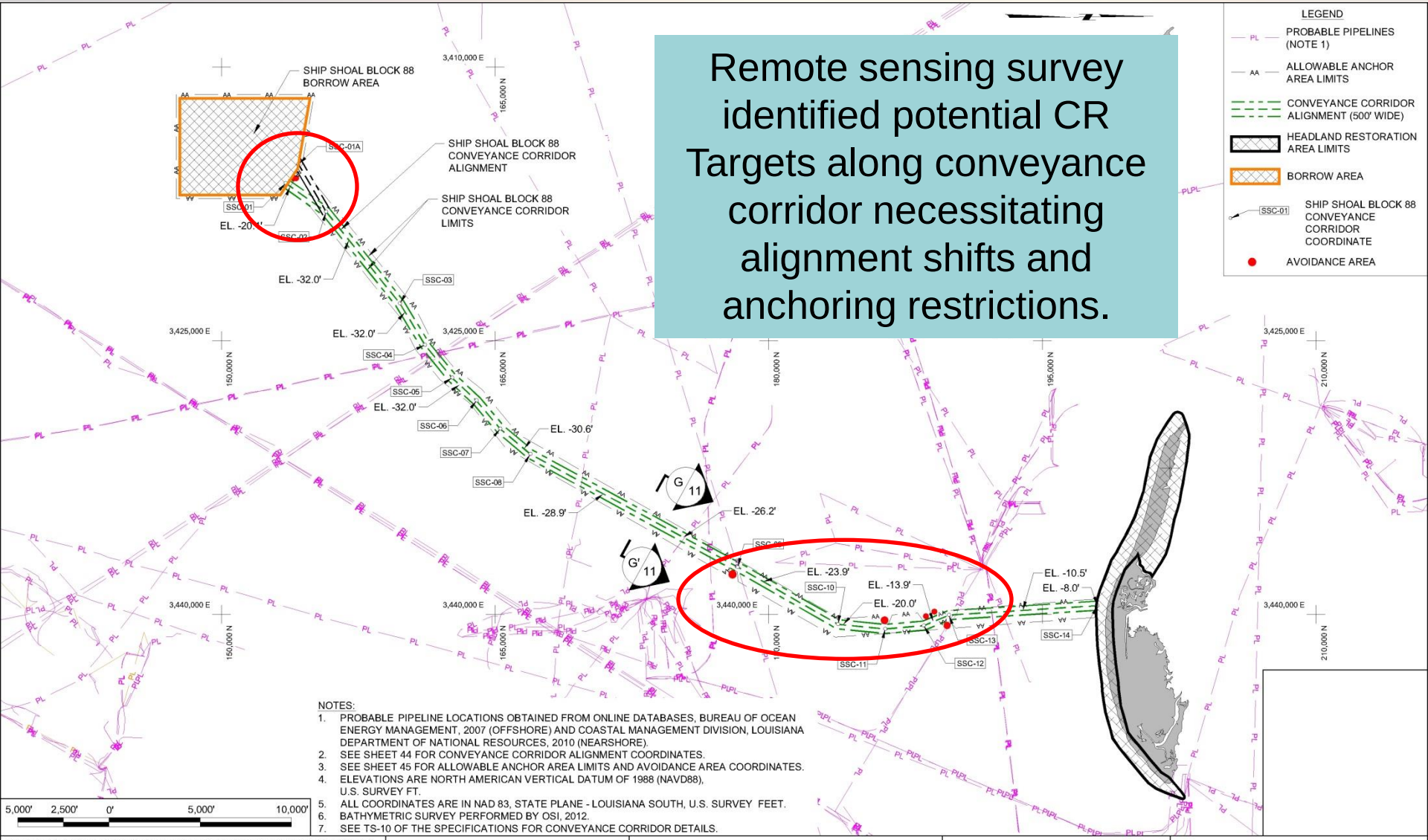
Land Loss


COASTAL ENGINEERING CONSULTANTS INC
Whiskey Island - Land Area Trends
[redacted]
Land Area (Acres)
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
1985
1990
1995
2000
2005
2010
2015
Year
Hurricanes Isidore & Lili (2002)
Hurricanes Katrina & Rita (2005)
Hurricanes Gustav & Ike (2008)
YOD = 2091
YOD = 2130
TE-27 (2000)
TE-50 (2009)
1985-2000
1985-2012
Linear (1985-2000)
Restoration Project Benefits

Sediment Budget



Ship Shoal Block 88 Conveyance Corridor



NOTES:

1. PROBABLE PIPELINE LOCATIONS OBTAINED FROM ONLINE DATABASES, BUREAU OF OCEAN ENERGY MANAGEMENT, 2007 (OFFSHORE) AND COASTAL MANAGEMENT DIVISION, LOUISIANA DEPARTMENT OF NATIONAL RESOURCES, 2010 (NEARSHORE).
2. SEE SHEET 44 FOR CONVEYANCE CORRIDOR ALIGNMENT COORDINATES.
3. SEE SHEET 45 FOR ALLOWABLE ANCHOR AREA LIMITS AND AVOIDANCE AREA COORDINATES.
4. ELEVATIONS ARE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), U.S. SURVEY FT.
5. ALL COORDINATES ARE IN NAD 83, STATE PLANE - LOUISIANA SOUTH, U.S. SURVEY FEET.
6. BATHYMETRIC SURVEY PERFORMED BY OSI, 2012.
7. SEE TS-10 OF THE SPECIFICATIONS FOR CONVEYANCE CORRIDOR DETAILS.

DWH CONFIDENTIAL INFORMATION: PRIVILEGED & CONFIDENTIAL WORK PRODUCT

REV.	DATE	DESCRIPTION	BY

COASTAL ENGINEERING CONSULTANTS, INC.
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5745 ESSEN LANE, SUITE 200
BATON ROUGE, LA 70810

LOUISIANA COASTAL PROTECTION AND RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801

NRDA - CAILLOU LAKE HEADLANDS

STATE PROJECT NUMBER: TE-100

FEDERAL PROJECT NUMBER: TE-100

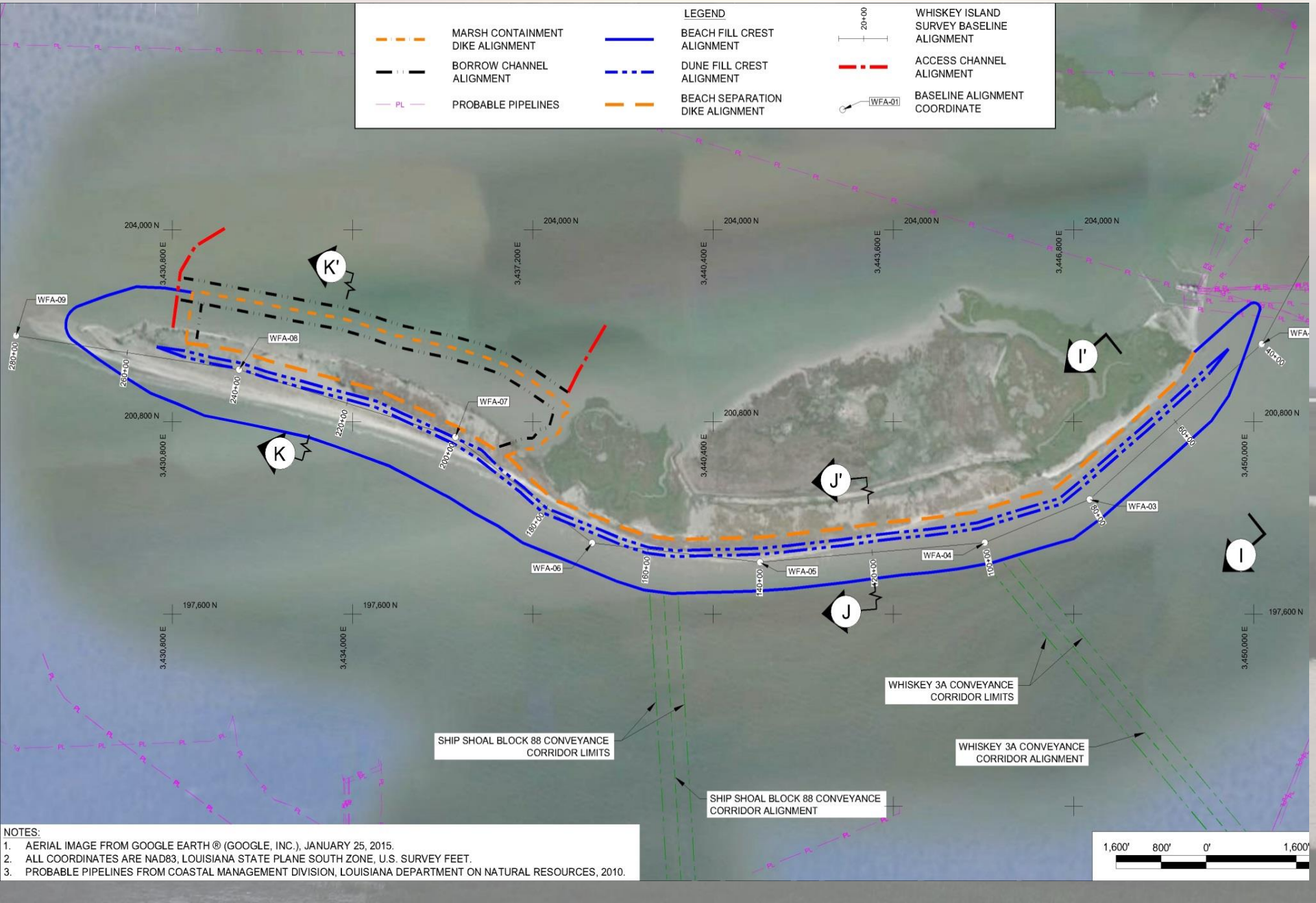
SHIP SHOAL BLOCK 88 CONVEYANCE CORRIDOR PLAN VIEW

DRAWN BY: STEVE DARTEZ | DESIGNED BY: MICHAEL T. POFF, P.E. | APPROVED BY: JACQUES BOUDREAUX

DATE: MAY 2015

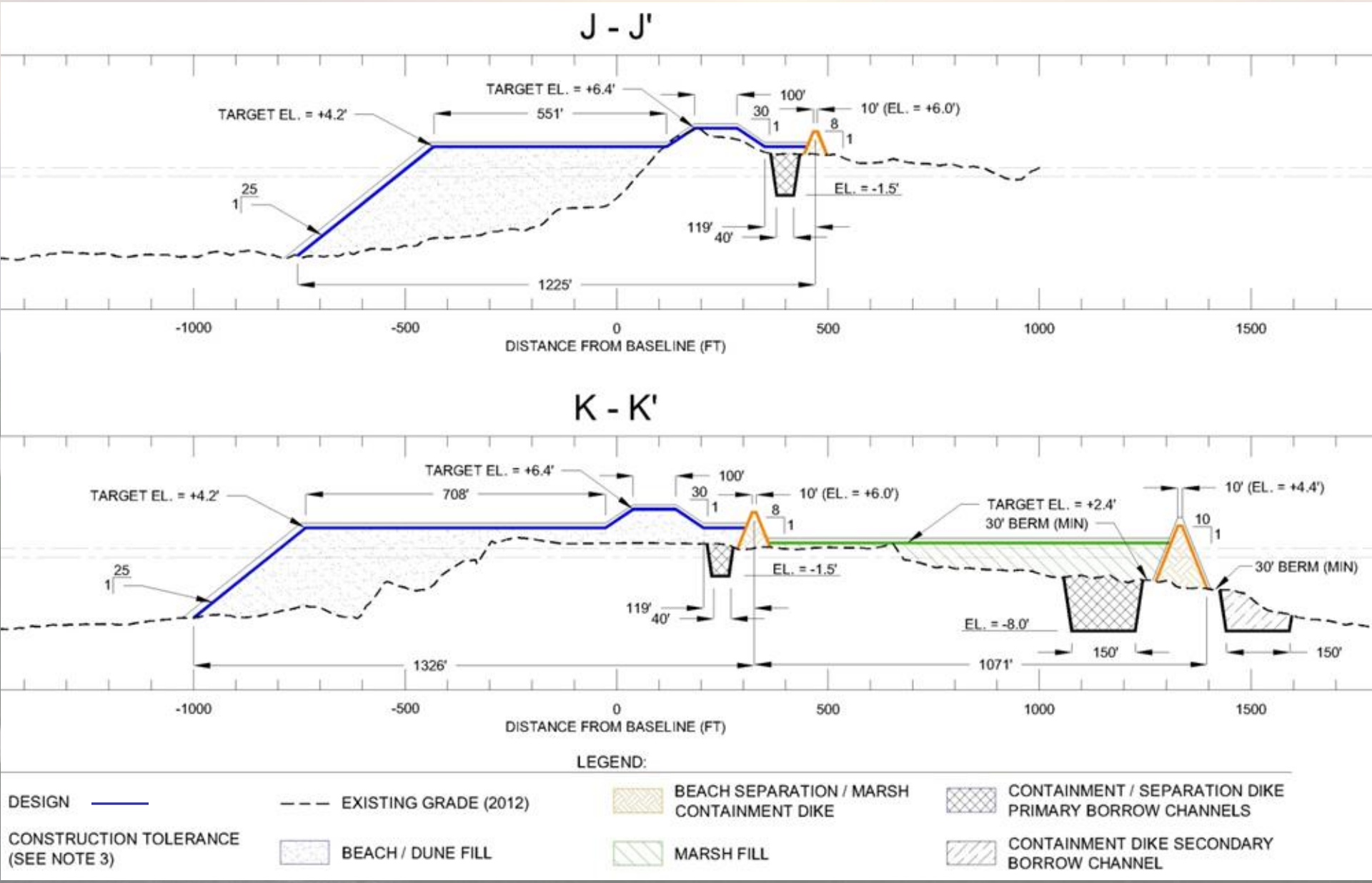
SHEET 10 OF 45

Headland Overview Map



NOTES:
1. AERIAL IMAGE FROM GOOGLE EARTH ® (GOOGLE, INC.), JANUARY 25, 2015.
2. ALL COORDINATES ARE NAD83, LOUISIANA STATE PLANE SOUTH ZONE, U.S. SURVEY FEET.
3. PROBABLE PIPELINES FROM COASTAL MANAGEMENT DIVISION, LOUISIANA DEPARTMENT ON NATURAL RESOURCES, 2010.

Headland Typical Sections



The " BADDEST "

- "Urban Dictionary" Definitions
  - Coolest
  - Toughest
  - The "Duke"

- Attributes of This Barrier Island Restoration Project
  - Design Challenges
  - Regulatory Hurdles
  - Assessing Mining Impacts
  - Maintaining Safe Navigation

- Selection ~ **CONSTRUCTABILITY**

RIVERINE MINING – SCOFIELD ISLAND RESTORATION

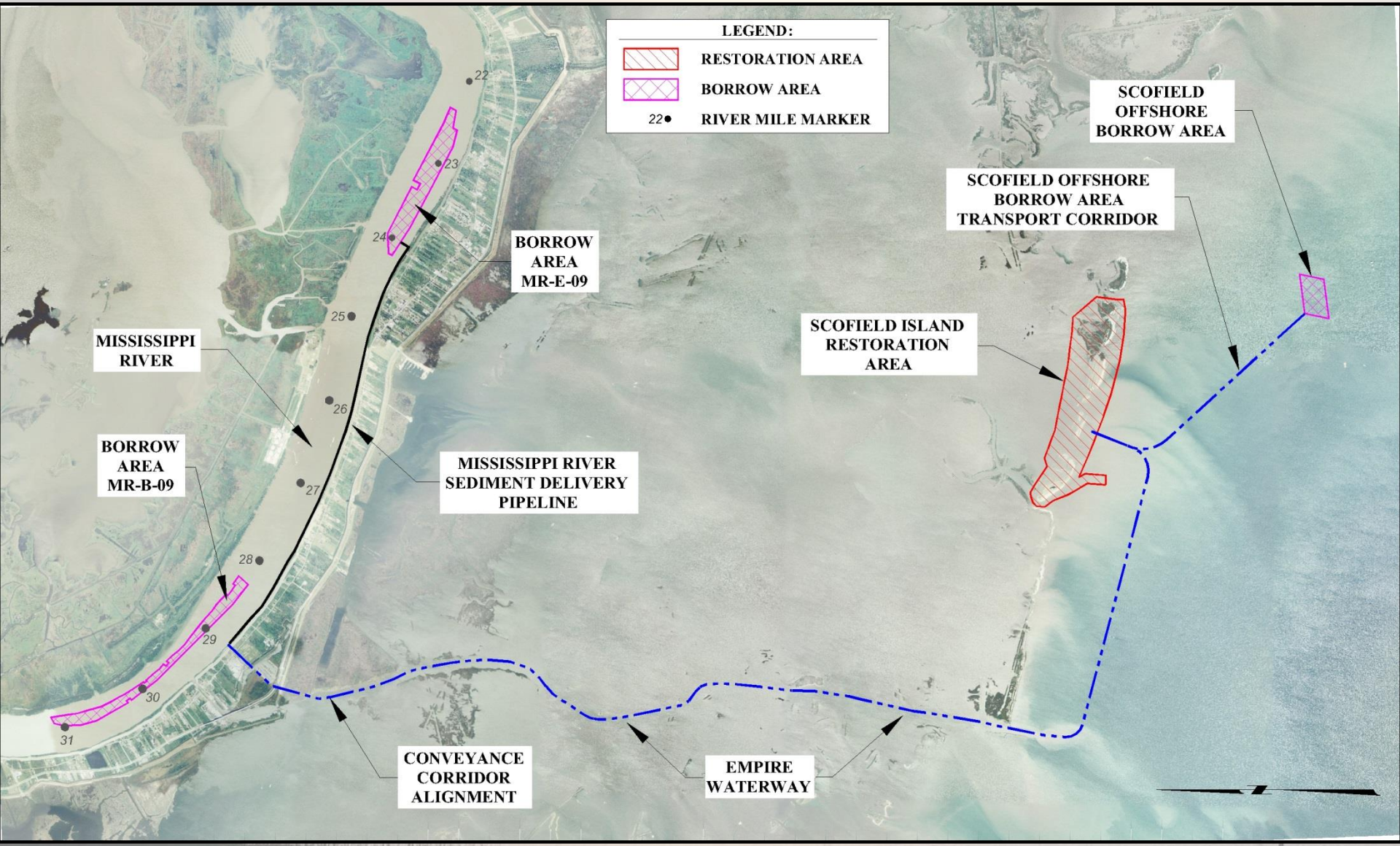
Fun Facts

- **Excavated riverine sediments from one of the Nation's busiest navigational waterways**
- **Delivered riverine sediments over 22 miles (Nation's First for Barrier Islands)**
- **Conveyance corridor required:**
  - **Casing pipe under two highways**
  - **2 levee (over) and 1 harbor canal (under) crossings**
  - **Pipeline installed along 16 miles of Empire Waterway**
  - **Provided 6 navigational crossings for commercial and recreational use over the sediment pipeline**

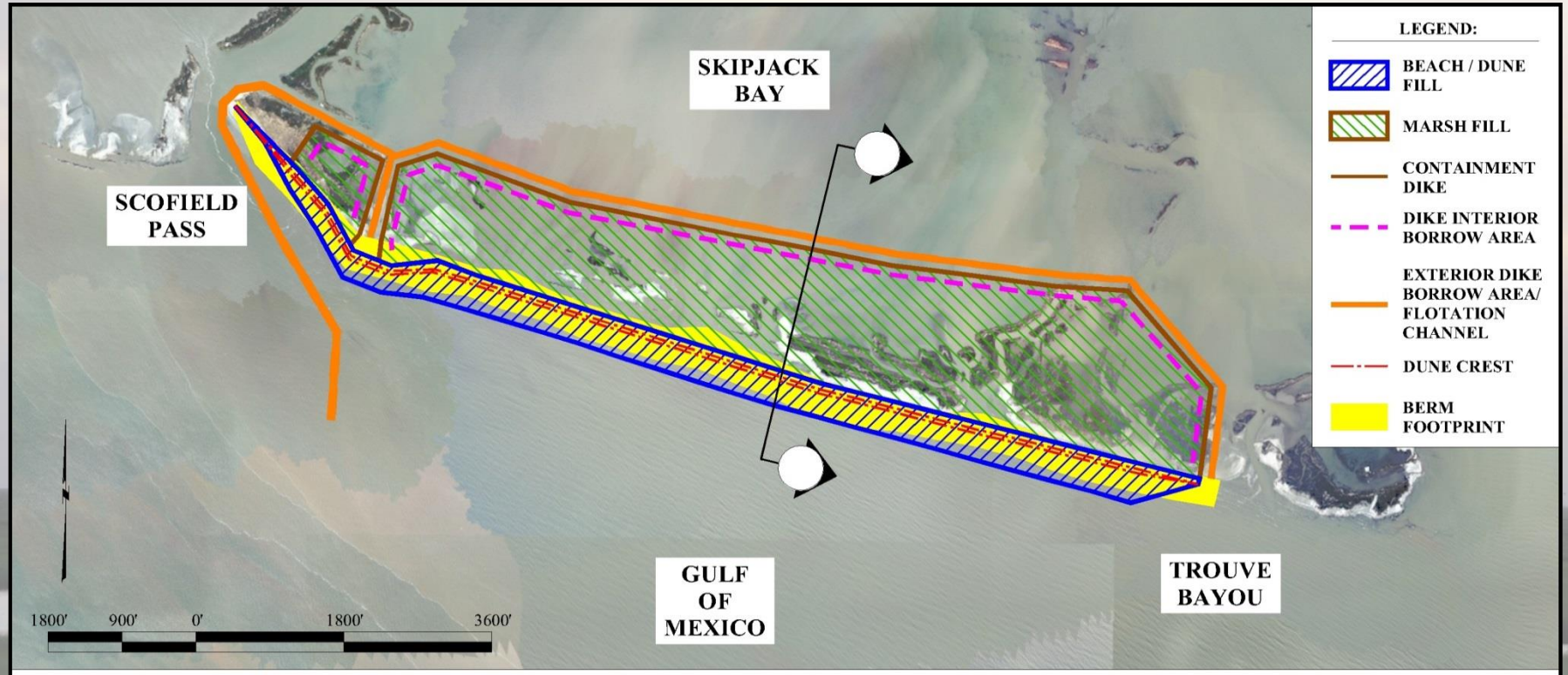
Fun Facts

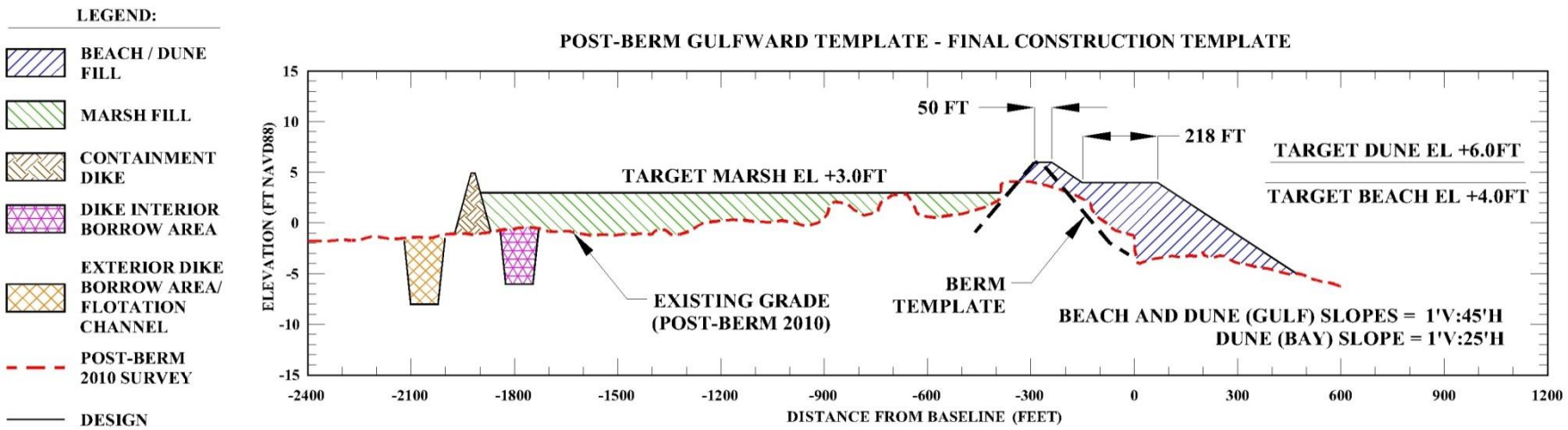
- **Highlight Reel: 50,000 CY/Day Production Rate**
- **Construction Cost**
  - **Engineer's Opinion of Cost = $58.1 Million**
  - **Construction Bid Range**
    - **Low = $46.5 Million**
    - **High = $82.3 Million**
    - **Avg = $64.4 Million**
    - **Final Cost = $52.2 Million**
- **Construction Elements**
  - **Beach/Dune Fill:** 1.89 MCY ~ 150 Acres
  - **Marsh Creation:** 1.63 MCY ~ 360 Acres
  - **Project Length:** 12,670 Feet
  - **Project Density:** 278 CY/ LF
  - **Borrow Area to Island:** 22 Miles

Project Elements



Construction Plan





Pre – Hurricane Isaac

Aero Photo
727.520.8181
www.aerophoto.com

Scofield Island

Image # 120802 6013
Date 08.02.12

Post – Hurricane Isaac

Aero Photo
727.520.8181
www.aerophoto.com

Scofield Island

Image # 121002 6049
Date 10.02.12

Hurricane Isaac Impacts

Original Construction Volumes	
Beach and Dune	1,632,000 cy
Marsh	1,761,500 cy
Hurricane Impacts	
Beach and Dune	- 257,310 cy (-15.8%)
Marsh	+133,260 cy (+7.6%)
Final Construction Volumes	
Beach and Dune	1,889,310 cy
Marsh	1,628,240 cy

Over the River Levee and Thru the Marsh…

GLDD's California in MR

Mississippi River Levee Crossing

Hurricane Protection Levee Crossing

Empire Harbor Canal Crossing

To Scofield Island We Go…

Scofield Island – Post-Construction August 2013

Courtesy of Aero Photo

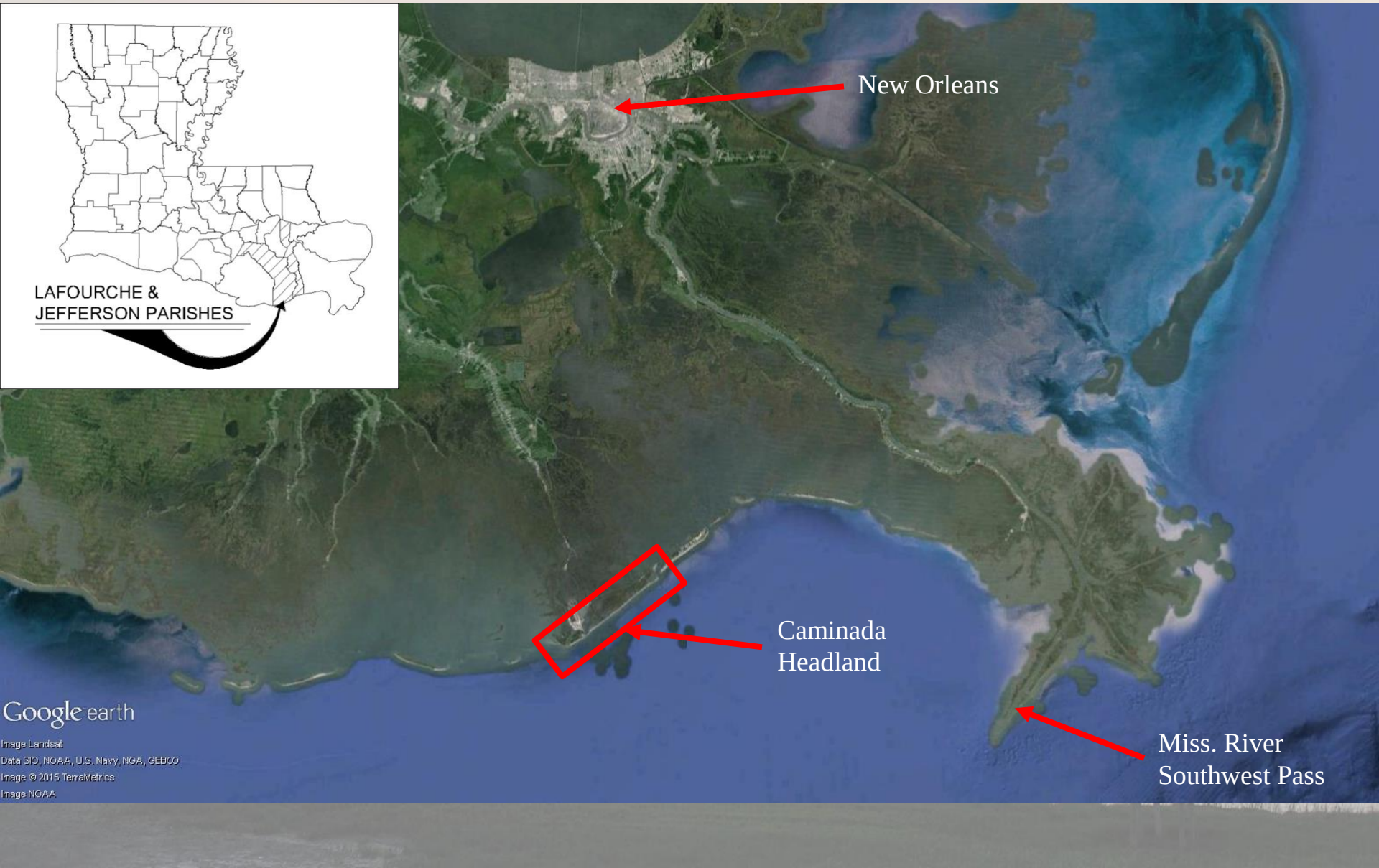
The "BESTEST"

- "Online Urban Slang Dictionary" Definitions
  - To show exceptional quality strong enough to be described by a word that is not technically a part of the English language
  - Incomparable
  - Exceeding the Level of Best
  - The "Best" of the Best
  - The "Greatest Of All Time"

- Attributes of a Barrier Island Restora[illegible]
  - Design Challenges
  - Project Length & Volume
  - Benefits (Habitats, Storm Damage Reduction, Infrastructure)
  - Overcome Regulatory Hurdles
  - Address Hurricane Impacts
  - Selection ~

NATIONAL SIGNIFICANCE!

CAMINADA HEADLAND BEACH AND DUNE RESTORATION

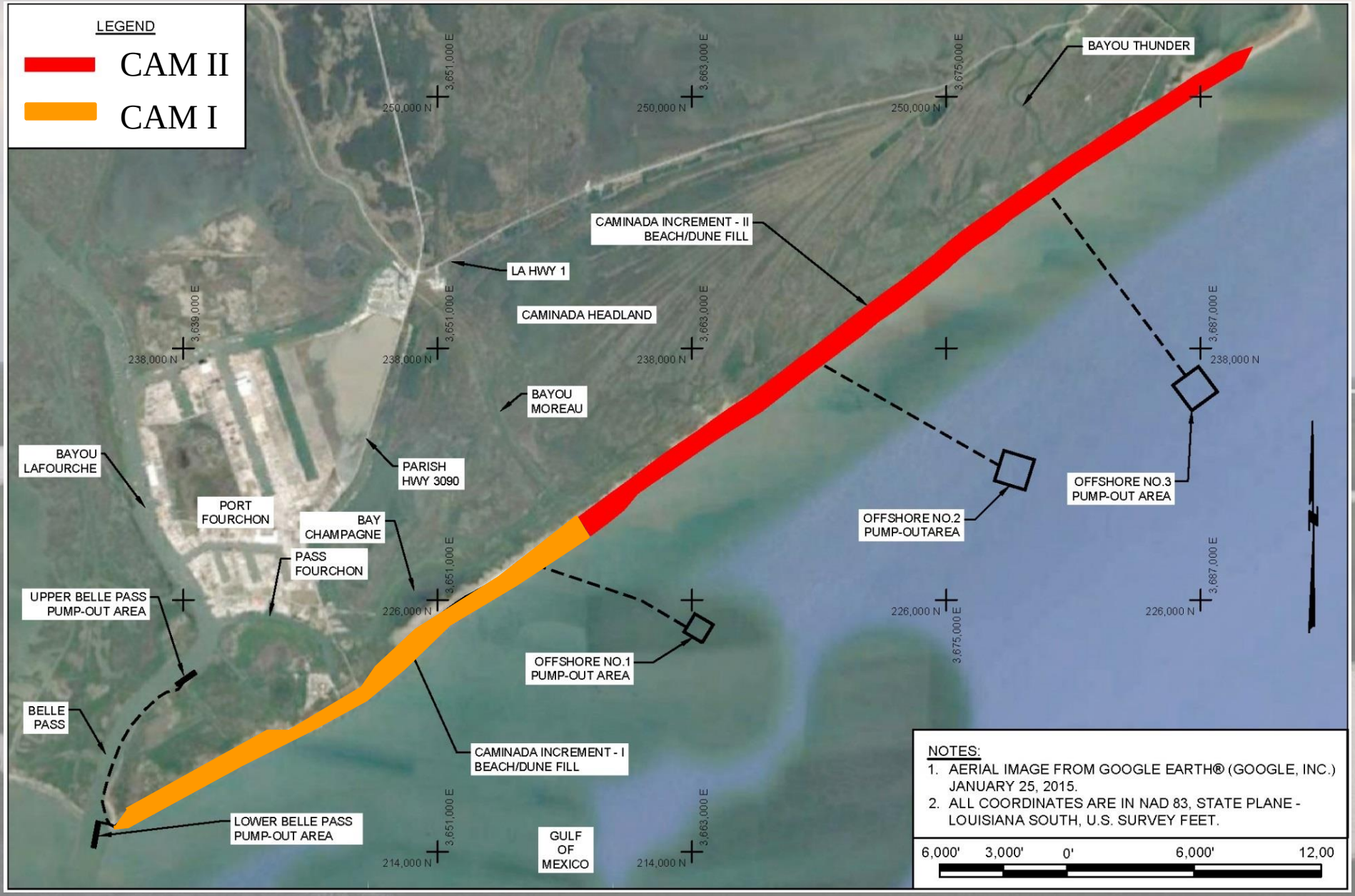


Port Fourchon

- 1,700 developed acres
- Services offshore oil, commercial fishing, seafood, shipping, tourism and recreation industries
- 250 companies utilize as base of operations
- Strategic role in furnishing **15-18% of United States oil supply**
- **Currently services over 90% of Gulf of Mexico deep water oil production**
- Land Base for Louisiana Offshore Oil Port – Only U.S. deep water port capable of offloading very large Crude Carriers and ultra large Crude Carriers

Source: Greater Lafourche Port Commission

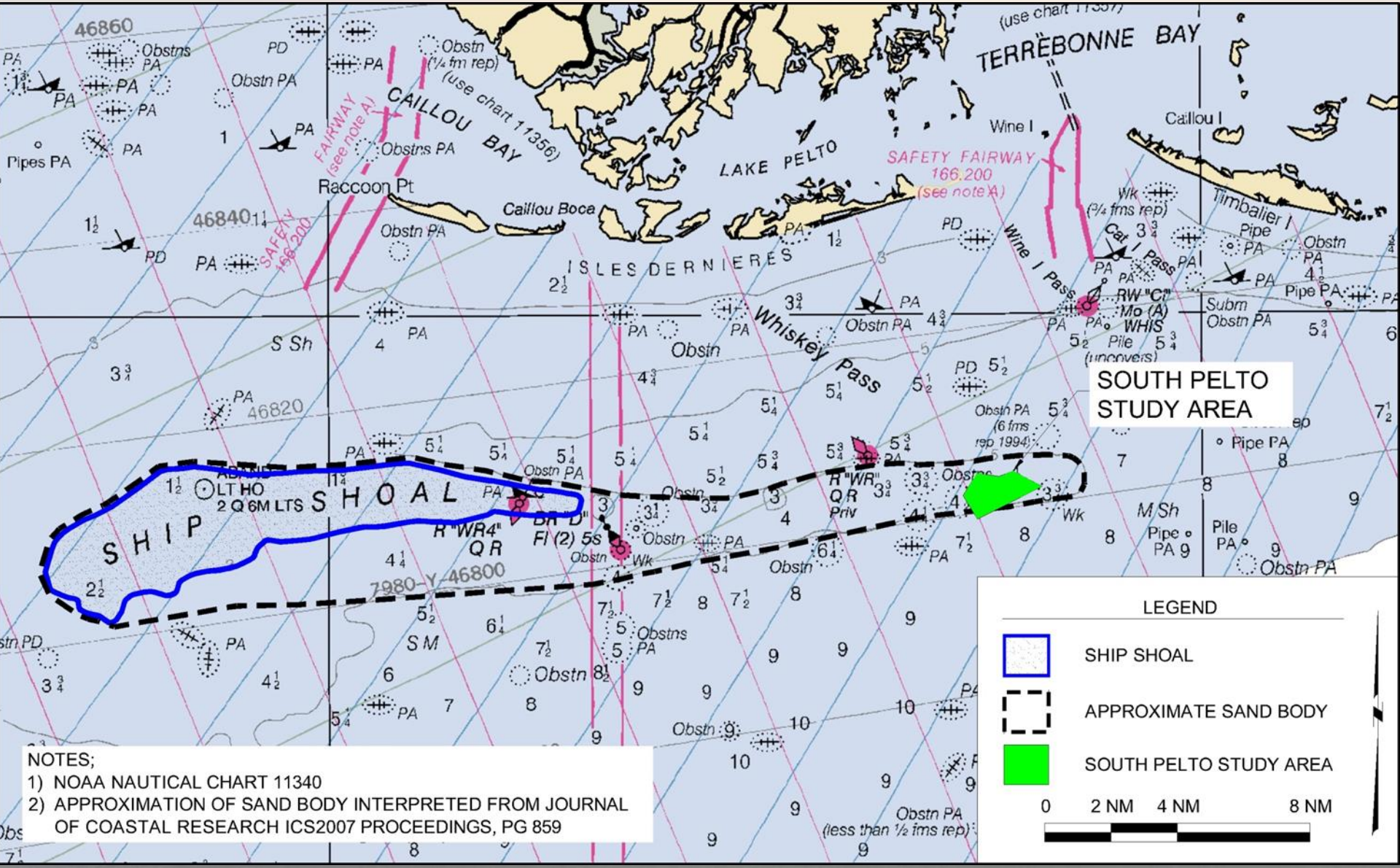
Headland Overview



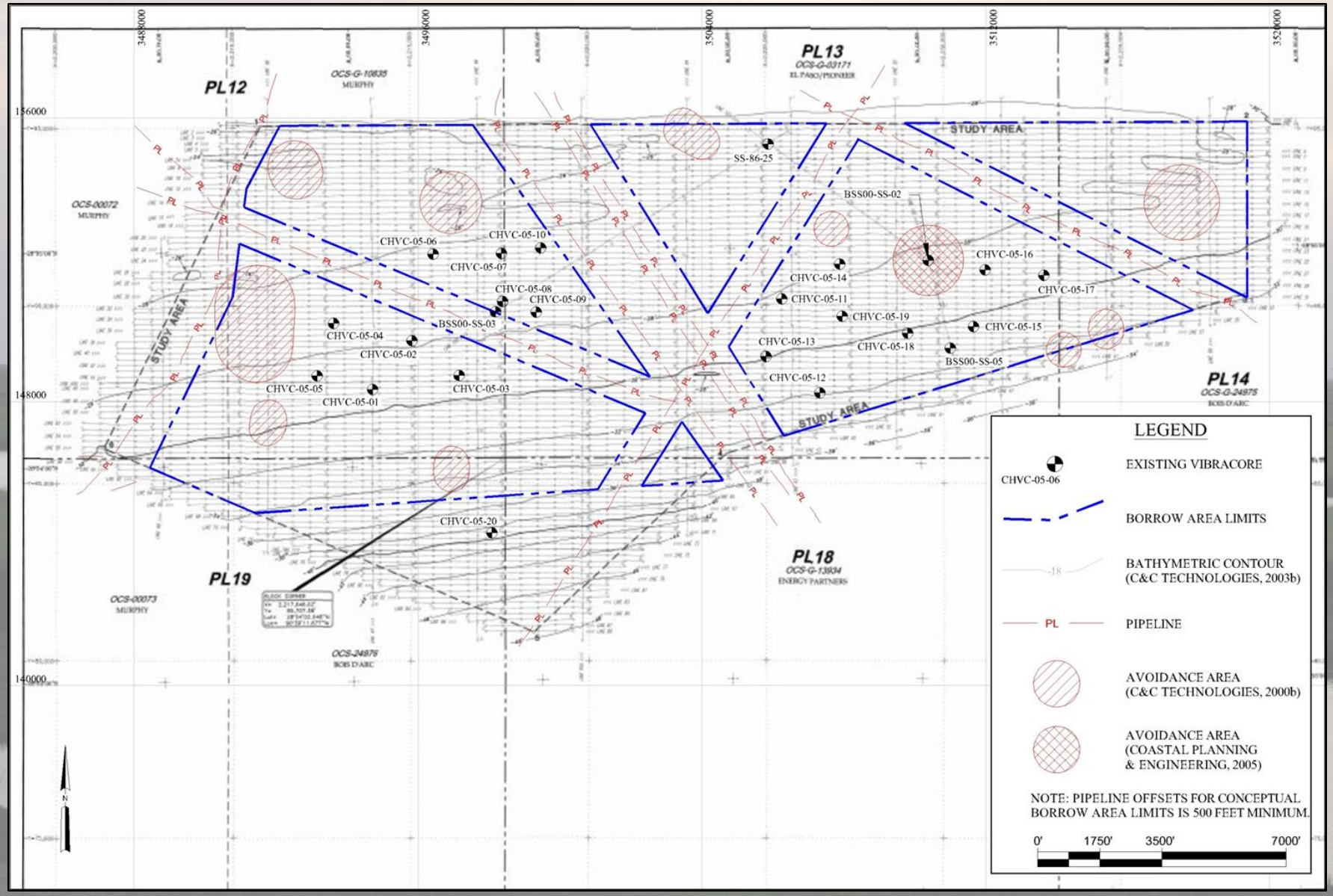
Fun Facts

- **Highlight Reel: 36,000 CY/Day Production Rate**
- **Construction Cost**
  - **Engineer's Opinion of Cost = $196.7 Million**
  - **Construction Bid Range**
    - **Low = $201.4 Million**
    - **High = $222.3 Million**
    - **Avg = $211.8 Million**
    - **Final Cost = $200.9 Million**
- **Construction Elements**
  - **Beach/Dune Fill:** **8.84 MCY ~ 1,060 Acres**
  - **Project Length:** **65,800 Feet**
  - **Project Density:** **134 CY/ LF**
  - **Borrow Area to Island:** **30+ Miles**

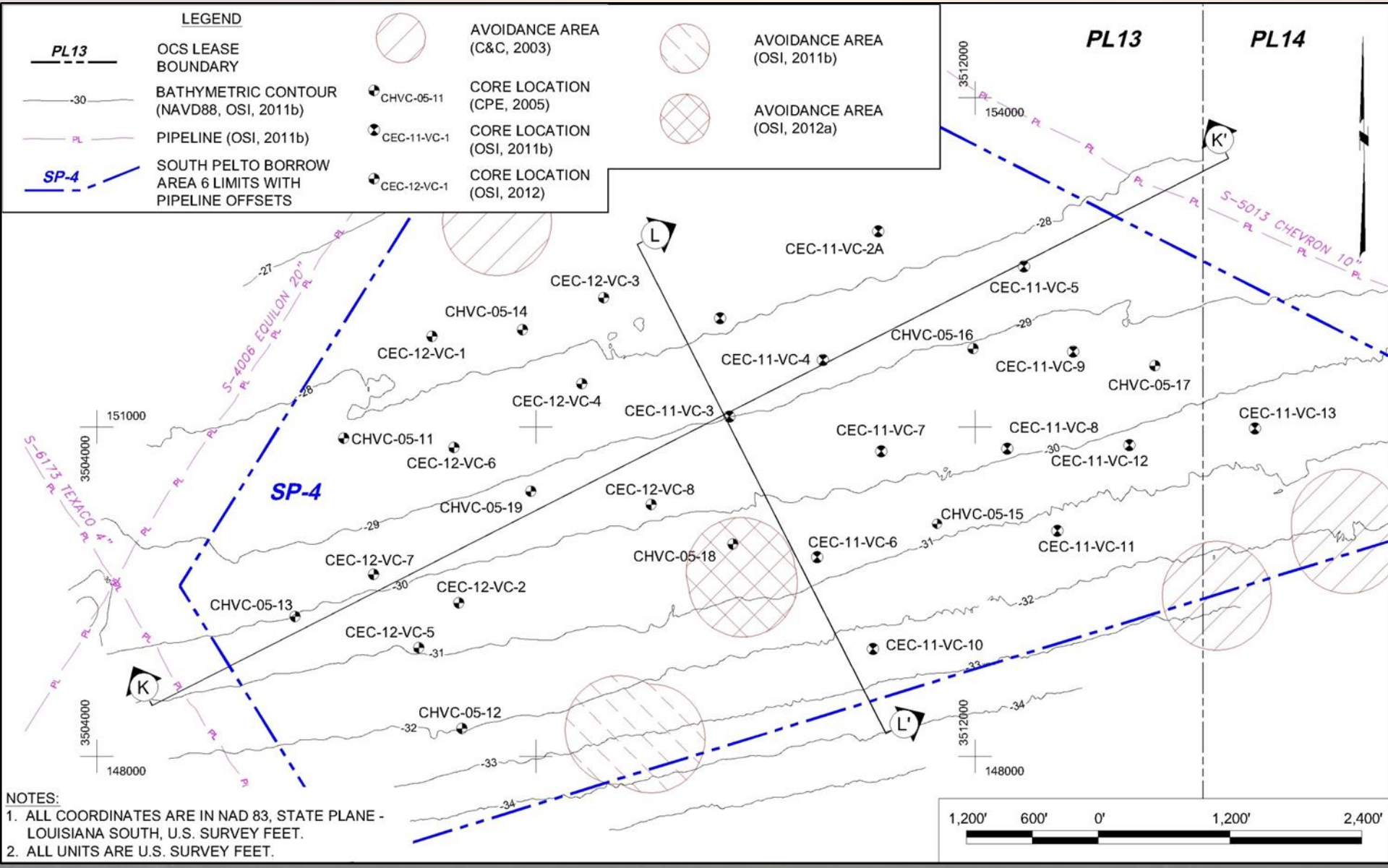
Ship Shoal Overview



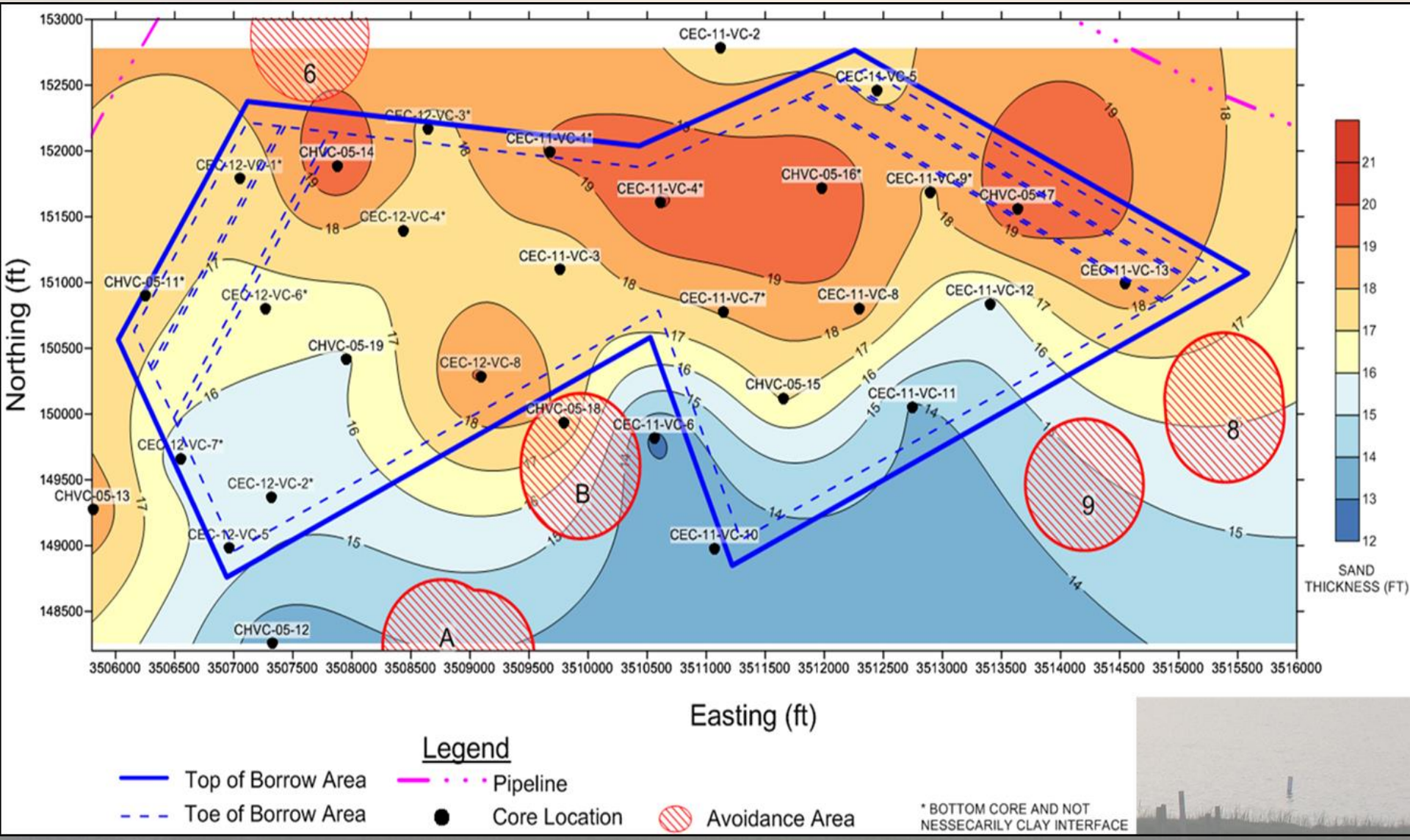
Prior Studies



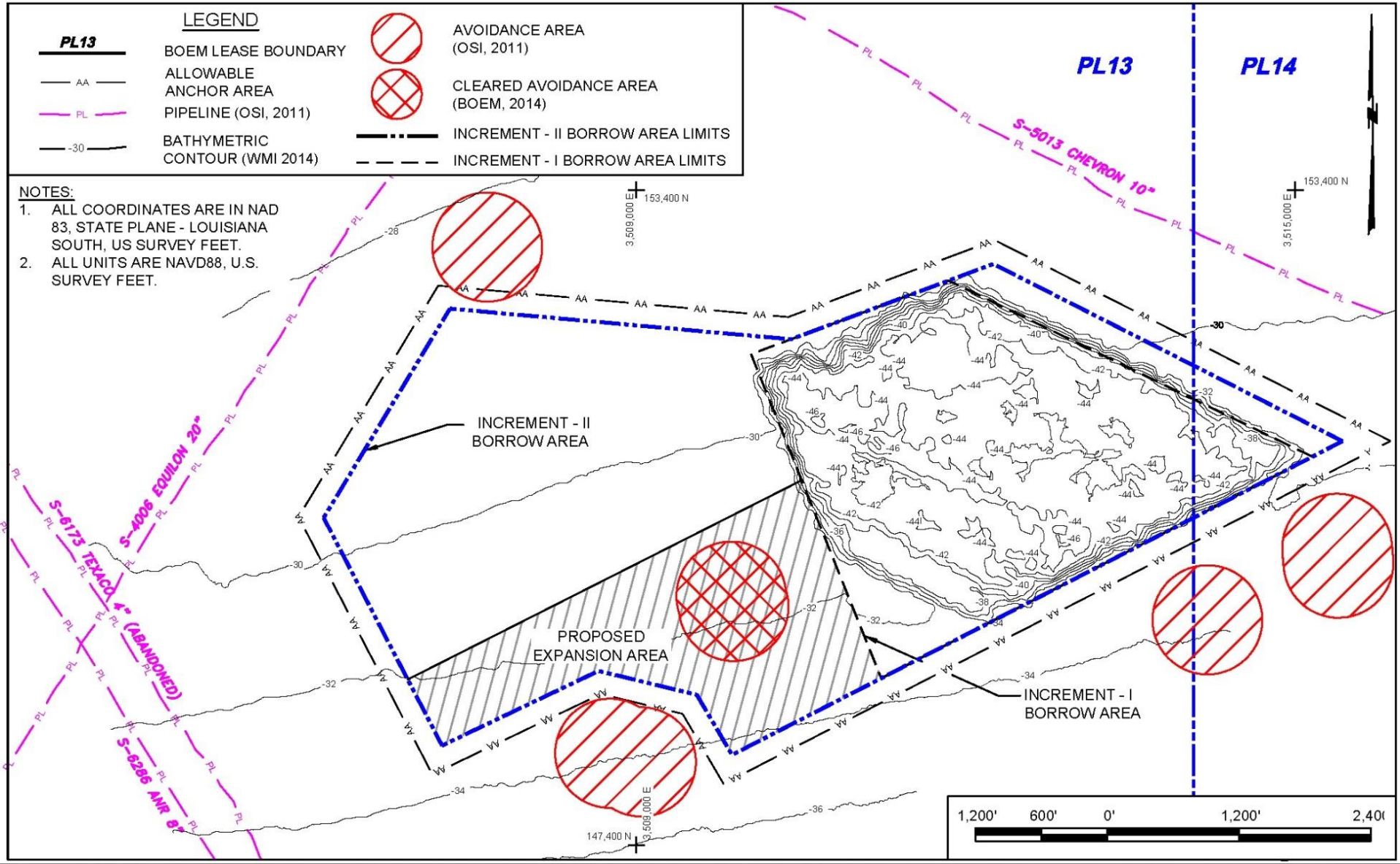
Geotechnical Investigations



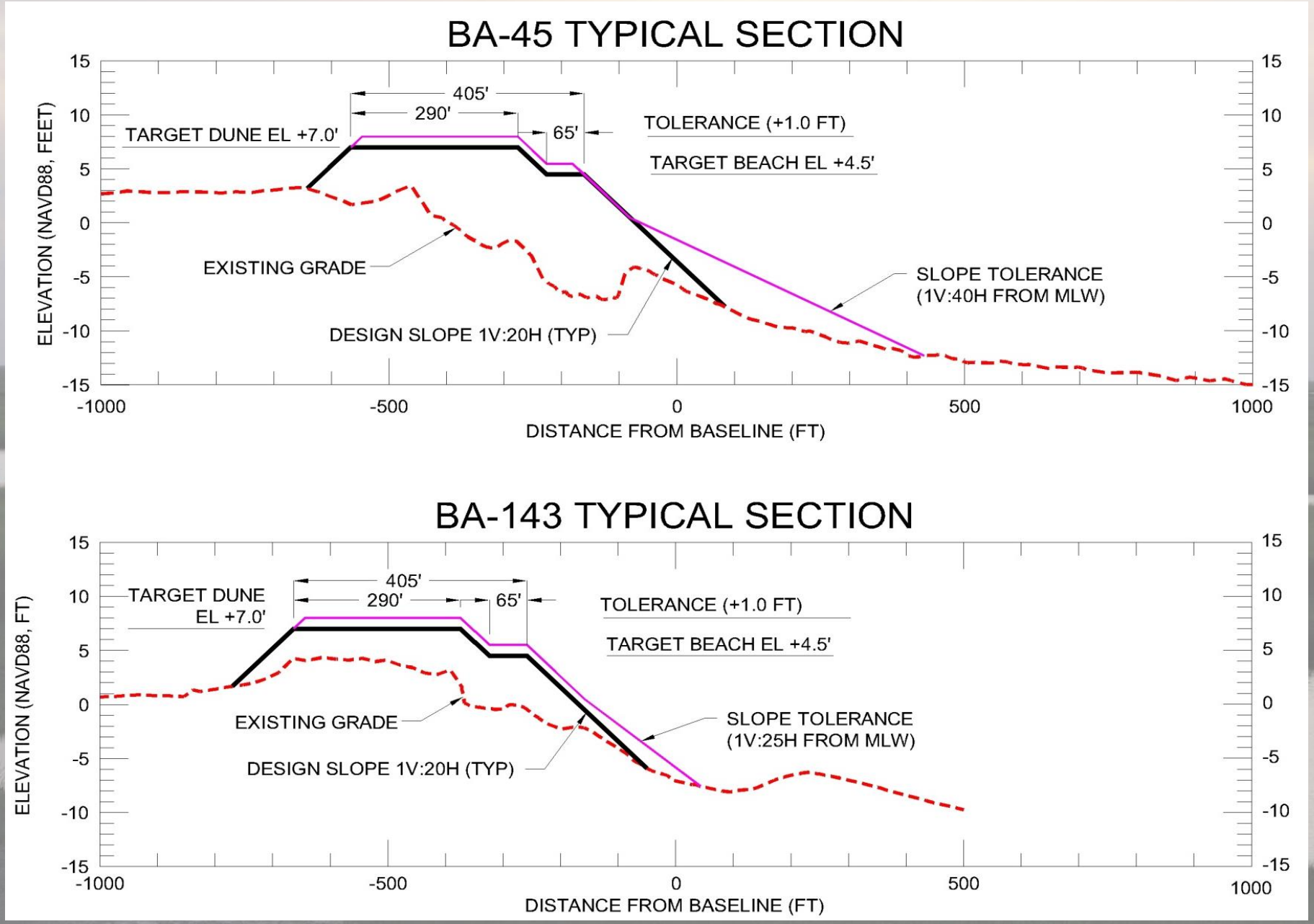
Isopach Map of Sand Thickness



Borrow Area Plan



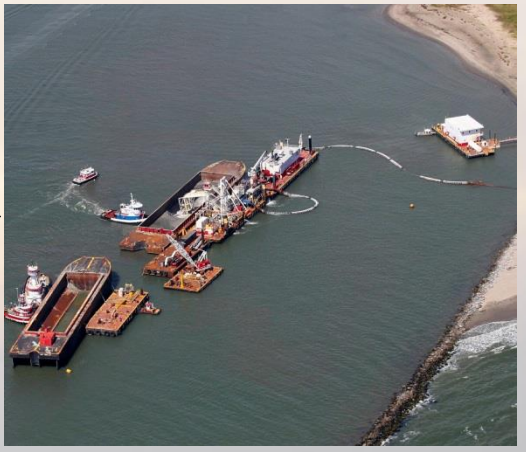
Typical Design Sections



Sediment Transport Methods

Cutterhead Dredge Excavation and Filling Scow Barge via Spider Barge

Scow Barge Transport to Fill Area



Hydraulic Unloading of Scow Barge and Pump to Fill Area

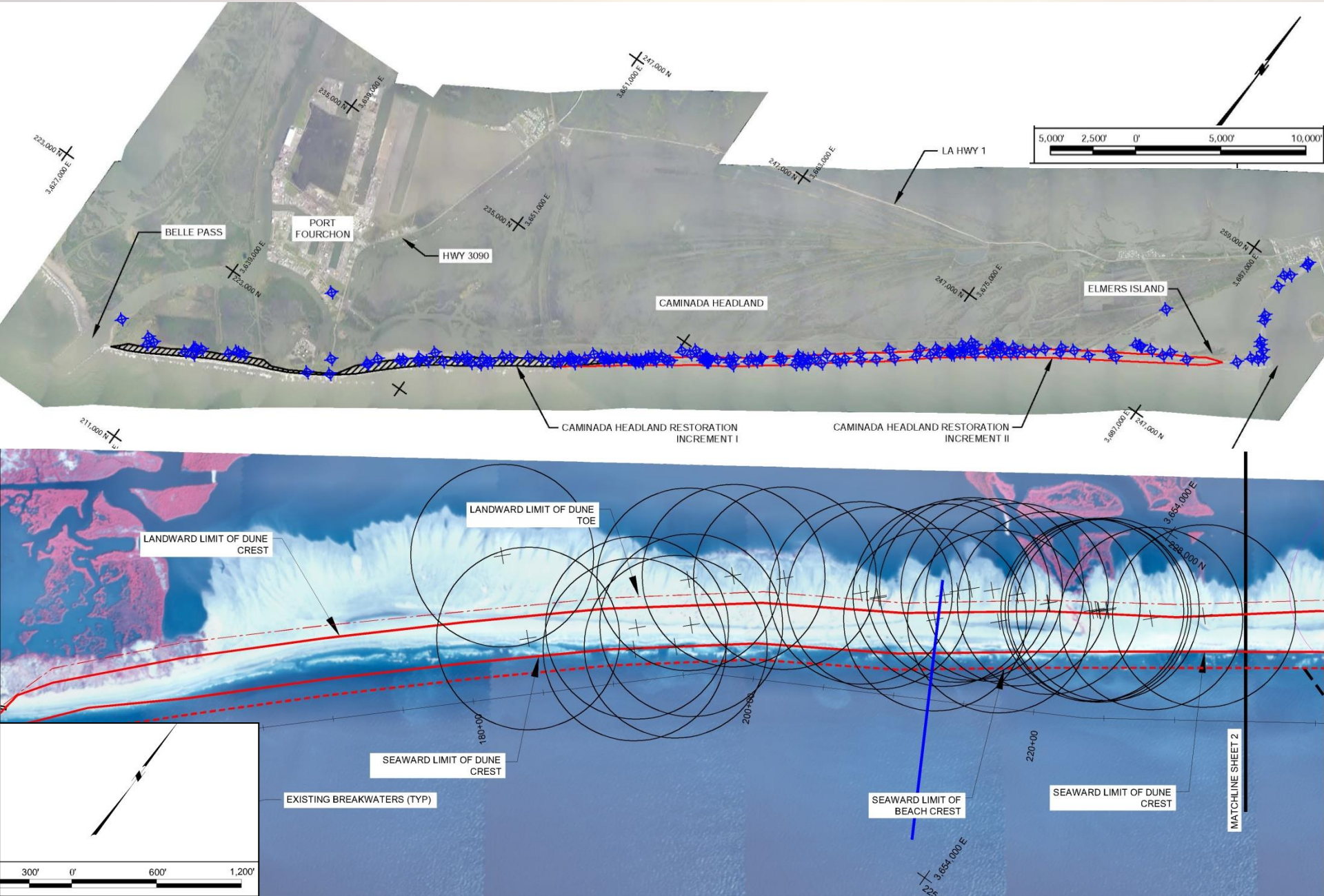
Hopper Dredge Excavation and Transport to Fill Area

Hopper Dredge Pump to Fill Area

Discharge at Fill Area

Migratory Bird Nesting

Nesting Bird Abundance



Bird Abatement – Wind Rows

Sea Turtle Protection

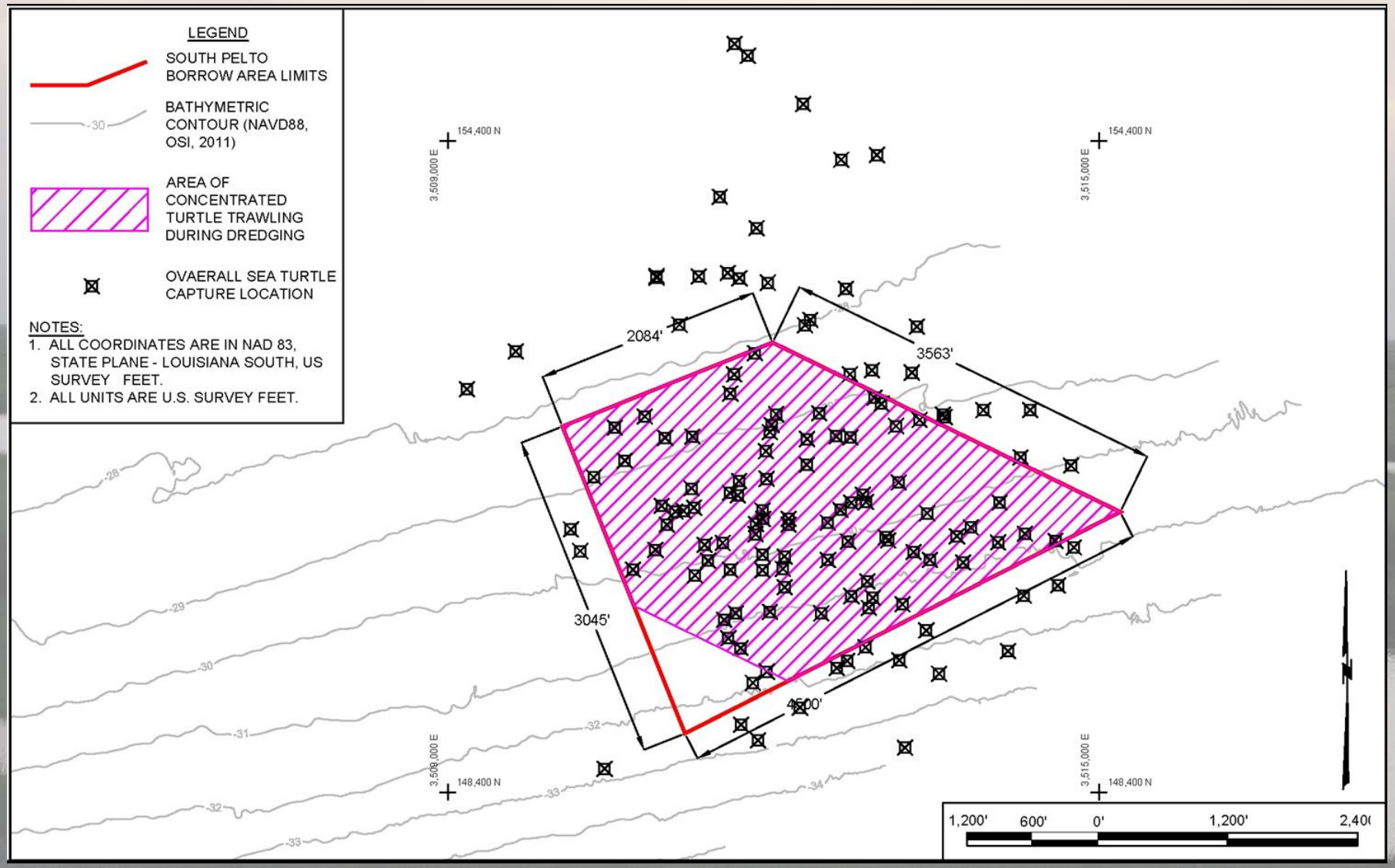
Biological Opinion Requirements – Inflow / Outflow Screening

Sea Turtle Protection

Biological Opinion Requirements – Relocation Trawling

Sea Turtle Relocation Trawling

Relocation Trawling Capture Locations

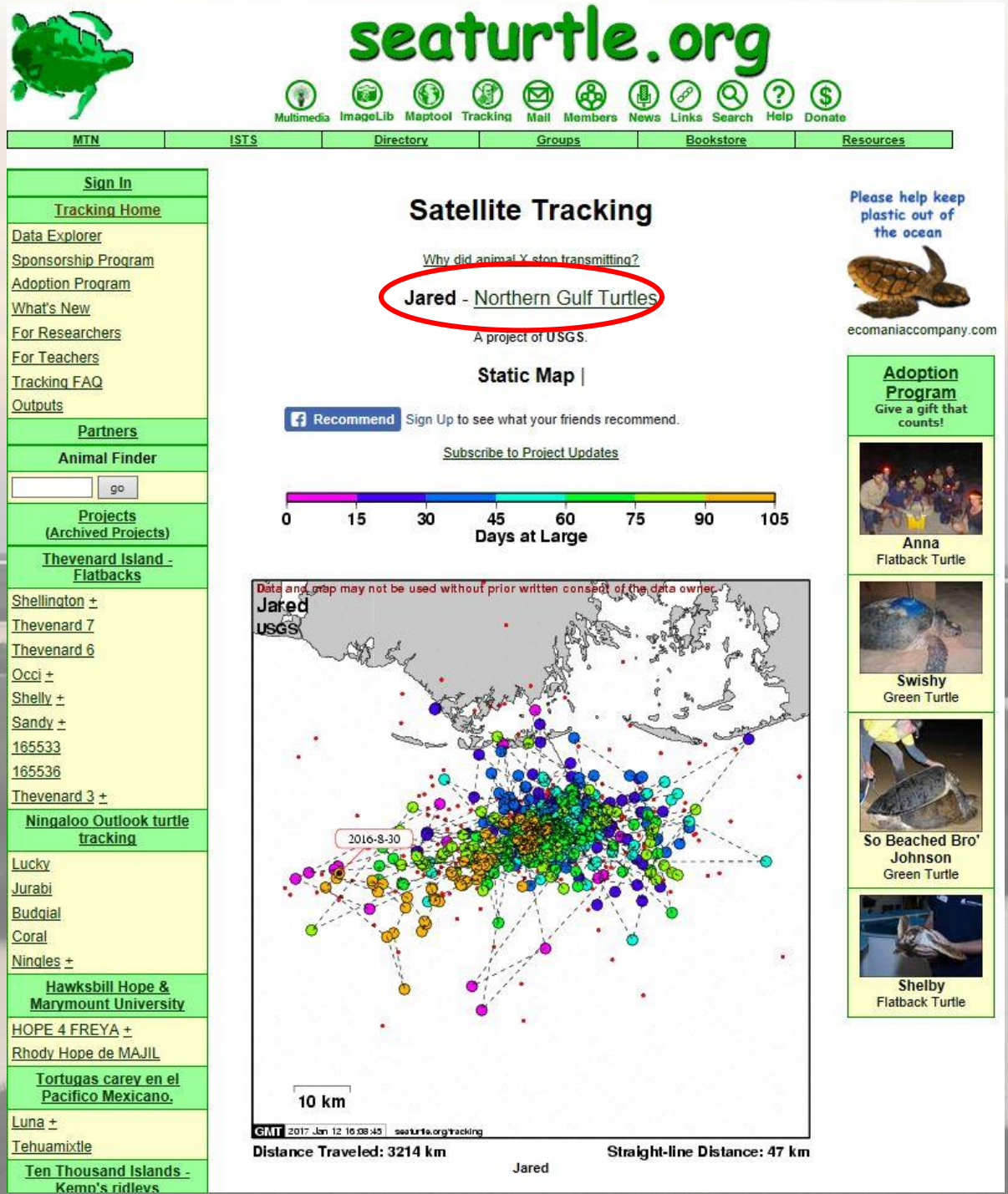


Sea Turtle – Hopper Dredging / Trawling

	CAM I	CAM 2	COMBO
Relocation Trawling Days	111	68	179
Total Number of Hopper Loads	384	117	501
Volume of Sediment Excavated	765,000	554,000	1,319,000
Total Number of Relocation Trawls	1582	808	2390
Total Relocations Total	157	43	200
Kemps Ridley	83	33	116
Loggerhead	69	7	76
Green	2	0	2
Recaptures	3	3	6
Injury or Mortality from Relocations	0	0	0
Geolocator Tags with USGS	0	10	10
Incidental Takes From Dredging	1	0	1
Endangered Species Observer	REMSA	REMSA	
Turtle Trawling Relocation Co	Coastwise Cons	East Coast Obs	
Hopper Dredges	R N W/B.E. Lind	Stuyvesant	

Sea Turtle Tracking

- CAM II Turtle Family
  - Alex
  - Barb
  - Heather
  - Jared
  - Jewel
  - Lexi
  - Lori
  - Rusty
  - Savanna
  - Tini
  - Tish
  - Yazu



CAM I Completed Project

CAM II Under Construction

Acknowledgements