The Juno Beach Shore Protection Project and Oyster Reef Restoration in the Loxahatchee River

(or… Making Lemonade out of Lemon-Sized Rocks)

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Palm Beach County Dept of Env. Resources Mgmt
Bud Howard
Loxahatchee River District
Kathy Fitzpatrick
Martin County Engineering Department

(We are here)

(Juno Beach)

ESC-AMBIA
SANTA ROSA
OKALOOSA
WALTON
HOLMES
WASH-INGTON
JACKSON
BAY
CALHOUN
LIBERTY
GADSDEN
LEON
WAKULLA
JEFFERSON
MADISON
TAYLOR
GULF
FRANK-LIN
HAMILTON
SUWAN-NEE
LAFAY-ETTE
COLUMBIA
BAKER
NASSAU
DUVAL
UNION
CLAY
ST. JOHNS
BRAD-FORD
ALACHUA
PUTNAM
FLAG-LER
DIXIE
GILCHRIST
LEVY
MARION
VOLUSIA
SEMINOLE
LAKE
CITRUS
SUM-TER
HER-NANDO
ORANGE
BREVARD
PASCO
PINELLAS
OSCEOLA
HILLS-BOROUGH
POLK
INDIAN RIVER
MANATEE
HARDEE
OKEE-CHOBEE
ST. LUCIE
HIGH-LANDS
SARA-SOTA
DESOTO
MARTIN
CHAR-LOTTE
GLADES
LEE
HENDRY
PALM BEACH
BROWARD
COLLIER
MIAMI-DADE
MONROE

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- Entire area designated as "Critically Eroded"
- 2.4 mile fill template
- DNR survey monuments R-26 and R-38
- ~1,000,000 cu yds of fill
- Four municipal parks
- 70 % of project area is
  - Public land
  - Parks
  - Public beach access
- Remainder is publicly accessible
- Juno Beach fishing pier
- Special permitting considerations:
  - Sea Turtles
  - Shorebirds
  - Nearshore reef


11.04.2008

Permit History

- Planned Construction: November 2008
- Pre-application meeting: April 2007
- Application Date: May 2007
- Public Notice Published: October 2007
- RAIs received: 1 Federal, 5 State
- Receipt of USFWS BO: September 2008
- Receipt of NMFS BO: January 2009
- USACE Permit Received: March 2009

A new borrow area, located in 70 fsw, offshore of Singer Island, FL was coarser and more similar to the native beach than the previous sand source. Seismic and sub bottom profiling combined with 42 vibracores showed a consistent borrow area, with enough beach quality material for the next two nourishment projects… or so it was thought

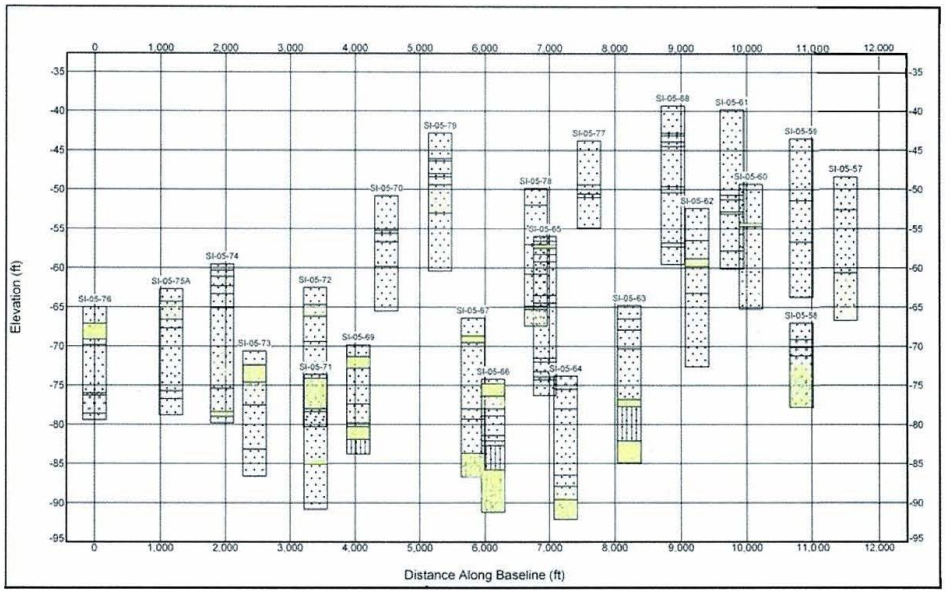
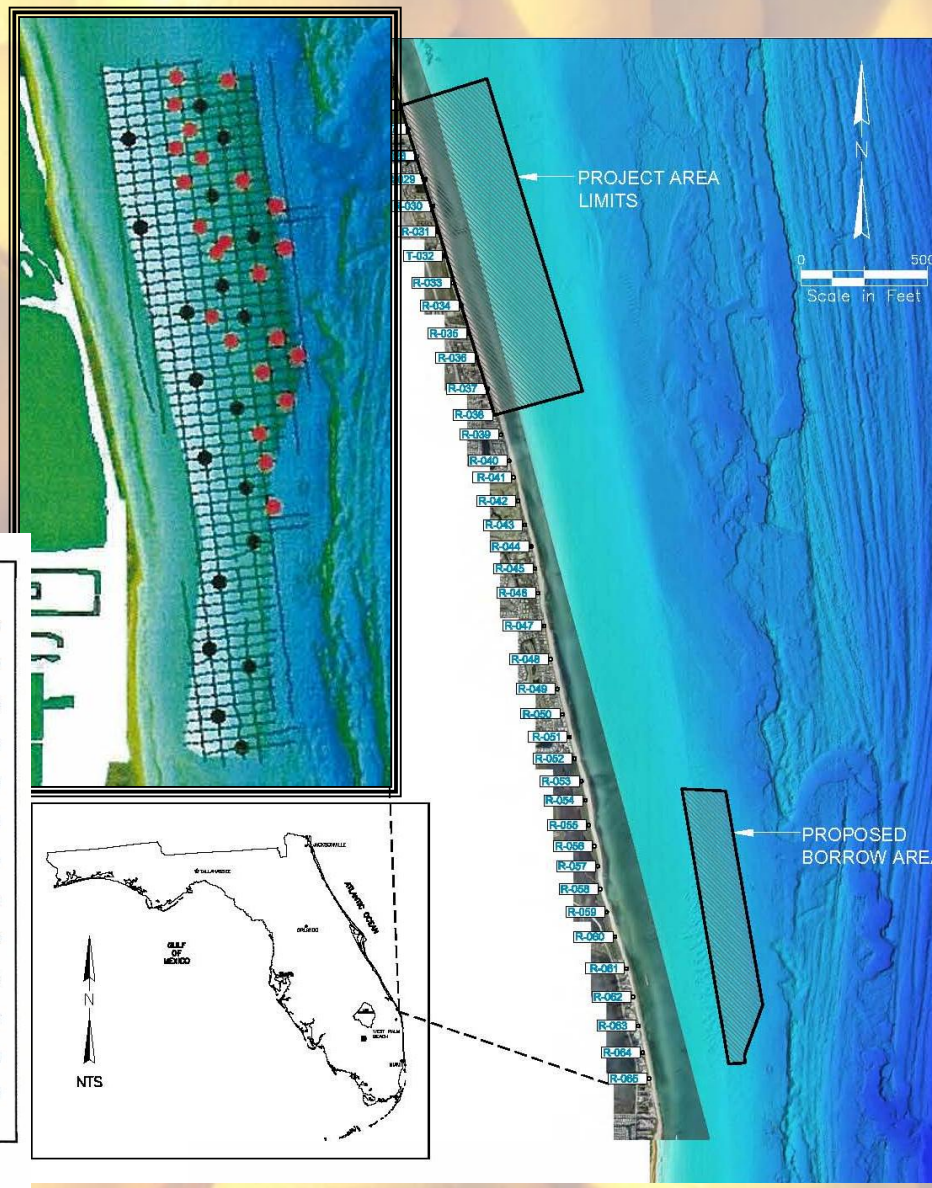
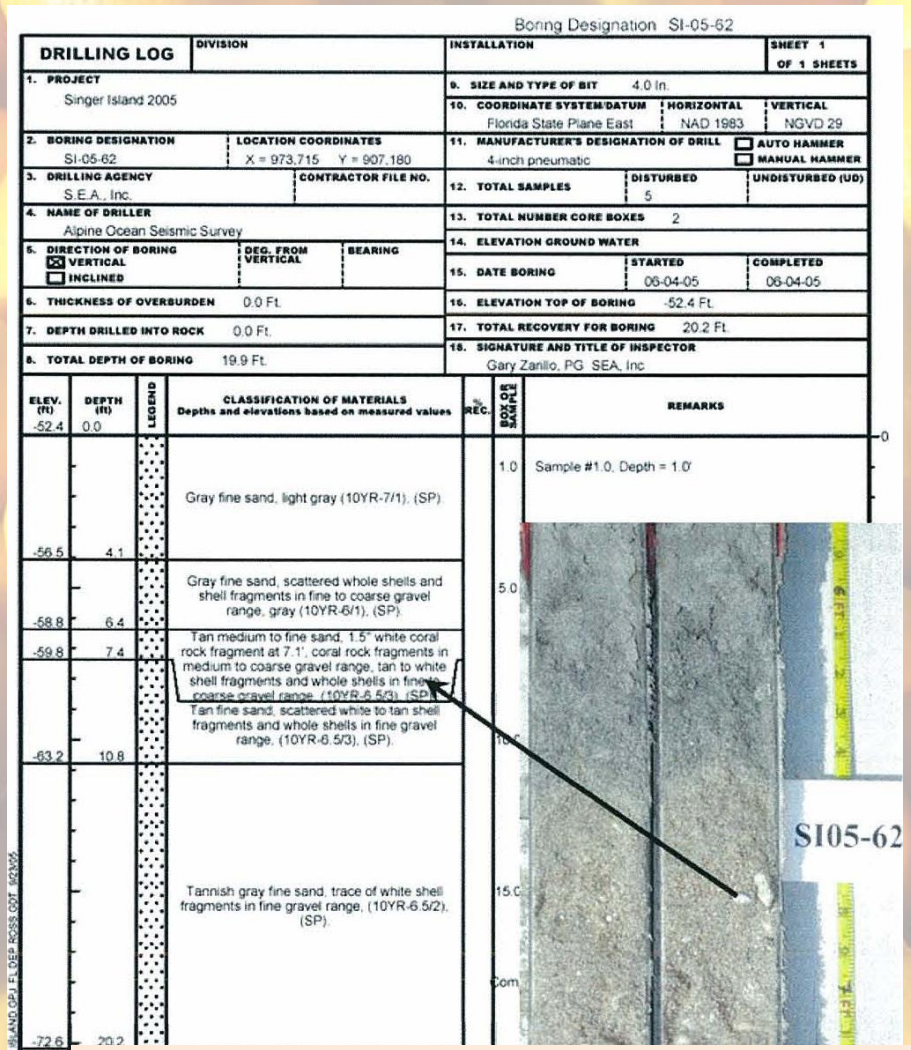


Figure 4. Spatial array of 2005 cores from the Singer Island survey area. The occurrence of scattered rock rubble in cores is shown in the yellow pattern.



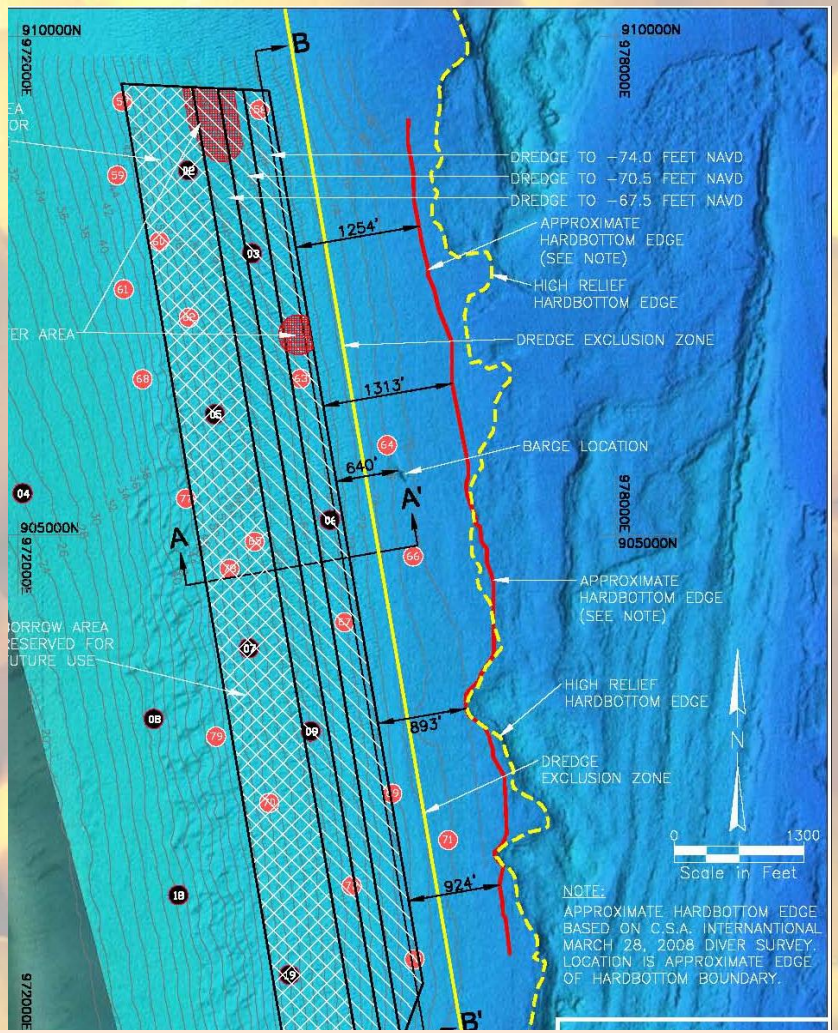


Boring Designation SI-05-62

DRILLING LOG

1. PROJECT	Singer Island 2005
2. BORING DESIGNATION	SI-05-62
LOCATION COORDINATES	X = 973,715 Y = 907,180
3. DRILLING AGENCY	S.E.A., Inc.
CONTRACTOR FILE NO.	
4. NAME OF DRILLER	Alpine Ocean Seismic Survey
5. DIRECTION OF BORING	☒ VERTICAL ☐ INCLINED
DEG. FROM VERTICAL	
BEARING	
6. THICKNESS OF OVERBURDEN	0.0 Ft.
7. DEPTH DRILLED INTO ROCK	0.0 Ft.
8. TOTAL DEPTH OF BORING	19.9 Ft.
9. SIZE AND TYPE OF BIT	4.0 in.
10. COORDINATE SYSTEM/DATUM	Florida State Plane East / HORIZONTAL NAD 1983 / VERTICAL NGVD 29
11. MANUFACTURER'S DESIGNATION OF DRILL	4-inch pneumatic ☐ AUTO HAMMER ☐ MANUAL HAMMER
12. TOTAL SAMPLES	DISTURBED 5 / UNDISTURBED (UD)
13. TOTAL NUMBER CORE BOXES	2
14. ELEVATION GROUND WATER	
15. DATE BORING	STARTED 06-04-05 / COMPLETED 06-04-05
16. ELEVATION TOP OF BORING	-52.4 Ft.
17. TOTAL RECOVERY FOR BORING	20.2 Ft.
18. SIGNATURE AND TITLE OF INSPECTOR	Gary Zanillo, PG SEA, Inc

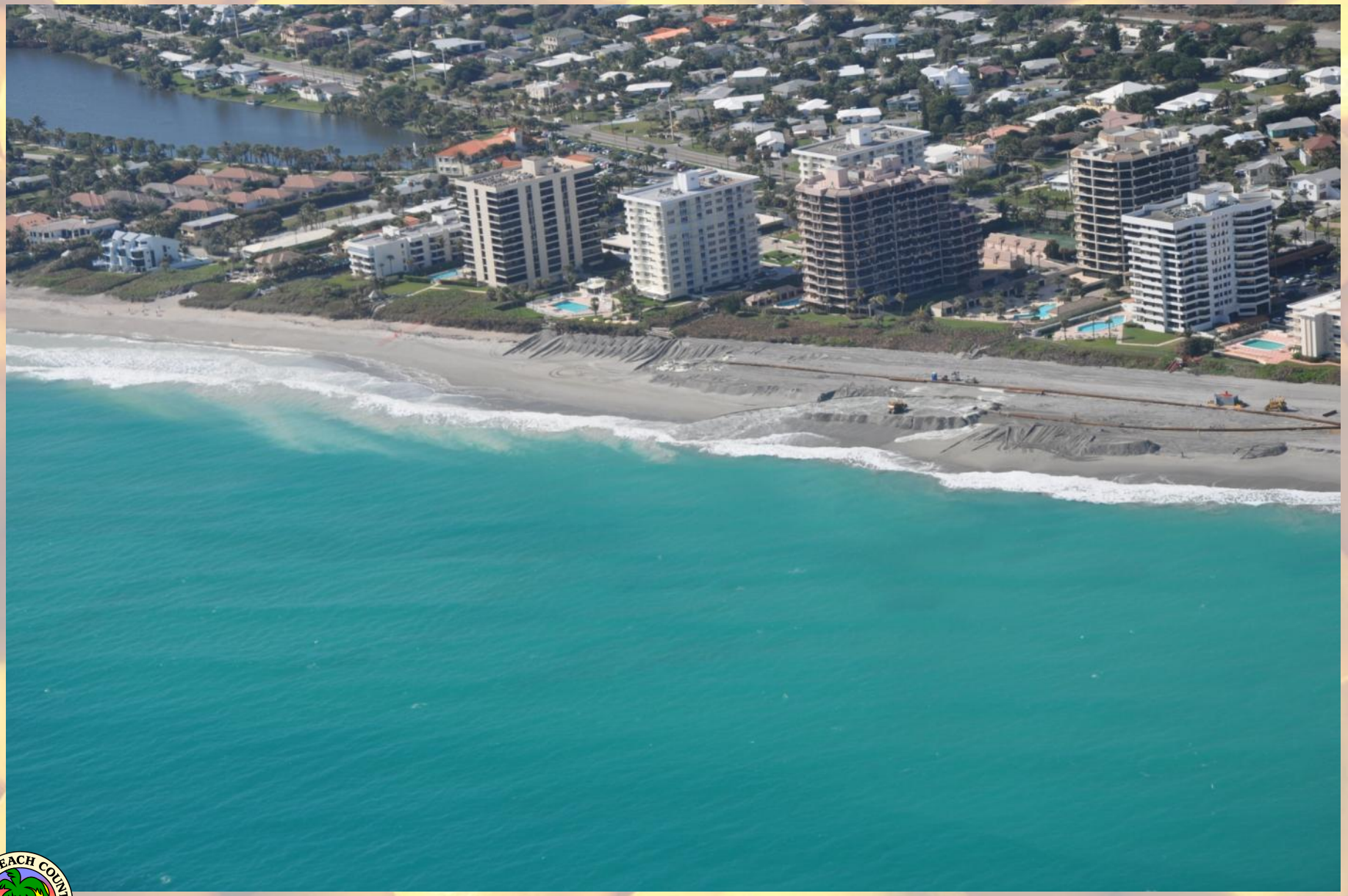
ELEV. (ft)	DEPTH (ft)	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	REC.	BOX OR SAMPLE	REMARKS
-52.4	0.0				
		Gray fine sand, light gray (10YR-7/1), (SP).		1.0	Sample #1.0, Depth = 1.0'
-56.5	4.1				
		Gray fine sand, scattered whole shells and shell fragments in fine to coarse gravel range, gray (10YR-6/1), (SP).		5.0	
-58.8	6.4				
-59.8	7.4	Tan medium to fine sand, 1.5" white coral rock fragment at 7.1', coral rock fragments in medium to coarse gravel range, tan to white shell fragments and whole shells in fine to coarse gravel range, (10YR-6.5/3), (SP).			
		Tan fine sand, scattered white to tan shell fragments and whole shells in fine gravel range, (10YR-6.5/3), (SP).			
-63.2	10.8				
		Tannish gray fine sand, trace of white shell fragments in fine gravel range, (10YR-6.5/2), (SP).		15.0	
-72.6	20.2				



From the Geotechnical Report: "Some cores contained intervals of very coarse shell material ranging in size from fine to coarse gravel. Occasionally whole shells and rock fragments in the coarse gravel to cobble size range were recovered. The coarse shell material and rock rubble deposits are considered to be lag deposits resulting from storms rather than part of a continuous deposit of either shell or rock."

Let's Build a Beach!

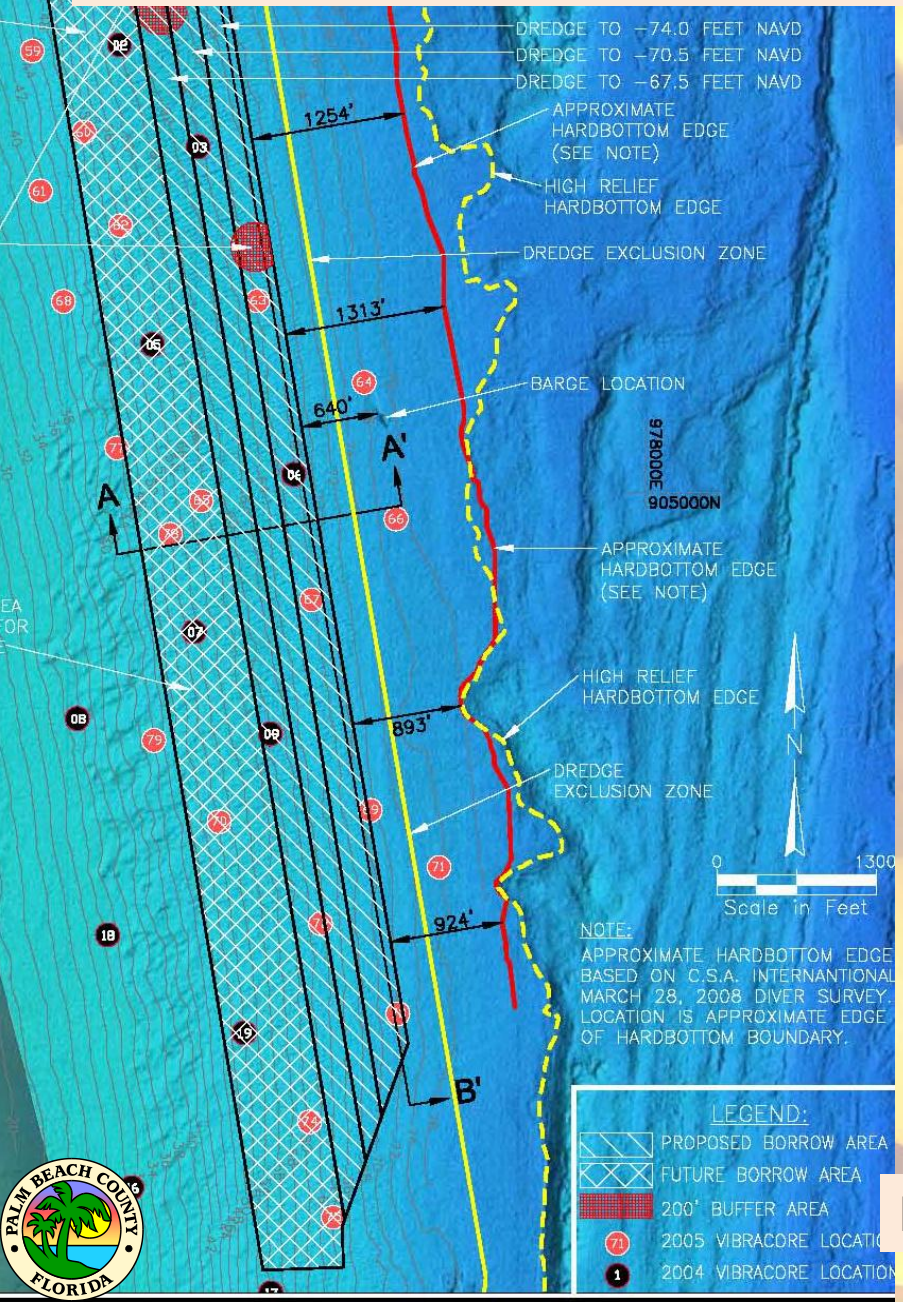
- Dredge R.N. Weeks on site 12/20/2009
- Beach complete 3/26/2010
- 1,093,857 cu yds pumped onshore
- Mean GS 0.41 mm (range 0.30 – 0.57mm)
- Relocated 8 leatherback nests out of construction area
- Approximately ½ the costs funded by FEMA (Hurr. Frances, TS Fay)
- Remainder split 50/50 w/DEP

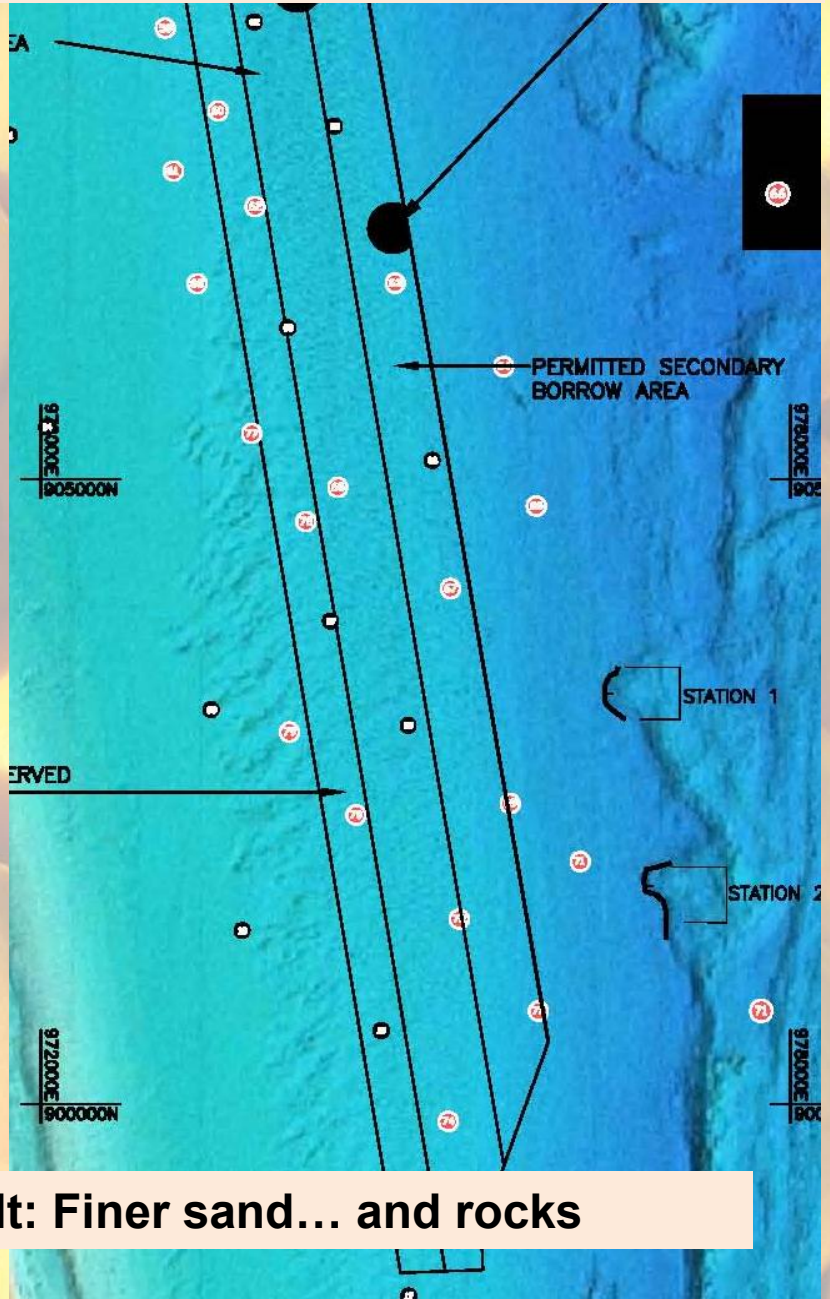



02/18/2010

With the very first load, it became apparent that the geotechnical reports did not tell the whole story of what was in the borrow area…

1) Dredge from a different part of the borrow area





Result: Finer sand… and rocks

2) Add'l Screening on the Dredge…

Result: Clogged screens and angry contractors

3) Add screens at end of discharge pipe

Result: Clogged boxes, backed up discharge pipes, and… angry contractors

4) Post construction screening of fill…


Result: Clean sand on beach; rocks removed,
safe beach for tourists, residents, and sea turtles!

Screening of Beach…

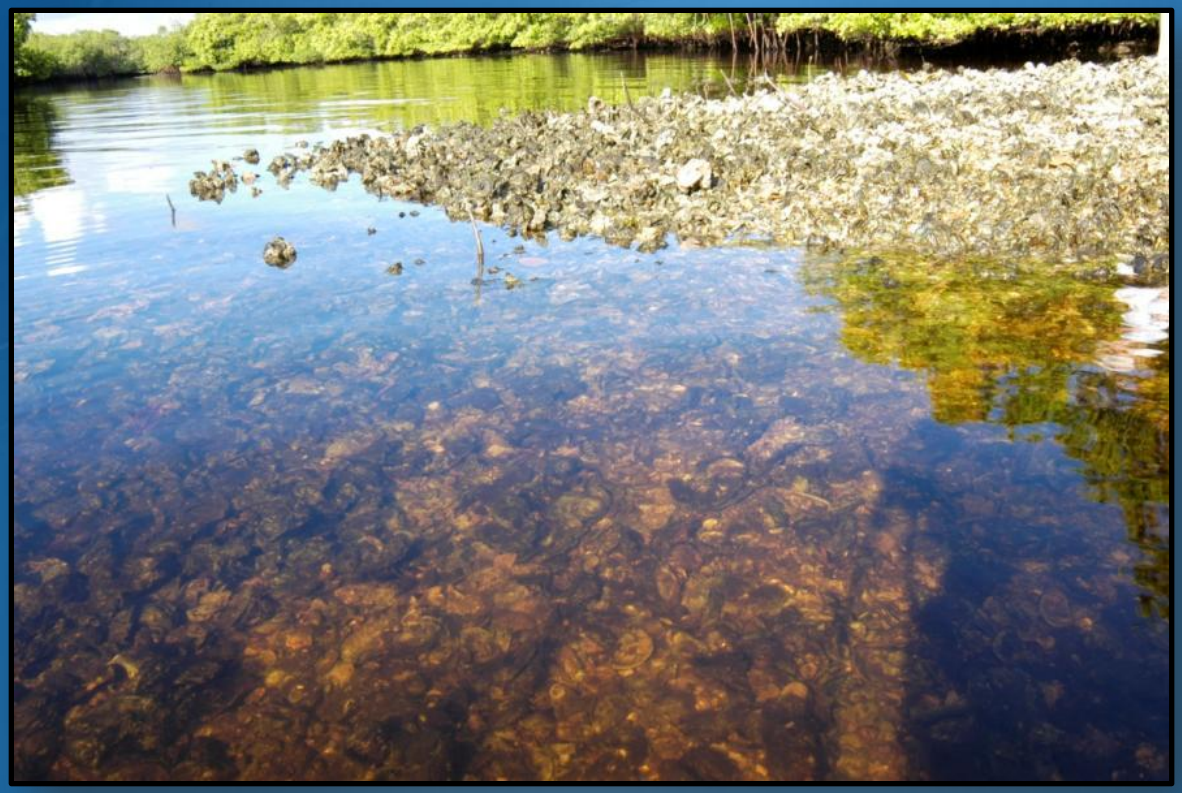
- Construction Dates: 3/15 – 4/30/2010
- Dry berm screened to 5’ depth
- Volume of fill screened = 211,000 yd^3
- Total rock screened from beach = 6457 tons
- Cost ~ $1,000,000


But… What do we do with these rocks?

NOAA, Martin County & Loxahatchee River District's Oyster Restoration Project

Bud Howard

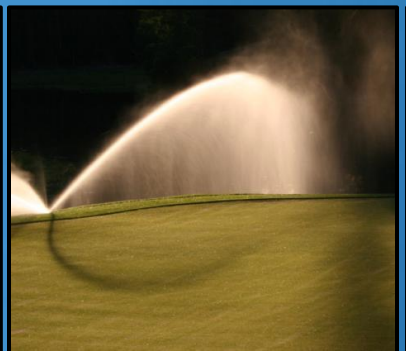
Director of Water Resources
Loxahatchee River District



Loxahatchee River District

Protection & Preservation of the Loxahatchee River

- Jupiter, FL
- Special District
- Wastewater Treatment
- Water Recycling – I.Q. Smart Water
- Environmental Education
- WildPine Ecological Laboratory



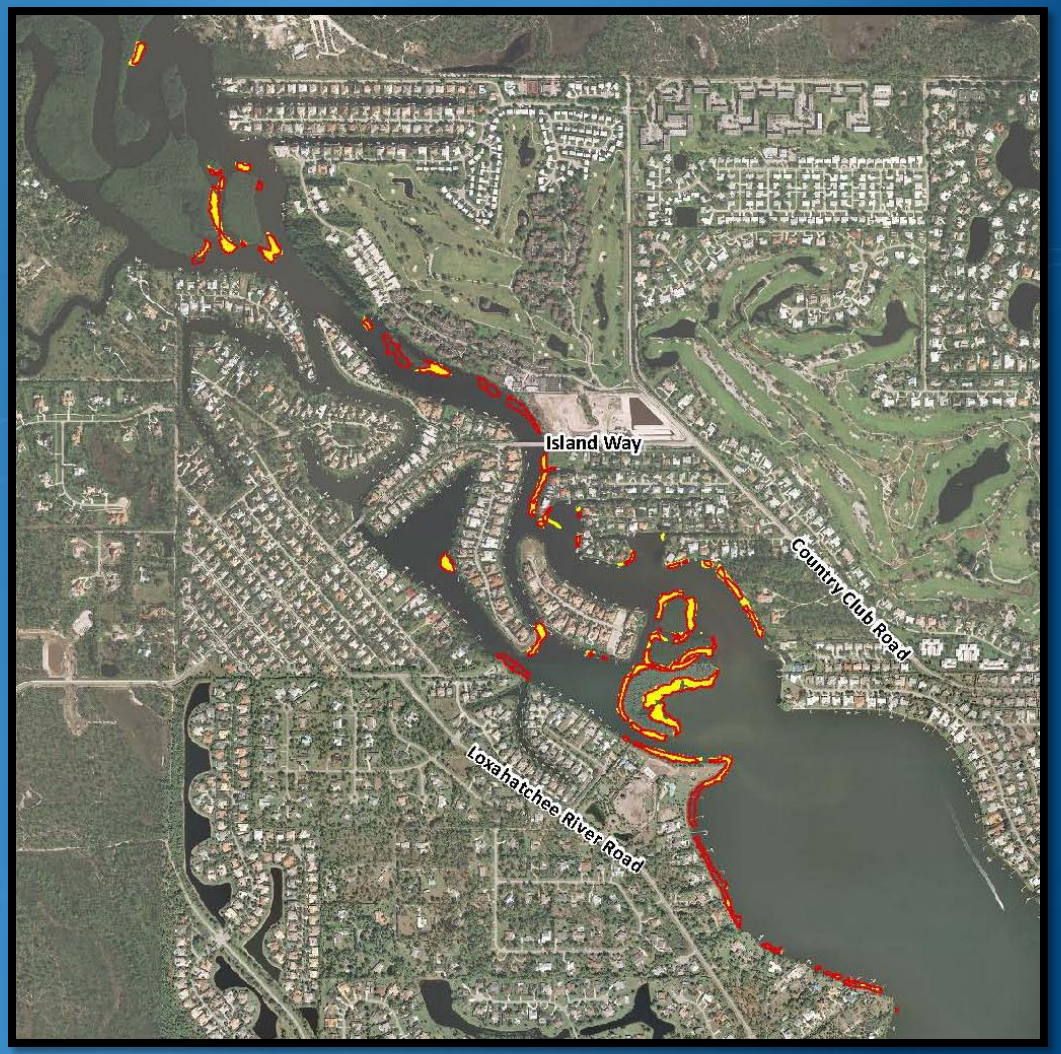
Oysters

Besides being good to eat…

- Amazing water filtering capacity
- Habitat value – home to > 300 species (e.g., fish, crabs, shrimp, worms, etc.)
- Globally 85% oyster reefs lost

Loxahatchee River Oysters

- Historically oysters widespread through estuary
- Habitat and water quality changes since 1950's




Loxahatchee River 1964

Today

The Need for Oyster Restoration

- Water quality data suggests substrate limited
- What if we provide substrate?
- Have a good seed source of naturally occurring oysters
- Pilot Projects very successful

Going Big - Oyster Restoration

- Stimulus funding through NOAA
- Martin County (Kathy Fitzpatrick) Dream Team
- Permits in <30 days!
- $4m Grant from NOAA
  - 22 acres in St. Lucie River
  - 3.5 acres in Loxahatchee River

Cultch

Collaboration = $avings = More Habitat

- Original Material Cost
  - 3,000 cy @ $34.50cy = $103,500

- Palm Beach County's Juno Beach Material
  - Free!
  - Minimal haul
  - 6 additional days of Construction

OYSTER REEF RESTORATION

Construction

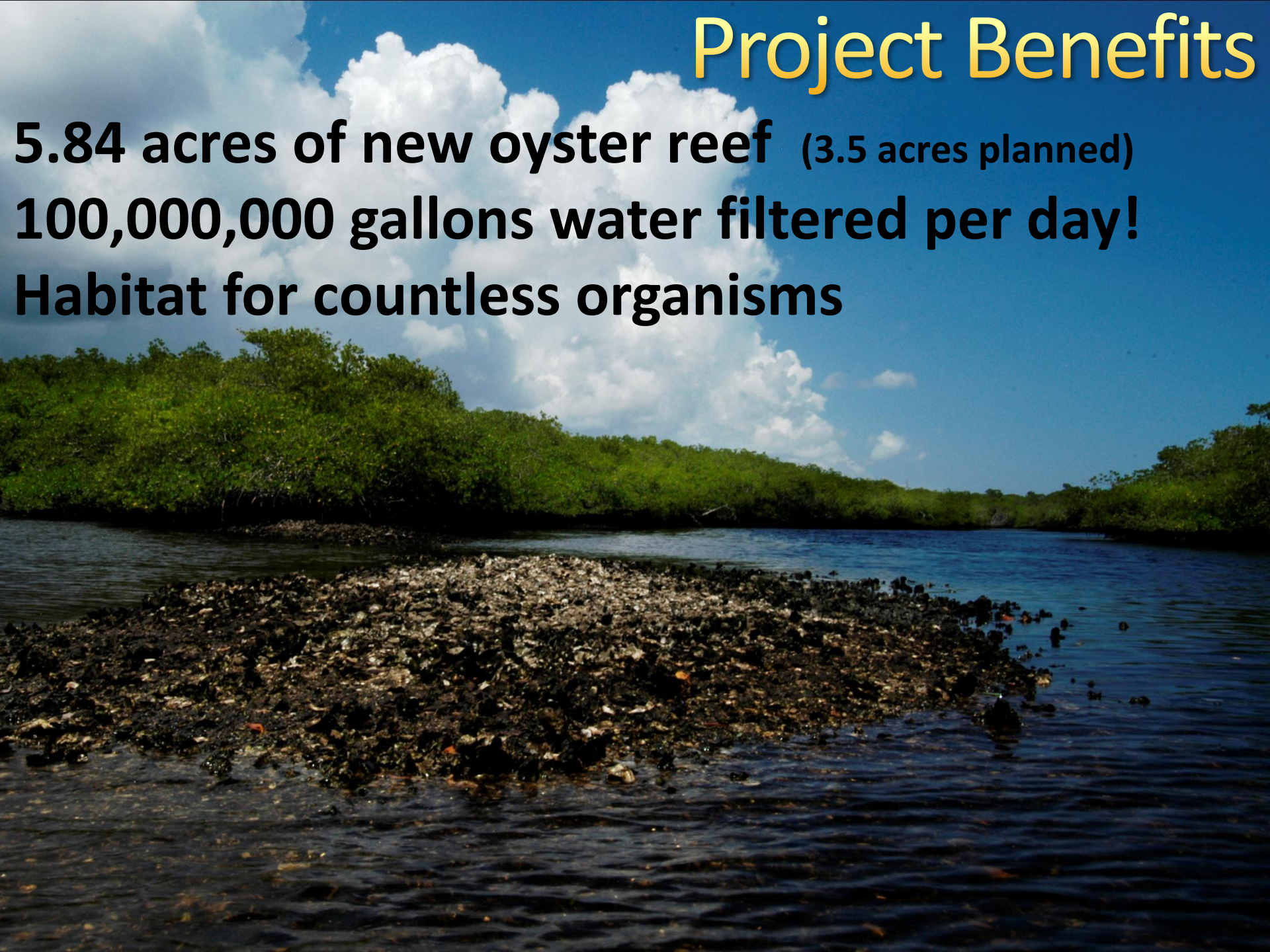
Final Construction Areas

Project Benefits

5.84 acres of new oyster reef (3.5 acres planned)

100,000,000 gallons water filtered per day!

Habitat for countless organisms



Valuable Lesson

- Communicate with Colleagues!
  - Collaboration leads to Success-
    - NOAA Funding
    - Material Cost Savings
  - Never know when the next win-win opportunity will arise


Thank you

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Bud.howard@loxahatcheeriver.org

Restoration Project Website - www.oysterrestoration.com
Reports & Data - www.loxahatcheeriver.org/reports.php