



Shoreline Management Challenges and Solutions in St. Johns County

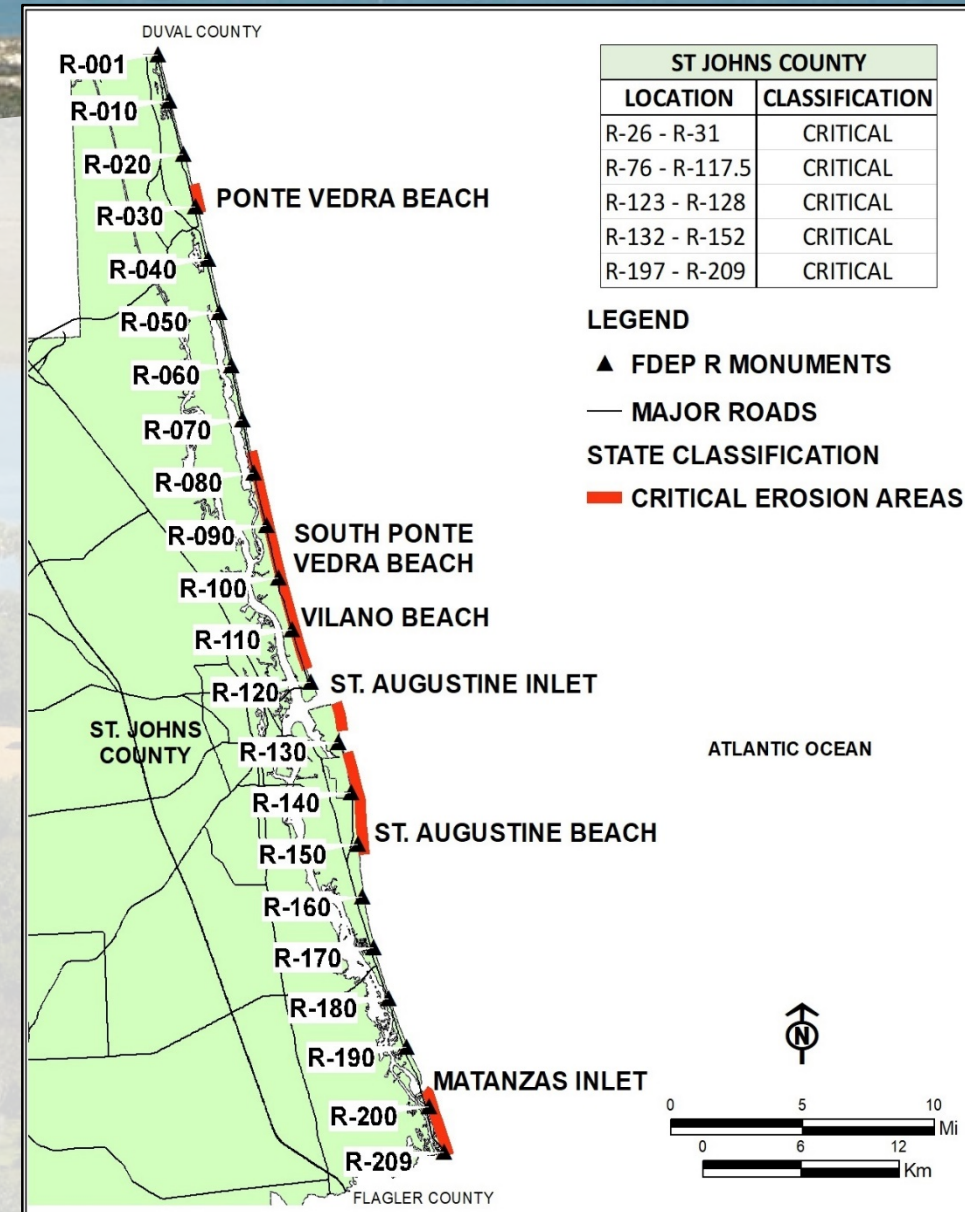
**Florida shore & Beach Preservation Association
33rd National Conference on Beach Preservation Technology
February 5-7, 2019**

Presented by: Stephen Hammond

Co-Author: Damon Douglas and Rajesh Srinivas

Background

- St. Johns County has 42 miles of Atlantic Coastline
- The County manages 32 miles of the shoreline
- FDEP designates 16.3 miles of our shoreline as critically eroded
- Another eight miles of non-designated beach also requires attention
- Primary causes of erosion:
 - Historic - St. Augustine and Matanzas Inlets
 - Present – Inlets, Hurricanes, Overwash, Seawalls



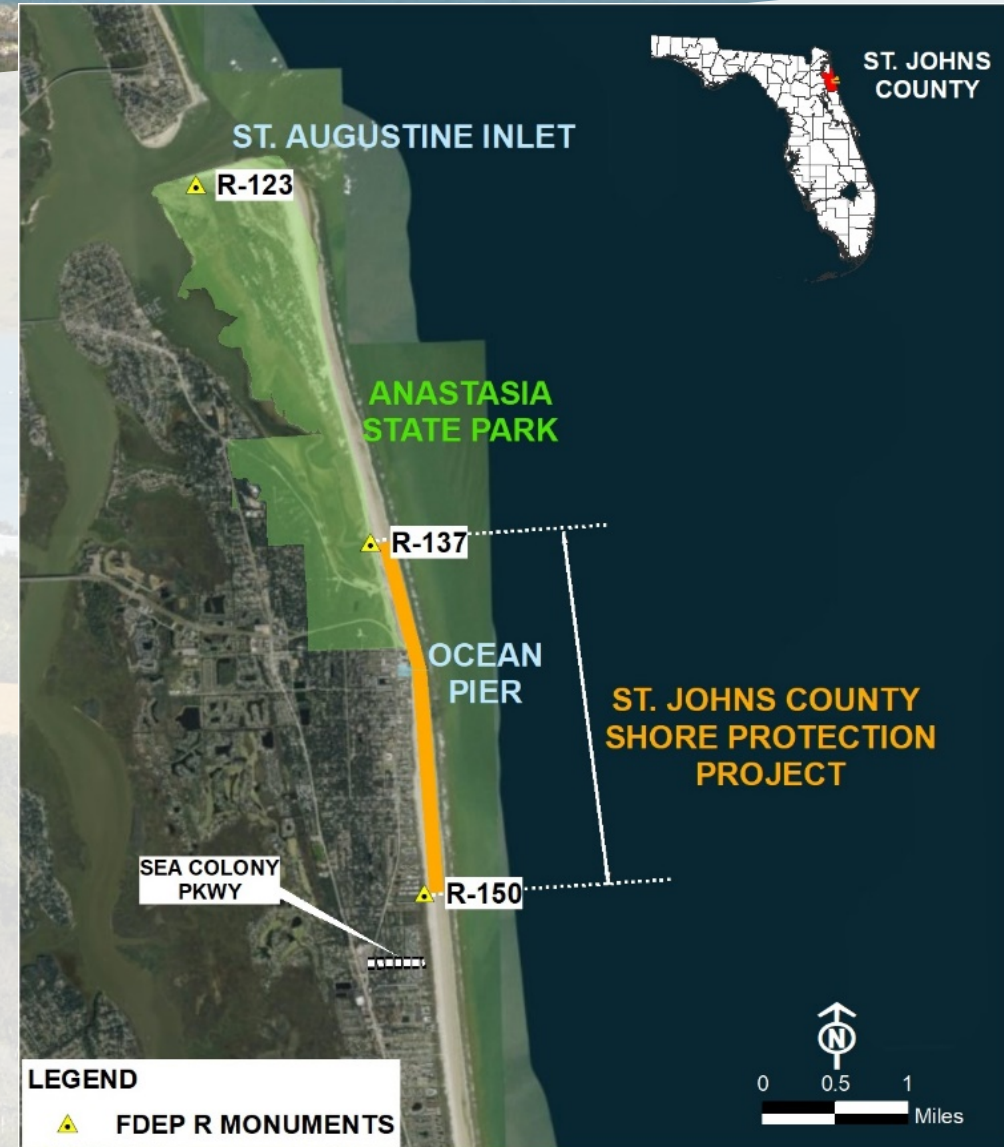
Ongoing Shoreline Management Initiatives

- USACE 50-year Projects
 - Anastasia State Park and St. Augustine Beach R137-R151
 - Construction began in 2001
 - South Ponte Vedra Beach-Vilano Beach R102.5-R117.5
 - Construction in 2020
- Non-Federal Projects
 - Ponte Vedra Beach R1-R46
 - Construction planned for 2021
 - South Ponte Vedra Beach R76-R102.5
 - Construction planned for early 2021
- FEMA Emergency Projects
 - Countywide (excluding parks, USACE project areas)
- Holistic long-term planning – working towards a strategic beach management plan



St. Johns County Shore Protection Project

- Federal project, authorizes:
 - Extent = R137 to R150
 - Length = 2.5 miles
 - 60 ft berm extension at 9.0 ft NAVD88
 - Renourishment interval = 5 years
- Borrow Area: St. Augustine Inlet Channel and Ebb Shoal
- Cost Shares: Federal 80.5%, State 8.5%, County 11%



St. Johns County Shore Protection Project

- Initial construction 2001-2003 (in two phases)
- Renourishment in 2005 (FCCE), 2012, and 2018
- Affected by Hurricanes Frances and Jeanne in 2004, Matthew in 2016, Irma in 2017, Dorian in 2019
 - Project area performed very well protecting upland infrastructure
- Total sand volume placed = 9.45 Mcy

| Date | Volume Placed | Length | Segment |
|------|---------------|--------|---------------|
| 2003 | 3,800,000 | 2.7 | R137-R151 |
| 2005 | 2,800,000 | 2.7 | R137-R151 |
| 2012 | 2,100,000 | 1.5 | R139-R147 |
| 2018 | 750,000 | 0.9 | R139.7-R144.4 |

- In 2018, the amount of inlet sand allowed to be dredged by a revised IMP (2014) dictated the placement volume
 - Revised IMP restricts ebb shoal and navigation channel dredging to 179,000 cy/yr

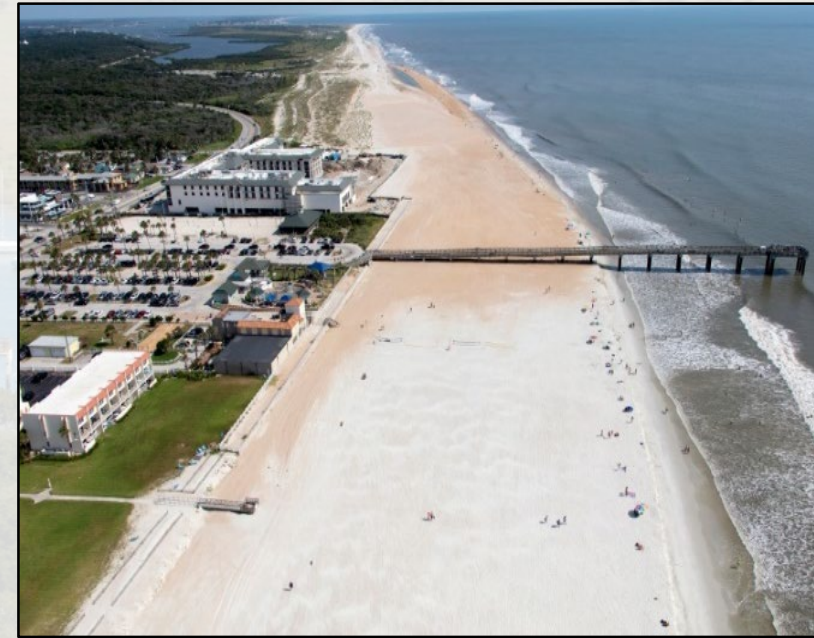
St. Johns County Shore Protection Project



Pre-Initial Construction (circa 2000)



2018 Construction



2018 Post-Construction

St. Johns County SPP Pre and Post Dorian

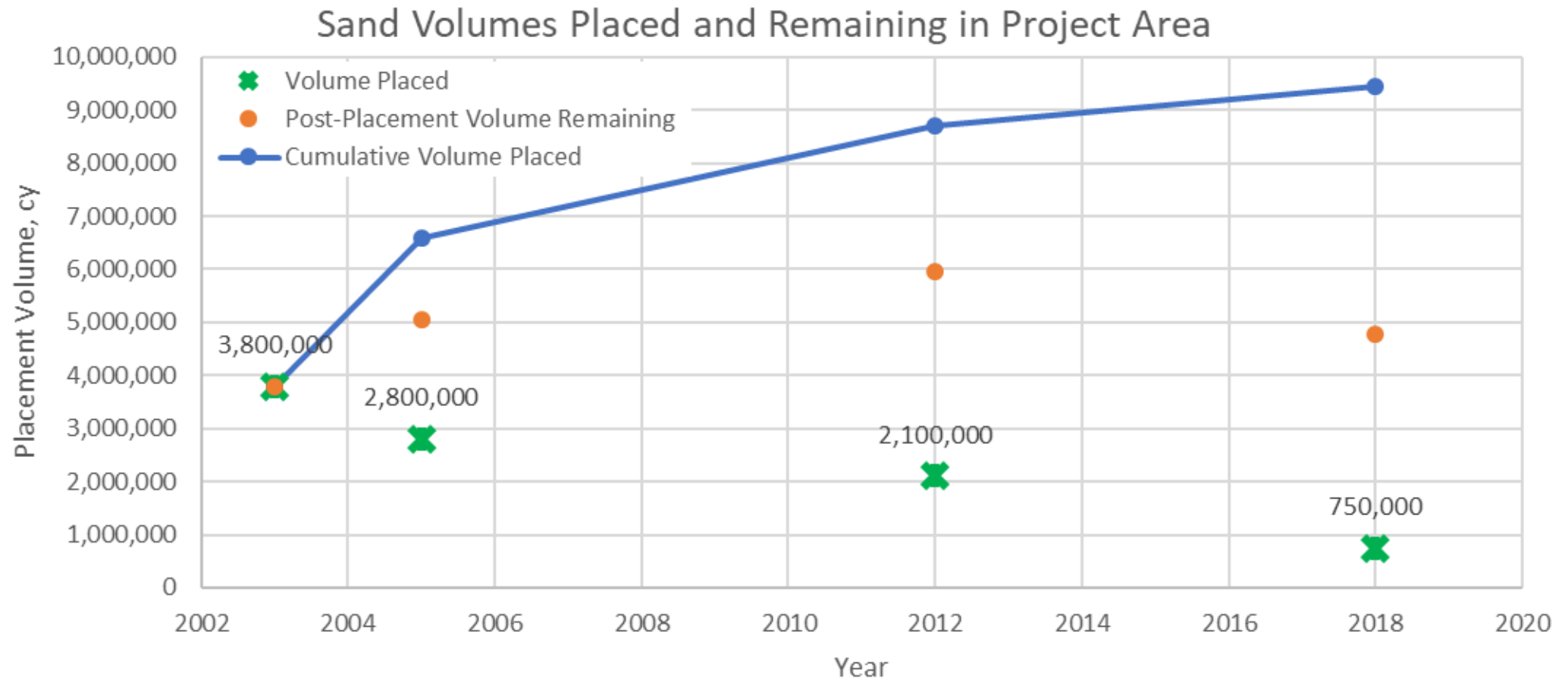


**Pre-Dorian
08/28/2019**



**Post Dorian
09/07/2019**

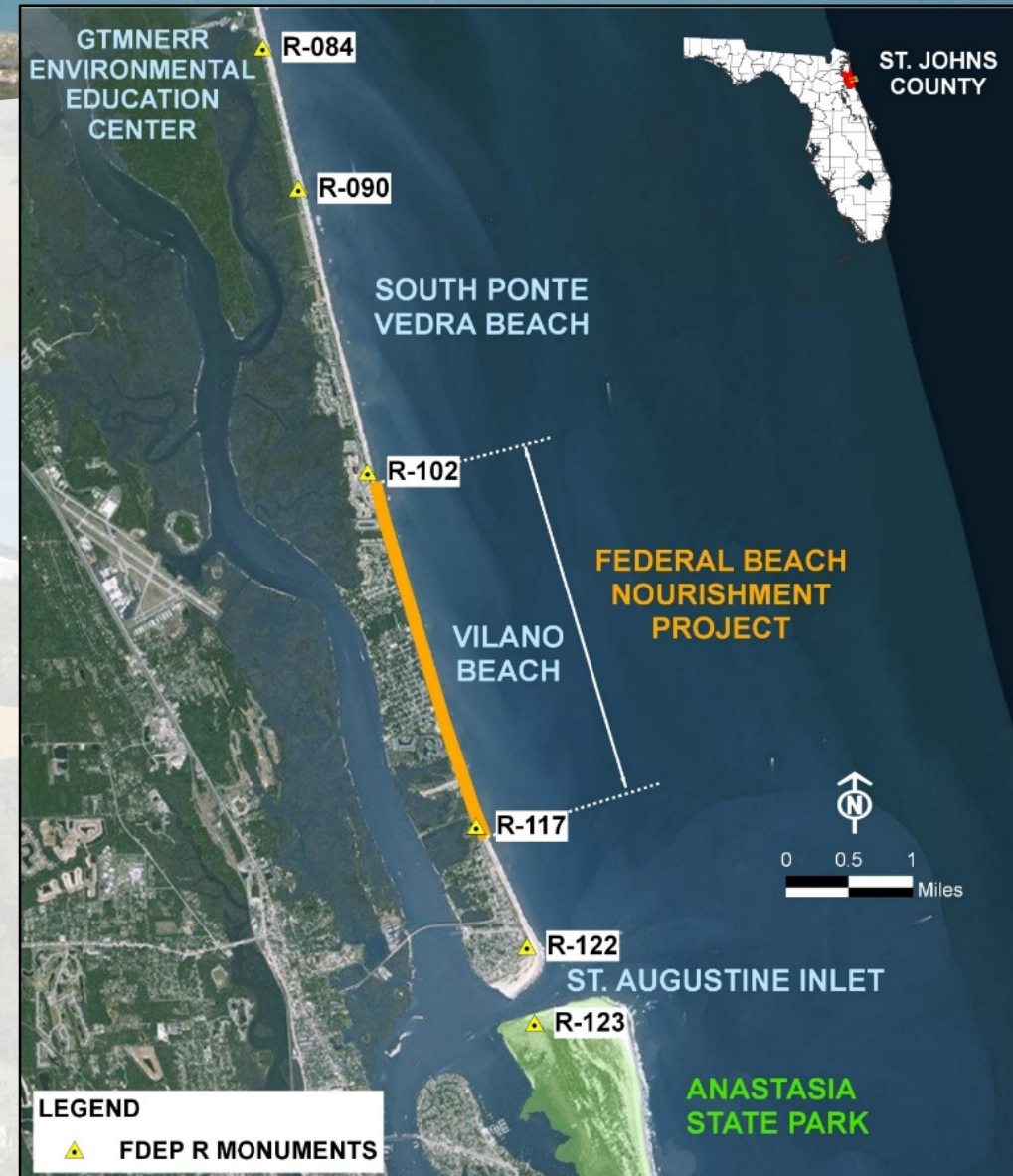
St. Johns County SPP Performance



Note: sand remaining is relative to 1998 conditions (before initiation of beach nourishment program)

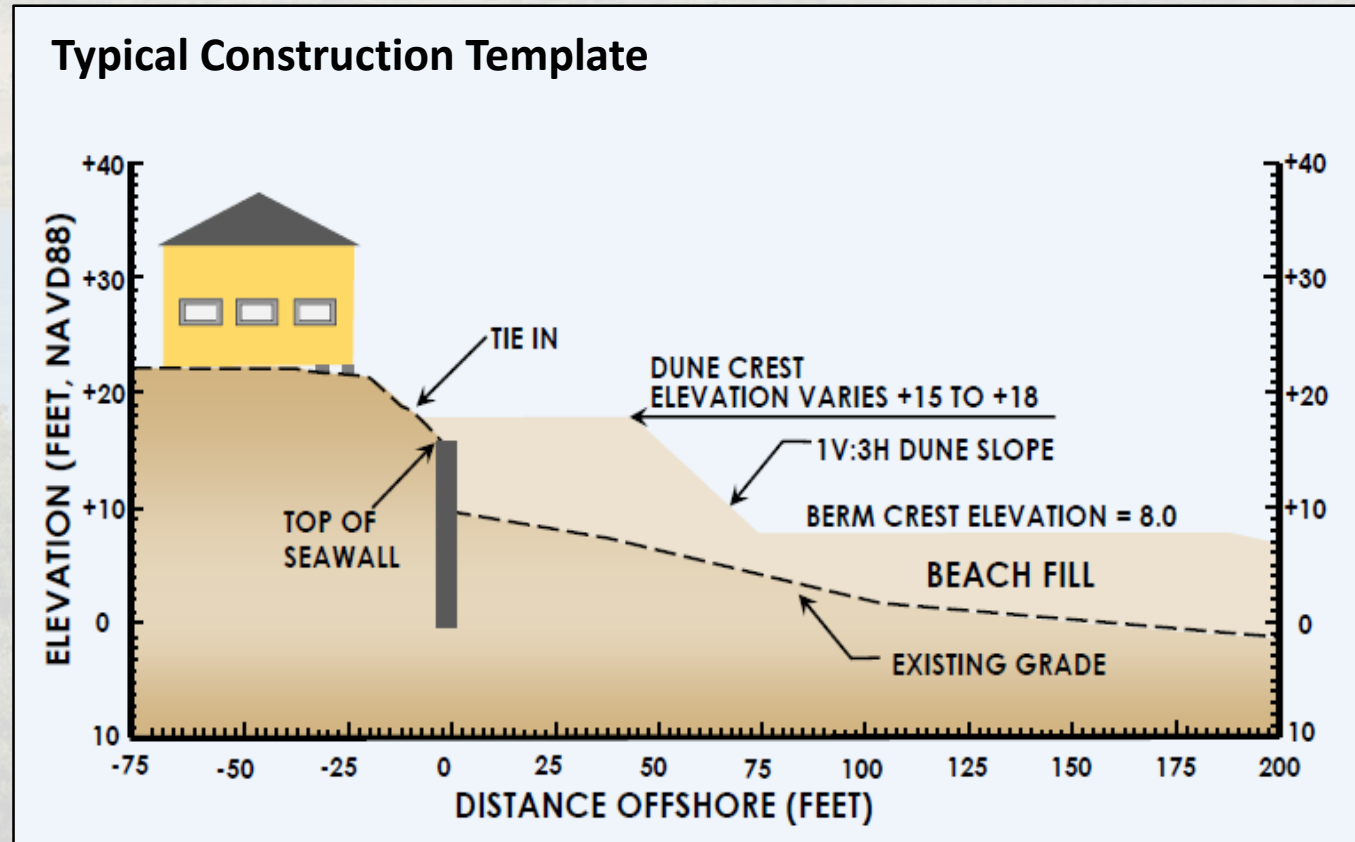
Coastal Storm Risk Management Project

- USACE Project
 - Authorized by 2018 WRDA
- Length – Three Miles
 - R102.5 to R117.5
- 50-year Project
 - Initial Nourishment: 1,310,000 cy
 - Renourishment: 866,000 cy every 12 years
- 50-year Project Cost = \$145M
- Borrow Site – St. Augustine Inlet Flood Shoals



Coastal Storm Risk Management Project

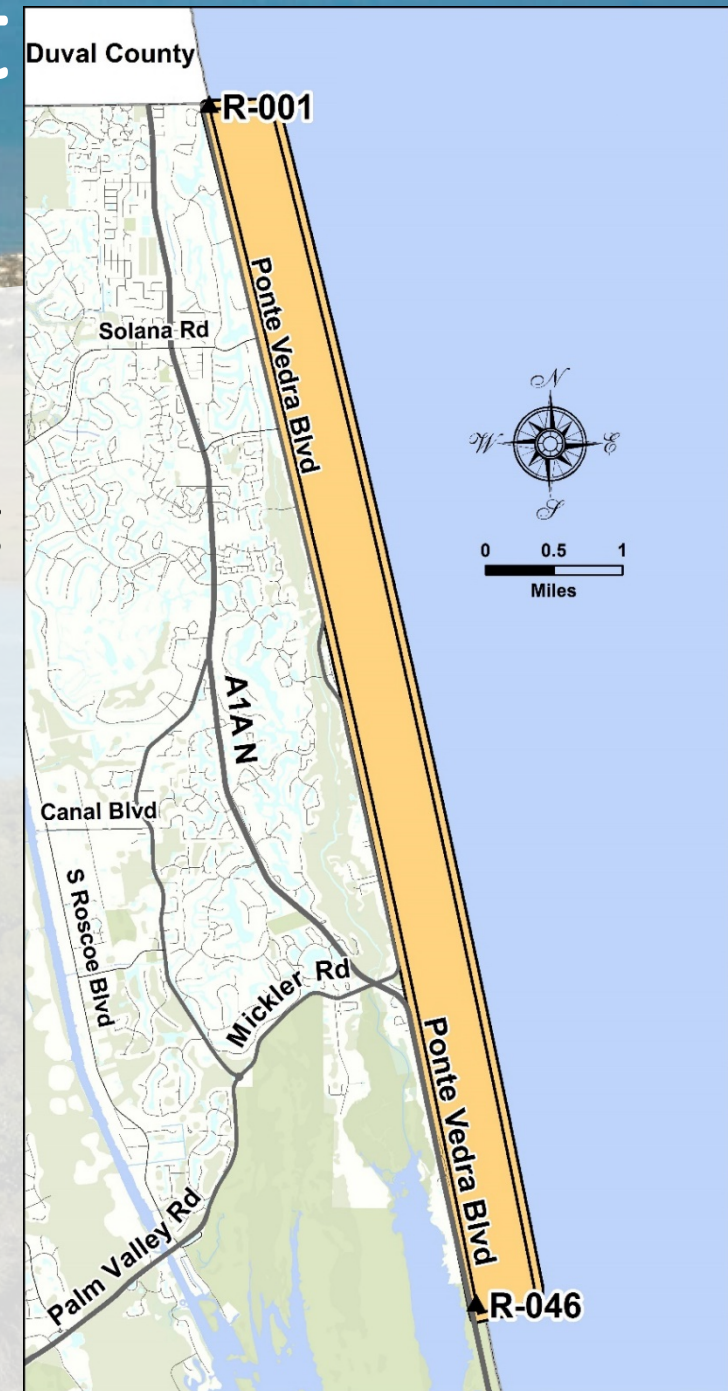
- 2018 US Bipartisan Budget Act appropriated \$36M for initial construction.
- USACE just completed the JCP process, permit due in March 2020.
- Project scheduled to begin construction in July 2020.



Courtesy of USACE

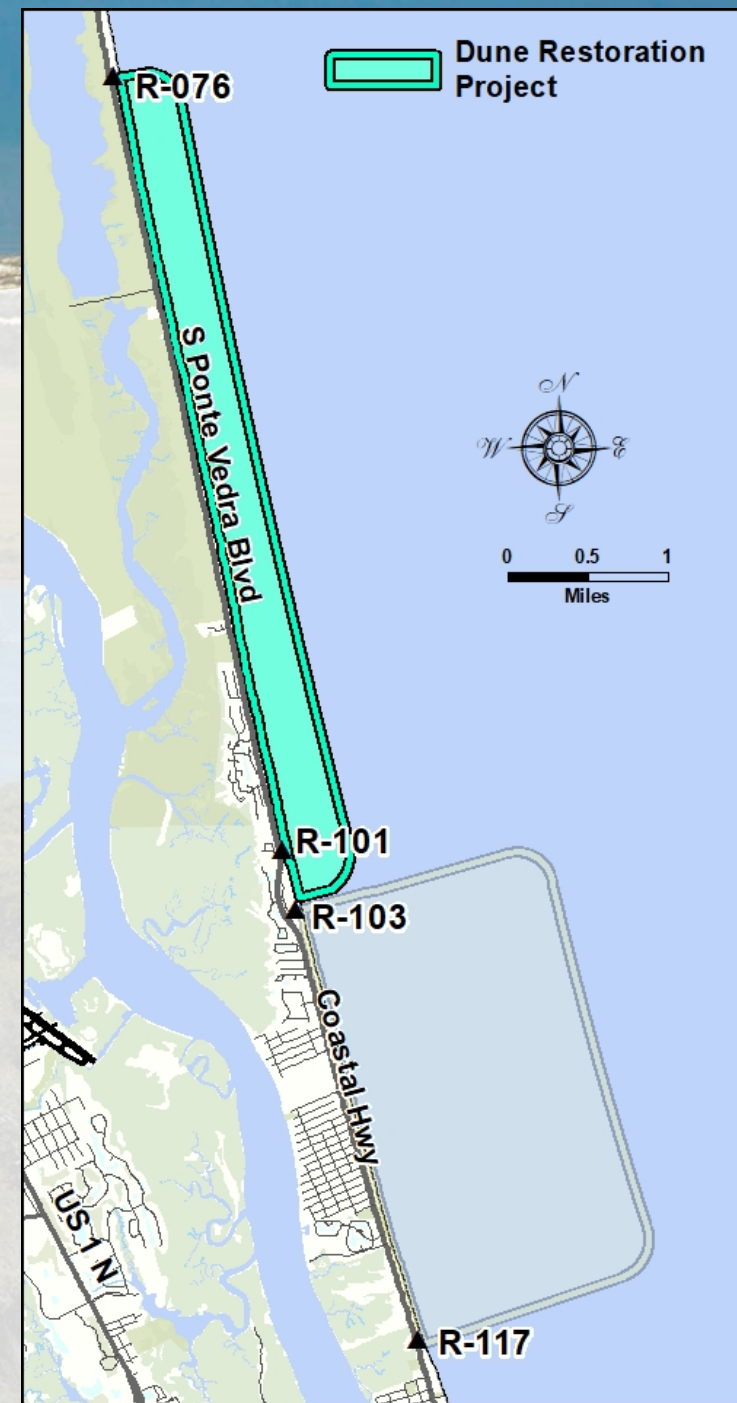
Ponte Vedra Beach Management Project

- Extends from R1 to R46, about nine miles.
- Currently in the project development and permitting phase.
 - Engineering Formulation
 - Borrow Area Definition
 - Environmental Documents Preparation
 - Permitting – FDEP, USACE; BOEM Lease
- Funding – combination of state’s special appropriations, MSTU, County tourism taxes.
- Construction anticipated to begin in 2021.



South Ponte Vedra Dune and Berm Restoration Project

- One-time project using State's Hurricane Matthew Recovery funding.
- Extent – R76 to R102.5, just over five miles
 - South end ties-in with new federal project
- Beach volume expected to be about 20 cy/ft on average
- Sands from borrow area in federal waters
 - Requires a lease from BOEM
- Currently in design and permitting stage
- Funding – combination of State's Post-Matthew Recovery funds, MSTU, and County funds
- Construction anticipated to begin early 2021



FEMA Emergency Berms

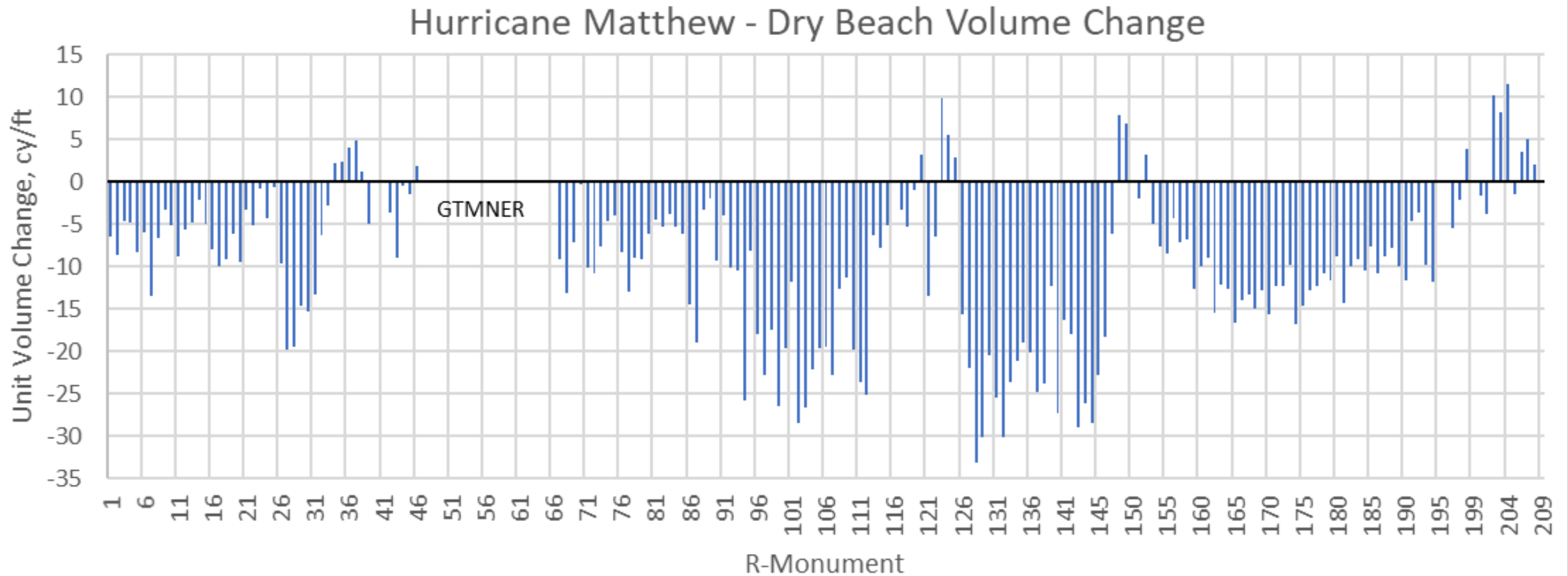
- Hurricanes Matthew and Irma caused tremendous erosion

| Beach | Segment | Length | Recent Storm-Related Volume Change Above MHW | | | | | |
|---------------------------------|------------|----------------|--|-----------|-------------------|-----------|-------------------|------------|
| | | | Matthew Impact 2016 | | Irma Impact 2017 | | Total | |
| | | | ft | cy | cy/ft | cy | cy/ft | cy |
| Ponte Vedra | R1-R46 | 46,733 | -253,268 | -5 | -472,997 | -10 | -726,265 | -16 |
| South Ponte Vedra | R67-R101 | 35,406 | -363,288 | -10 | -117,251 | -3 | -480,539 | -14 |
| South Ponte Vedra and Vilano | R101-R122 | 22,173 | -290,609 | -13 | -113,927 | -5 | -404,536 | -18 |
| St. Augustine, Butler, Crescent | R-151-R194 | 43,480 | -443,276 | -10 | -436,380 | -10 | -879,657 | -20 |
| Summer Haven | R-197-209 | 12,576 | -44,191 | -4 | -16,108 | -1 | -60,299 | -5 |
| Countywide* | | 160,368 | -1,394,632 | -9 | -1,156,663 | -7 | -2,551,295 | -16 |

- *Excludes parks
- Matthew data for R197-R209 excludes over wash landward of monument
- Irma data is from FDEP report
- Irma data for R151-R194 is approximate

FEMA Emergency Berms

- Hurricane Matthew – Countywide Sand Loss



FEMA Emergency Berms

- County applied for Category B Emergency Berms under FEMA’s Public Assistance Program
 - Emergency berms are meant to protect properties from a 5-year storm
- Determined eligible sand replacement volumes on a reach-by-reach basis countywide, excluding federal project areas and parks.

| Reach | Location | Extents | Shoreline Length, ft | Replacement Sand Volume | | |
|-------|---|-----------|----------------------|-------------------------|----------------|------------------|
| | | | | Matthew | Irma | Total |
| | | | | CY | CY | CY |
| 1 | Ponte Vedra Beach I | R1-R23 | 22,822 | 78,358 | 109,181 | 187,539 |
| 2 | Ponte Vedra Beach II | R23-R46 | 24,106 | 101,338 | 93,152 | 194,490 |
| 4 | South Ponte Vedra Beach I | R67-R84 | 17,921 | 95,477 | 34,695 | 130,172 |
| 5 | South Ponte Vedra Beach II | R84-R100 | 16,447 | 45,291 | 32,877 | 78,168 |
| 6 | South Ponte Vedra Beach III, Vilano Beach | R100-R117 | 17,703 | 43,973 | 34,955 | 78,928 |
| 7 | Vilano Beach | R117-R122 | 5,508 | 14,780 | 20,777 | 35,557 |
| 10 | Butler Beach | R151-R173 | 22,272 | 65,483 | 24,212 | 89,695 |
| 11 | Crescent Beach | R173-R194 | 20,811 | 95,416 | 61,573 | 156,989 |
| 13 | Summer Haven Beach | R203-R209 | 13,076 | 45,280 | 59,613 | 104,893 |
| | | | 160,666 | 585,396 | 471,035 | 1,056,431 |

FEMA Emergency Berms

- Sands proposed to be obtained from upland mines
 - Truck hauled to the placement areas
- Sand replacement costs expected to be about \$30M
- FEMA completed an EA on sand berms in Oct 2019
- The County is preparing to initiate construction while waiting for FEMA to complete its Project Worksheets

Strategic Beach Management Planning

- Recently hired a coastal engineer
- Currently developing estimates of shoreline changes and beach volume changes
 - Really long-term – ~1870s to present (shoreline change only)
 - Long-term – Early 1970s to present
 - Intermediate-term – pre-2004 storm season to present
 - Short-term – pre-2016 hurricane to present
- Shoreline change – beach volume change relationships
- Examples of some of the products we have developed so far in the discussion of long term planning.

Challenges and Solutions



Coastal Storm Risk Management Project

Challenge:

- Authorization documents determined a huge local share:
 - Parking was inadequate and a 2,200-ft segment lies in a CBRU
 - County had a few beach accesses in the project area with no eligible parking

| Project's Original Cost Share | | |
|-------------------------------|----------------------|---------------|
| Entity | Initial Construction | Renourishment |
| Federal | 23.0% | 17.7% |
| Non-Federal | 77.0% | 82.3% |
| State | 13.8% | 14.8% |
| <u>County</u> | <u>63.1%</u> | <u>67.5%</u> |

Coastal Storm Risk Management Project

Solution:

- County staff worked to improve the projects cost share by:
 - Looking for gaps in “eligible” shorelines (FDEP and USACE)
 - Inventorying existing open and unopened beach accesses
 - Developing potential parking improvement alternatives
 - Considering community feedback
- Actions
 - Increased spaces at an existing park to convert a secondary beach access to a primary beach access
 - Added two new parking lots
 - Added bike parking at two accesses
 - Received clarification guidance from SAD allowing USACE to cost share on publicly owned lands in CBRU
- Results
 - County expects to save about \$4M for the initial construction, and about \$20M over the three renourishment

| Project's Original Cost Share | | |
|-------------------------------|----------------------|---------------|
| Entity | Initial Construction | Renourishment |
| Federal | 23.0% | 17.7% |
| Non-Federal | 77.0% | 82.3% |
| State | 13.8% | 14.8% |
| <u>County</u> | <u>63.1%</u> | <u>67.5%</u> |

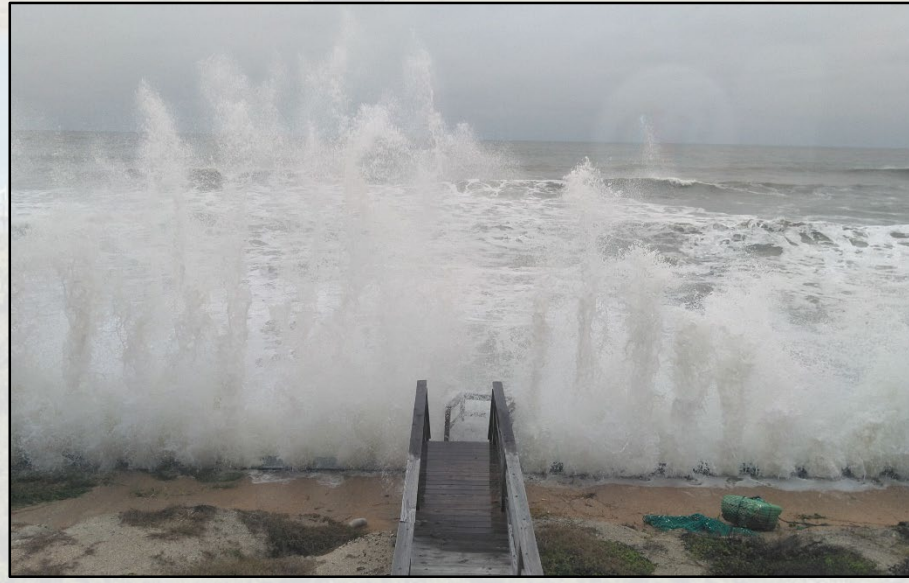
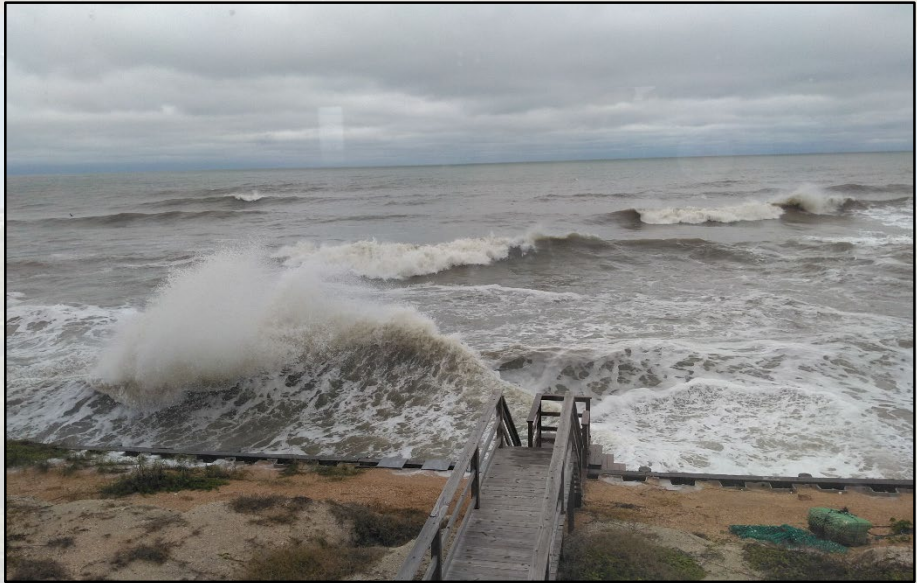
| Project's New Cost Share | | |
|--------------------------|----------------------|---------------|
| Entity | Initial Construction | Renourishment |
| Federal | 29.0% | 22.3% |
| Non-Federal | 71.0% | 77.7% |
| State | 24.6% | 26.9% |
| <u>County</u> | <u>46.4%</u> | <u>50.8%</u> |

South Ponte Vedra Dune and Berm Restoration Project

Challenge:

- How to place 10 cy/ft of sand on a severely eroded beach
- Seawalls covering majority of the project coastline
- Dry beach only present at low tide

South Ponte Vedra Dune and Berm Restoration Project



South Ponte Vedra Dune and Berm Restoration Project

Solution:

- Switched from a truck haul project to a dredge project.
- Moved the borrow source offshore allowing the project to go from 10 cy/lf to 20 cy/lf for the same price if not less.
- Developing a design template that manages the shoreline irregularities.

Long Term Planning



St. Johns County Beach Management Plan

- Analyzing historical shoreline data to develop an understanding of what is trending throughout the 42 miles of coastline.
 - Shoreline Change per Year
 - Volume Change per Year
- Use this and additional data to develop a plan to manage the coastline.
- This plan can be used as a decision making tool to develop new projects.

County Wide Rate of Shoreline Change

The Rate of Shoreline Change (ft/yr)

| Reach | ~1870 - 2017 | 1972 - 2017 | 2003 - 2017 | Matthew and Irma 2016 - 2017 | R-Monument |
|---|--------------|-------------|-------------|---------------------------------|------------|
| | Avg | Avg | Avg | Avg | |
| Ponte Vedra Beach | 1 | 0 | -1 | -4 | R-1-46 |
| GTMNERR | 1 | 0 | -1 | 2 | R-47-67 |
| South Ponte Vedra Beach | 0 | -1 | -3 | -16 | R-68-102 |
| South Ponte Vedra Beach and Vilano Beach CSRM | 0 | -2 | -2 | -17 | R-103-122 |
| Anastasia State Park | 19 | 2 | -5 | -57 | R-123-137 |
| St. Augustine Beach SPP | 1 | 6 | -2 | -65 | R-138-152 |
| Butler Beach | 6 | 5 | 2 | -73 | R-152-173 |
| Crescent Beach | 2 | 2 | -3 | -42 | R-174-194 |
| Fort Matanzas State Park | 0 | -3 | -10 | -18 | R-195-196 |
| Summer Haven | -2 | -1 | -7 | 0 | R-197-209 |

County Northern Boundary

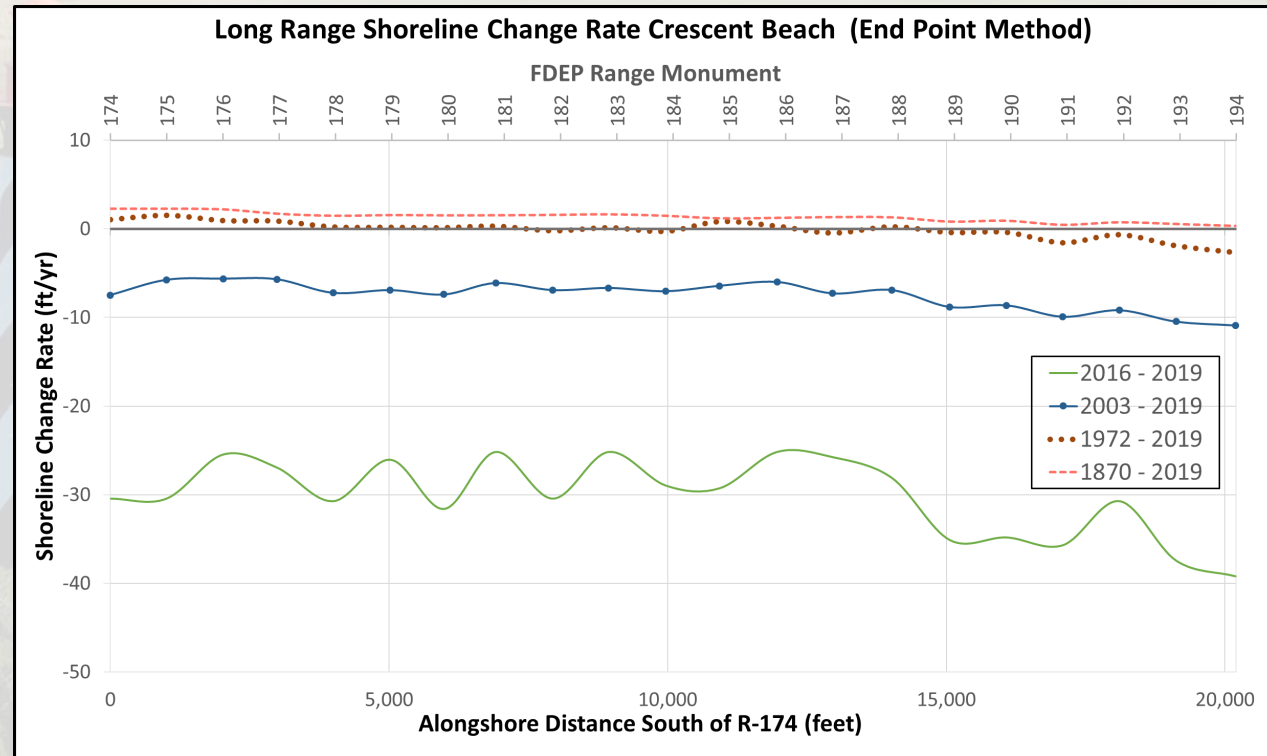
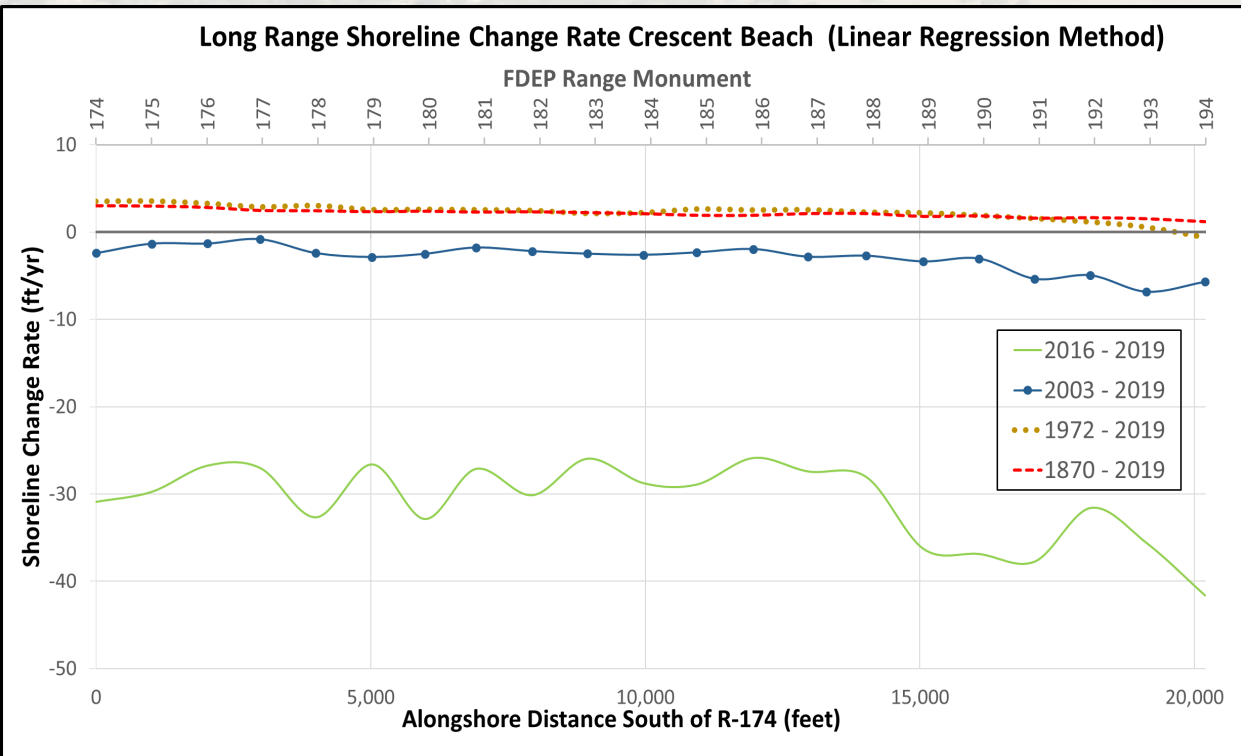
St. Augustine Inlet

Matanzas Inlet

County Southern Boundary

*Data in table represents preliminary data analysis results

Crescent Beach Rate of Shoreline Change



*Data in figures represents preliminary data analysis results

Summary

- The County has been heavily impacted by recent strong storm events causing extensive damage to our coastline.
- Multiple projects are emerging to help mitigate this damage along the County's coastline.
- The County is working to develop a long term beach management plan to better understand our changing coastline and position the County to address future needs.

Thank You!

