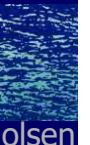
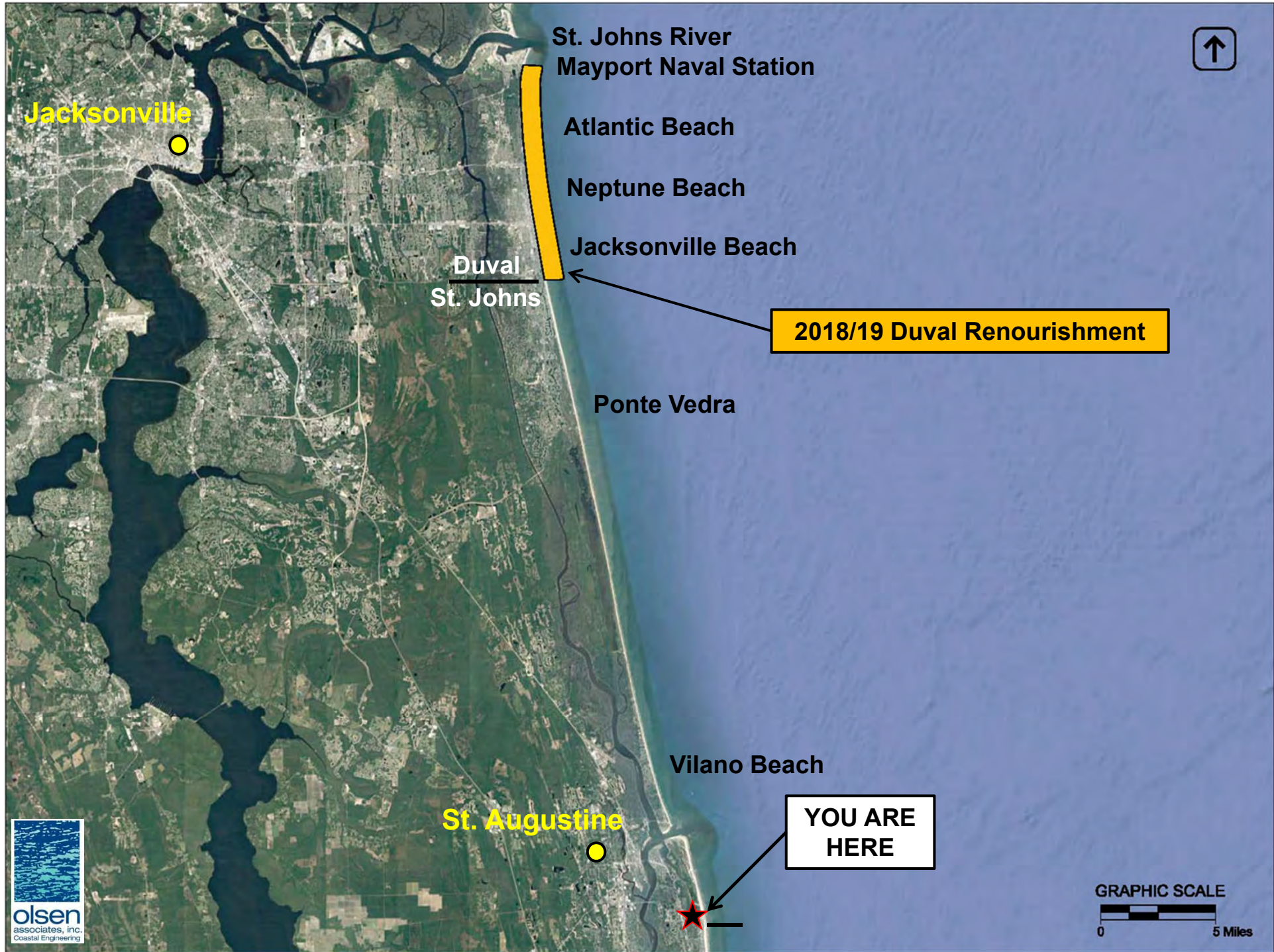




Dune Reconstruction after Hurricanes Matthew and Irma, Jacksonville Beaches

**Kevin Bodge, Steven Howard, Patrick Cooper
Olsen Associates, Inc.**





Jacksonville



St. Johns River
Mayport Naval Station



Atlantic Beach

Neptune Beach

Jacksonville Beach

Duval
St. Johns

2018/19 Duval Renourishment

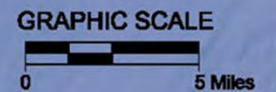
Ponte Vedra

Vilano Beach

St. Augustine



YOU ARE
HERE

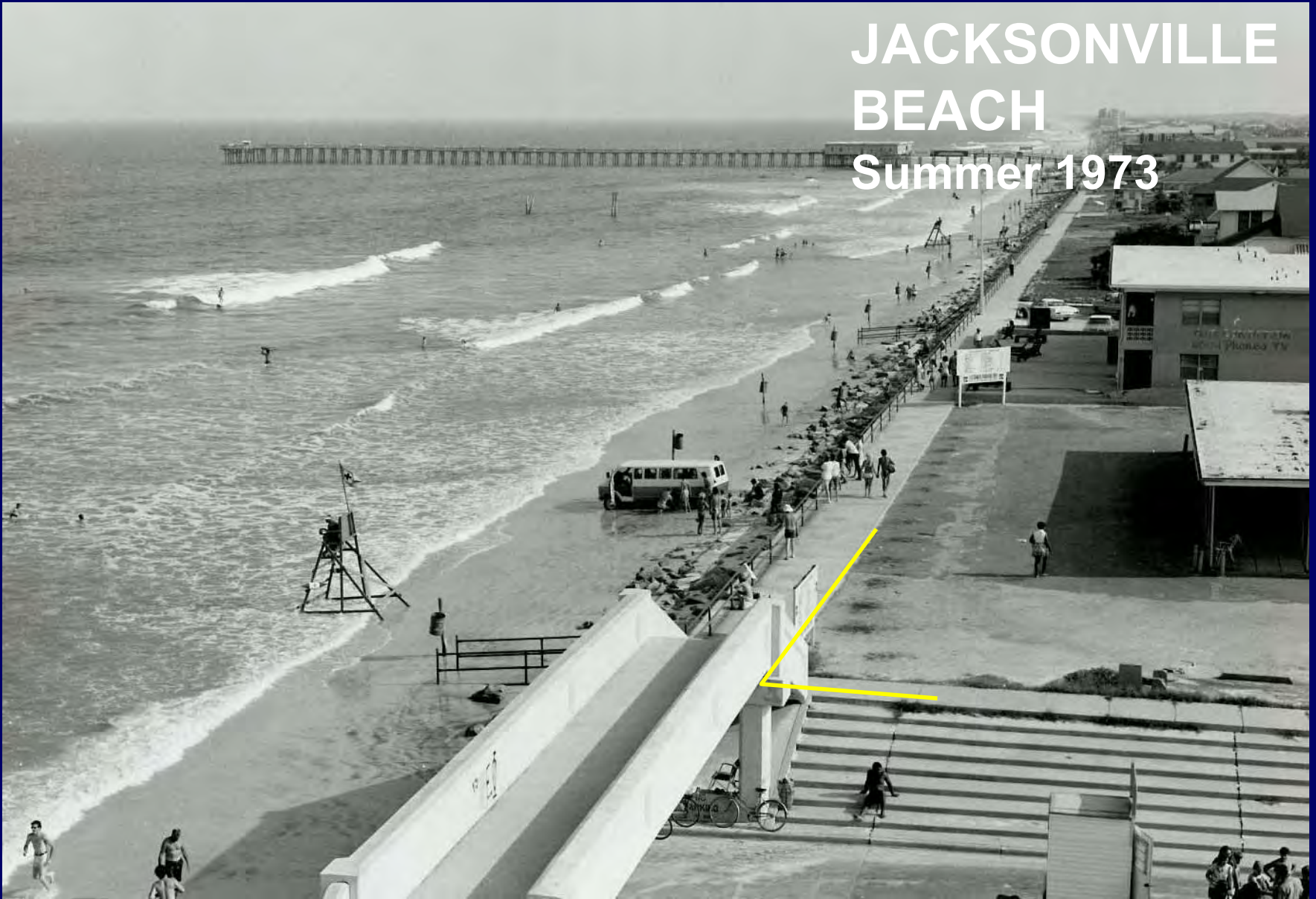


Duval County Shore Protection Project

Initial construction
in 1978-80.



JACKSONVILLE BEACH Summer 1973



JACKSONVILLE BEACH February 2011





Post-Matthew (Oct 2016)





Post-Matthew (Oct 2016)



Post-Hurricane Matthew – 4 November 2016



Post-Hurricane Matthew – December 2016 . . . April 2017



**Post - Matthew:
Reed Detritus from
Marshes**



South Limit of Hydraulic Renourishment

Truck-Haul Transfer for Dune Repair



**Post-Matthew:
5,000 CY
Dune Stockpile
Sand Transfer
July 2017**



Post-Matthew – 650,000 dune plants installed



Post-Matthew – 650,000 dune plants installed

By August 2017, initial plantings from May 2017 had begun to thrive.



Post-Matthew – 650,000 dune plants installed

By 28 August 2017 – final plants installed



Hurricane Irma Preparation (Sept 10, 2017)

Hurricane Matthew – Street End Flooding (Oct 2016)



Hurricane Irma – Preparatory Street End Diking



ST JOHNS RIVER

POST-MATTHEW / PRE-IRMA CONDITION

MAYPORT NAS

HANNA PARK

ATLANTIC BEACH

NEPTUNE BEACH

JACKSONVILLE BEACH

2 MILES

4. No Renourishment (1.5 miles)

Matthew Dune Erosion = - 5.1 cy/ft

3. No Renourishment (1.1 miles)

Matthew Dune Erosion = - 5.2 cy/ft

2. Post-Matthew Dune & Beach Renourishment (5 miles)

Matthew Dune Erosion = - 7.2 cy/ft
(100% repaired)

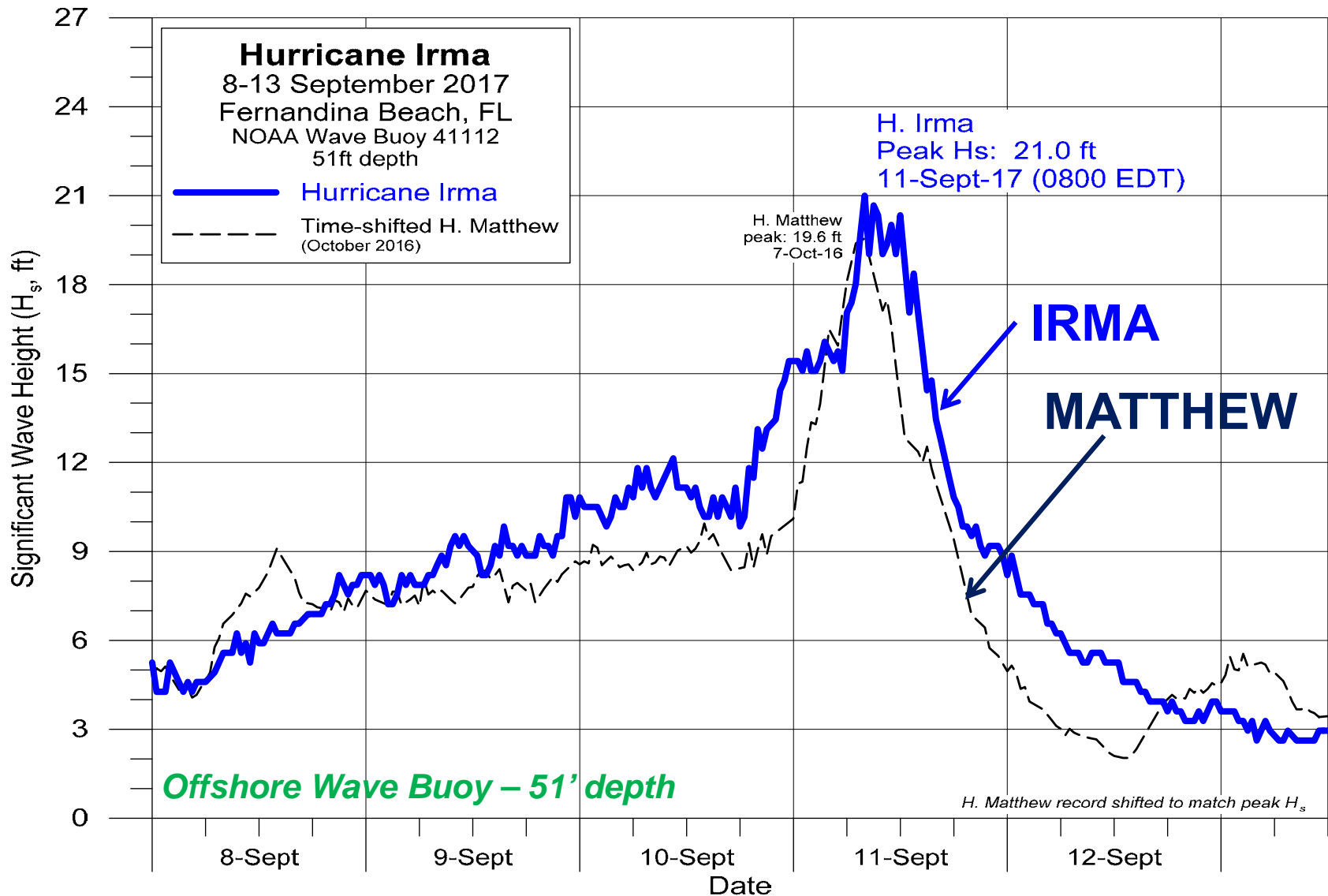
1. Pre-Matthew Beach Renourishment and limited dune repair (1.5 miles)

Matthew Dune Erosion = - 2.2 cy/ft
(35% repaired)

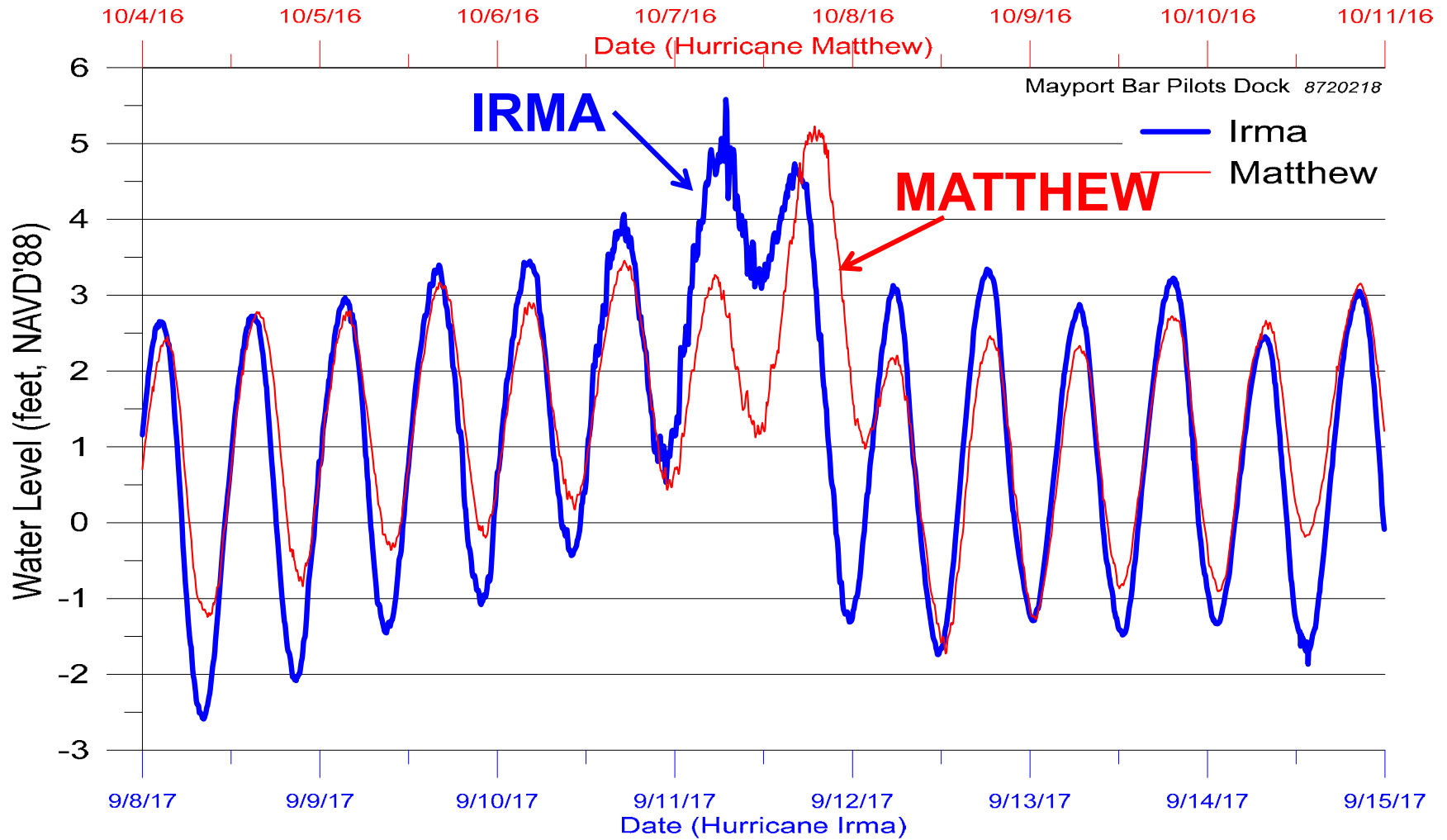
ST JOHNS COUNTY

©2011 Google

Hurricane Irma vs. Matthew Wave Record



Hurricane Irma vs. Matthew Tide Record



Tide Gauge - Mayport, FL

Hurricane Irma

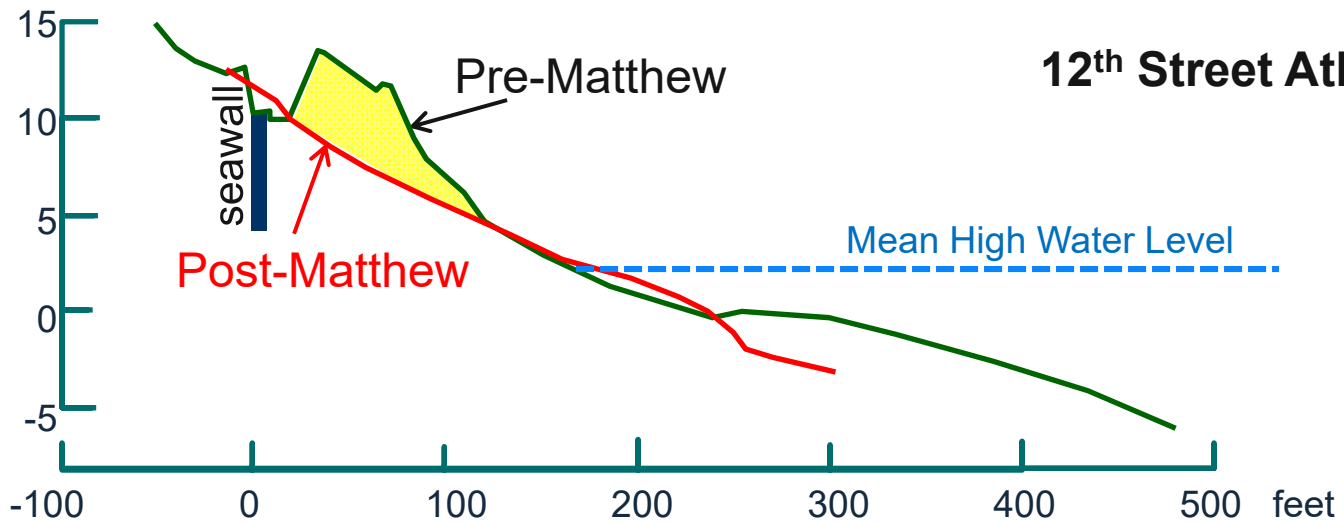


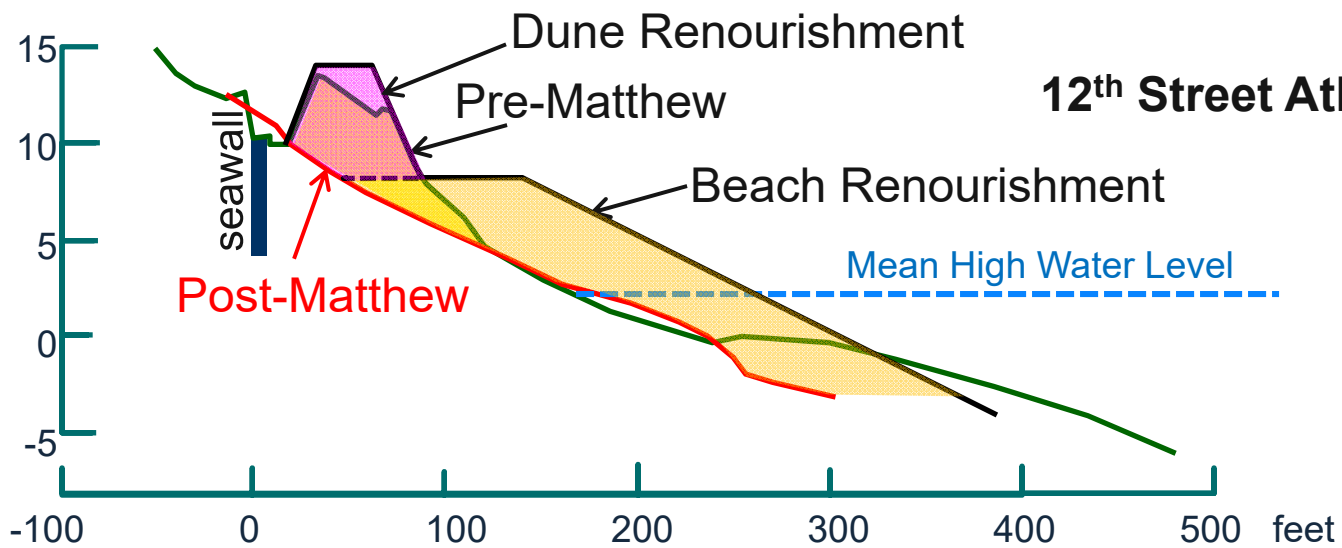
Hurricane Irma

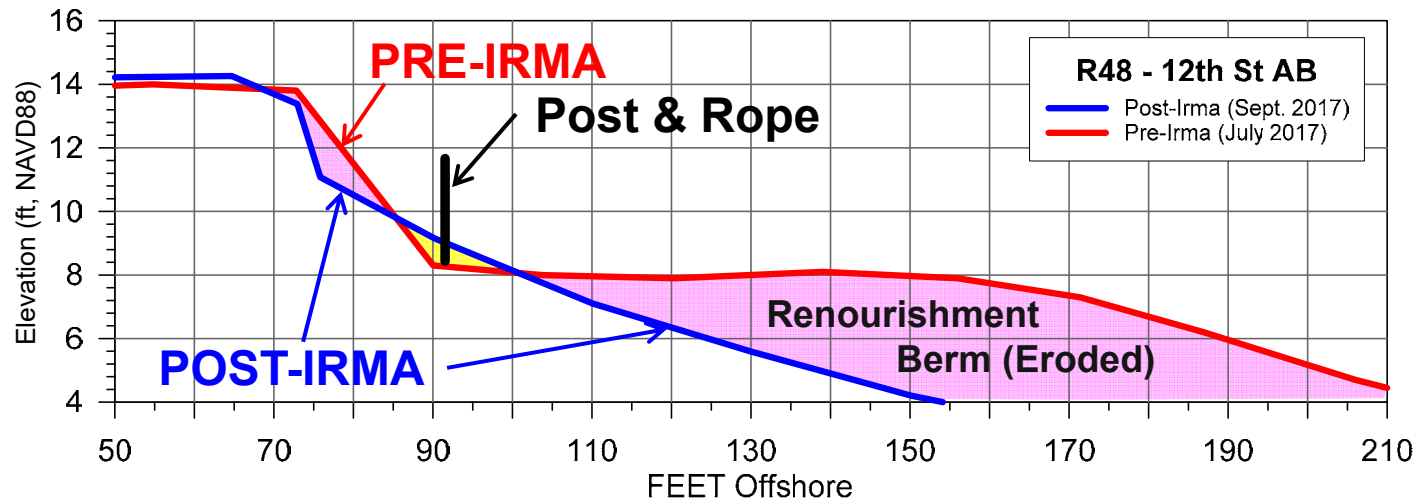


Post-Hurricane Irma

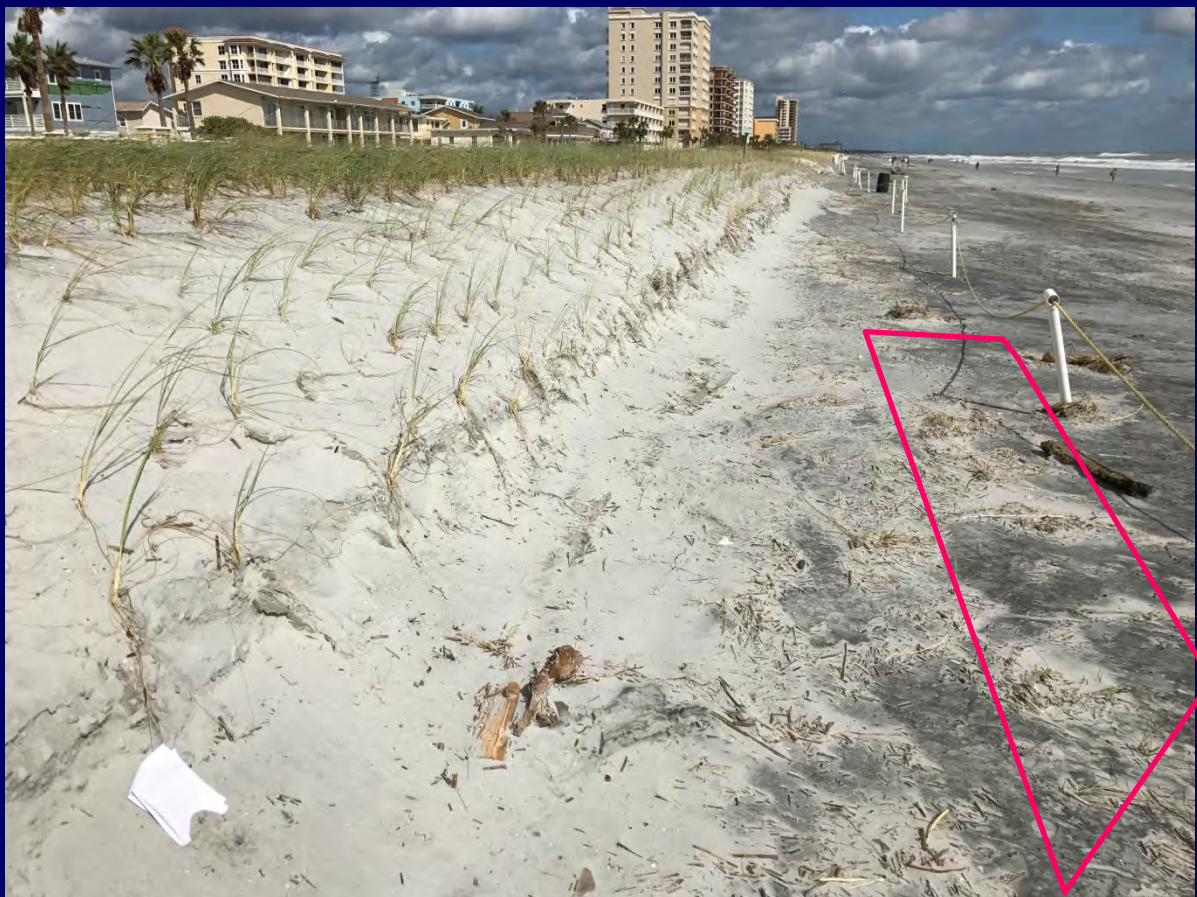








Post-Hurricane Irma – 12 September 2017



Sea oat plantings still in place at dune toe, buried in sand overwash from berm, and erosion from upper dune.

North Atlantic Beach – Post Matthew & Irma (No Dune or Beach Renourishment)



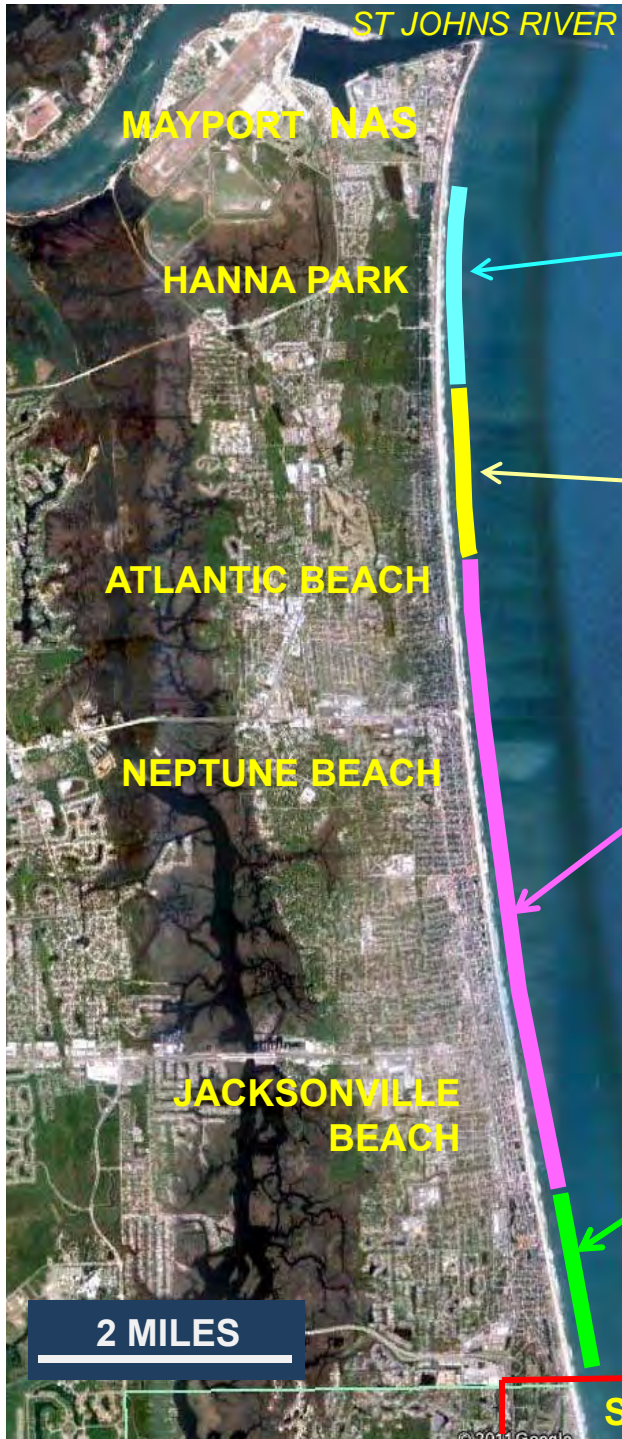
North Atlantic Beach was outside of the pre/post-Matthew dune & beach repair limits, and so received no sand renourishment after Matthew or before Irma. The dunes were heavily & equally impacted by both storms.

South Jacksonville Beach – Post-Matthew & Irma (Limited Pre-Irma Renourishment)



South Jax Beach received some nourishment prior to Matthew, and some limited dune & beach repair after Matthew. The dunes were further impacted by Hurricane Irma, but not as severely as north Atlantic Beach.

POST- IRMA CONDITION



4. No Renourishment (1.5 miles)

Matthew Dune Erosion = - 5.1 cy/ft
Irma Dune Erosion = - 0.8 cy/ft

3. No Renourishment (1.1 miles)

Matthew Dune Erosion = - 5.2 cy/ft
Irma Dune Erosion = - 3.2 cy/ft

2. Post-Matthew Dune & Beach Renourishment (5 miles)

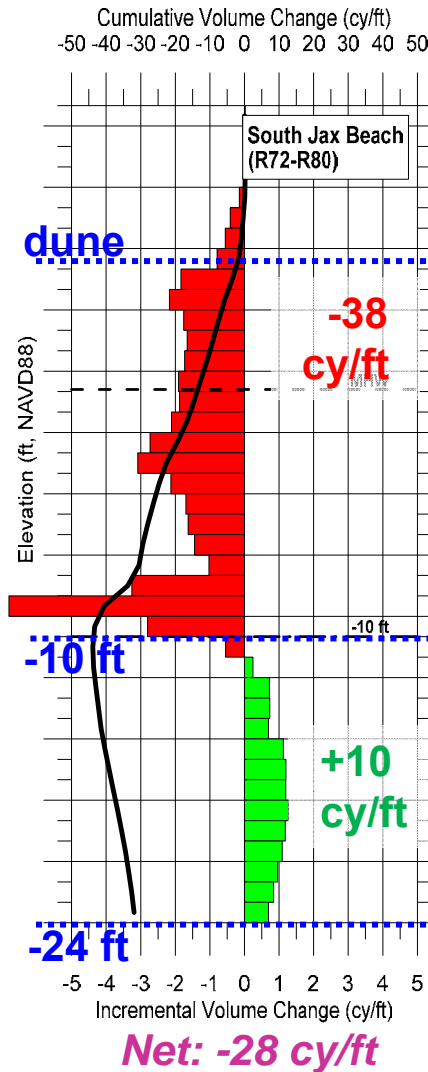
Matthew Dune Erosion = - 7.2 cy/ft (100% repaired)
Irma Dune Erosion = - 0.5 cy/ft (<8% loss of repair)

1. Pre-Matthew Beach Renourishment and limited dune repair (1.5 miles)

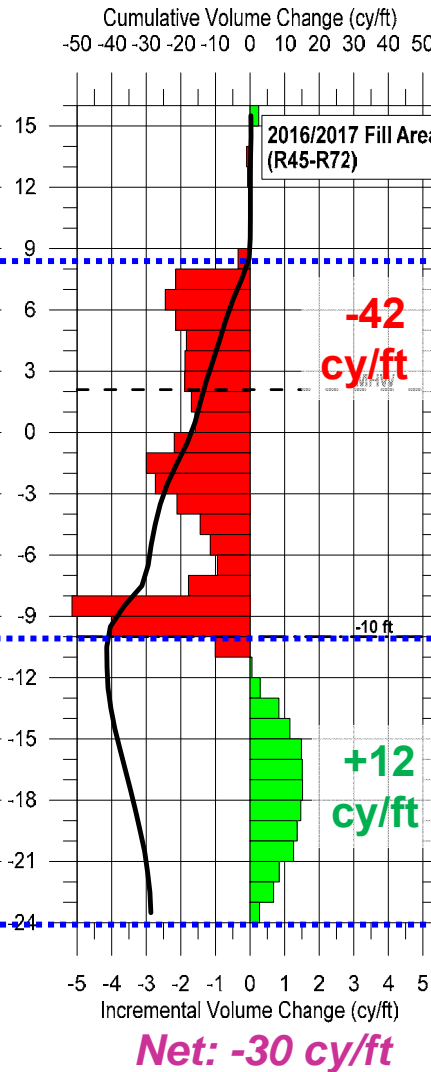
Matthew Dune Erosion = - 2.2 cy/ft
Irma Dune Erosion = - 2.4 cy/ft

Hurricane Irma Beach Profile Volume Change

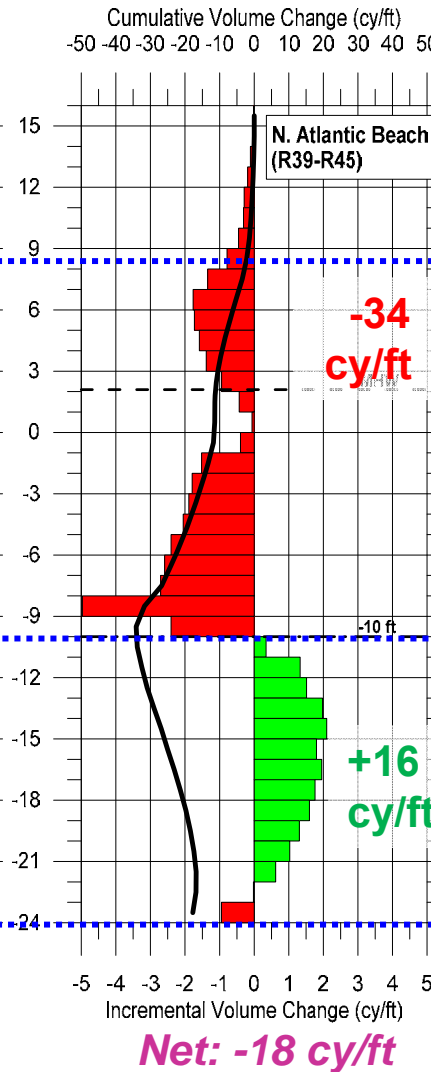
1. South Jax Beach (limited renourishment)



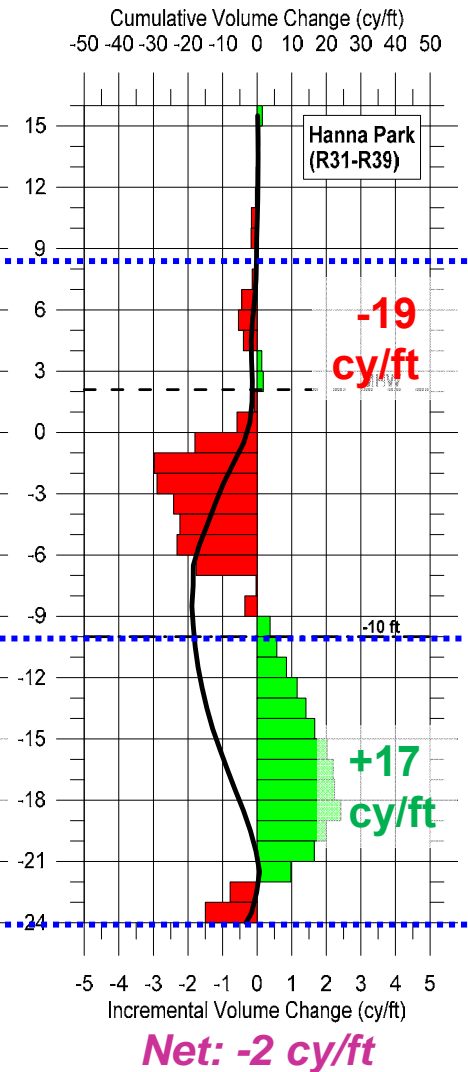
2. Renourished Beach & Dune



3. No. Atlantic Bch (no renourishment)



4. Hanna Park (no renourishment)

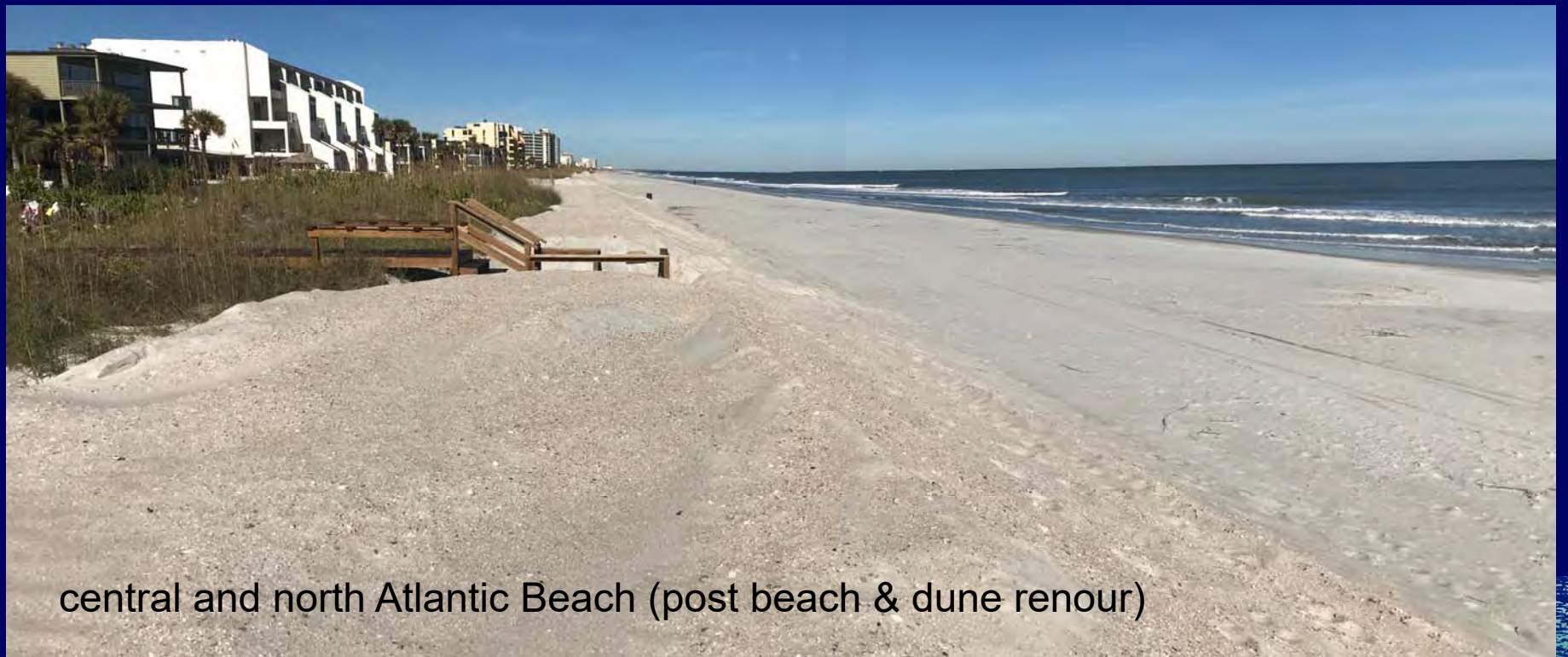


POST- IRMA RENOURISHMENT

Nov 2018 – Jan 2019



Hurricane Irma Repairs (Nov 2018 – Jan 2019)



central and north Atlantic Beach (post beach & dune renour)

Hurricane Irma Repairs (Nov 2018 – Jan 2019)



south Jacksonville Beach (post beach & dune renour)

Hurricane Irma Repairs (Nov 2018 – Jan 2019)



north Atlantic Beach
(post beach & dune fill
placement)...dealing
with walkovers within
the dune fill.



Hurricane Irma Repairs (Nov 2018 – Jan 2019)



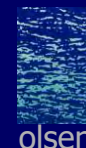
The local public works departments of Cities of Atlantic, Neptune, and Jacksonville Beach erected post-and-rope and signs to help keep people off of the rebuilt dunes.



The City of Jacksonville will install 340,000 dune plants in Spring-Summer 2019, augmenting the 650,000 plants installed in Summer 2018 (of which about 40% were lost by erosion or stress during H. Irma).

. . . by the numbers . . .

| | BEACH FILL (Cu.Yds.) | DUNE FILL (CY) FILL AREA | DUNE FILL (CY) OUTSIDE | DUNE PLANTS |
|----------------------------|-------------------------------------|---|---------------------------------------|---------------------------------|
| Matthew Repairs | + 874,000 | + 195,000 | 0 | + 650,000 |
| Irma Damage | - 850,000 | - 13,700 < 8% loss | - 41,000 | - 255,000 ~ 40% loss |
| Irma Repairs | + 825,000 | + 18,000 | + 74,000 | + 340,000 |



LOCAL COST

City of Jacksonville

Hurr. MATTHEW

Hurr. IRMA

Dune Sand:

\$ 3,300,000

\$ 17 / cy

\$ 1,200,000

\$ 13 / cy

Stockpile

\$ 126,000

- N/A -

Transfer:

\$ 25 / cy

Plants:

\$ 345,000

\$ 330,000 (est'd)

Additional

\$ 1,882,000

\$ 0

Beach Fill:

\$ 17 / cy

(100% fed cost)

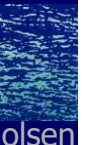
Design-Montg:

\$ 147,000

\$ 170,000

\$ 5,800,000 ~~+~~ \$ 1,700,000

\$ 7,500,000



olsen

LOCAL COST

City of Jacksonville

Hurr. MATTHEW

Hurr. IRMA

City Expenditure

~~\$ 5,800,000~~ + \$ 1,700,000
\$ 7,500,000

Reimbursements
To-Date

\$ 3,461,264 \$ 0

Reimbursements
Anticipated

\$ 1,043,536 \$ 1,310,500

NET Anticipated
Cost to City

~~\$ 1,295,200~~ → \$ 389,500
\$ 1,684,700 (22.5%)

Acknowledgements

Great Lakes Dredge & Dock Company (2016-17)

Manson Construction Company (2018-19)

City of Jacksonville – Public Works

Particularly . . . **Tom Fallin & Gary Goldsberry**

City of Jacksonville – City Council

Particularly . . . **Commissioner Bill Gulliford**

US Army Corps of Engineers

Particularly . . . **Jason Harrah & Geoff Klug**

Florida Dept of Env Protection - BIPP

Bureau of Ocean Energy Management (BOEM)

Beaches Sea Turtle Patrol

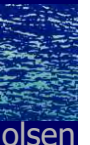
City of Jacksonville Beach

City of Neptune Beach

City of Atlantic Beach

LG2Environmental Solutions

...and many others...





Dune Reconstruction after Hurricanes Matthew and Irma, Jacksonville Beaches

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