

# Hurricane Matthew Impacts and Response in Indian River County, FL



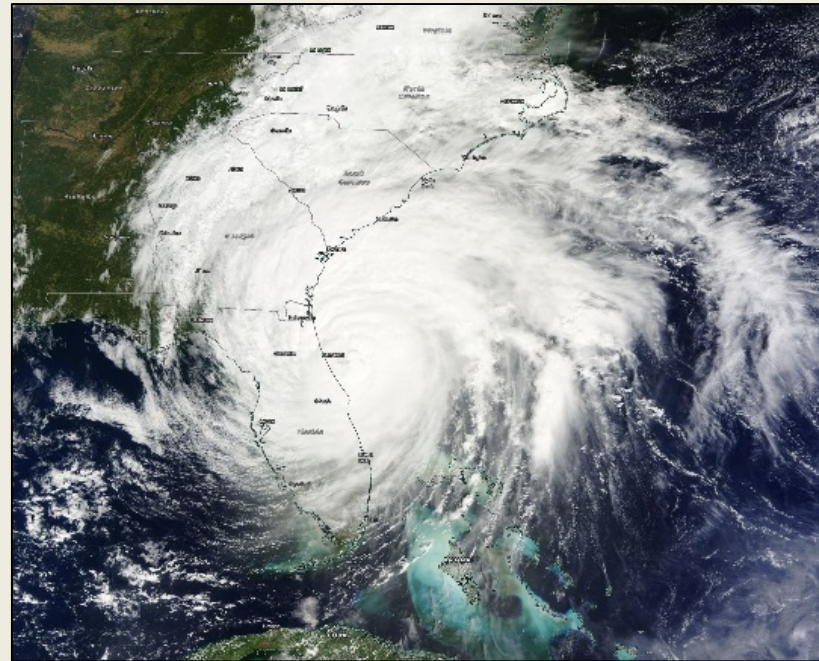
**Will Reilly, P.E.<sup>1</sup>**

**James Gray, Jr.<sup>2</sup>**

**Michelle Pfeiffer, P.E.<sup>1</sup>**

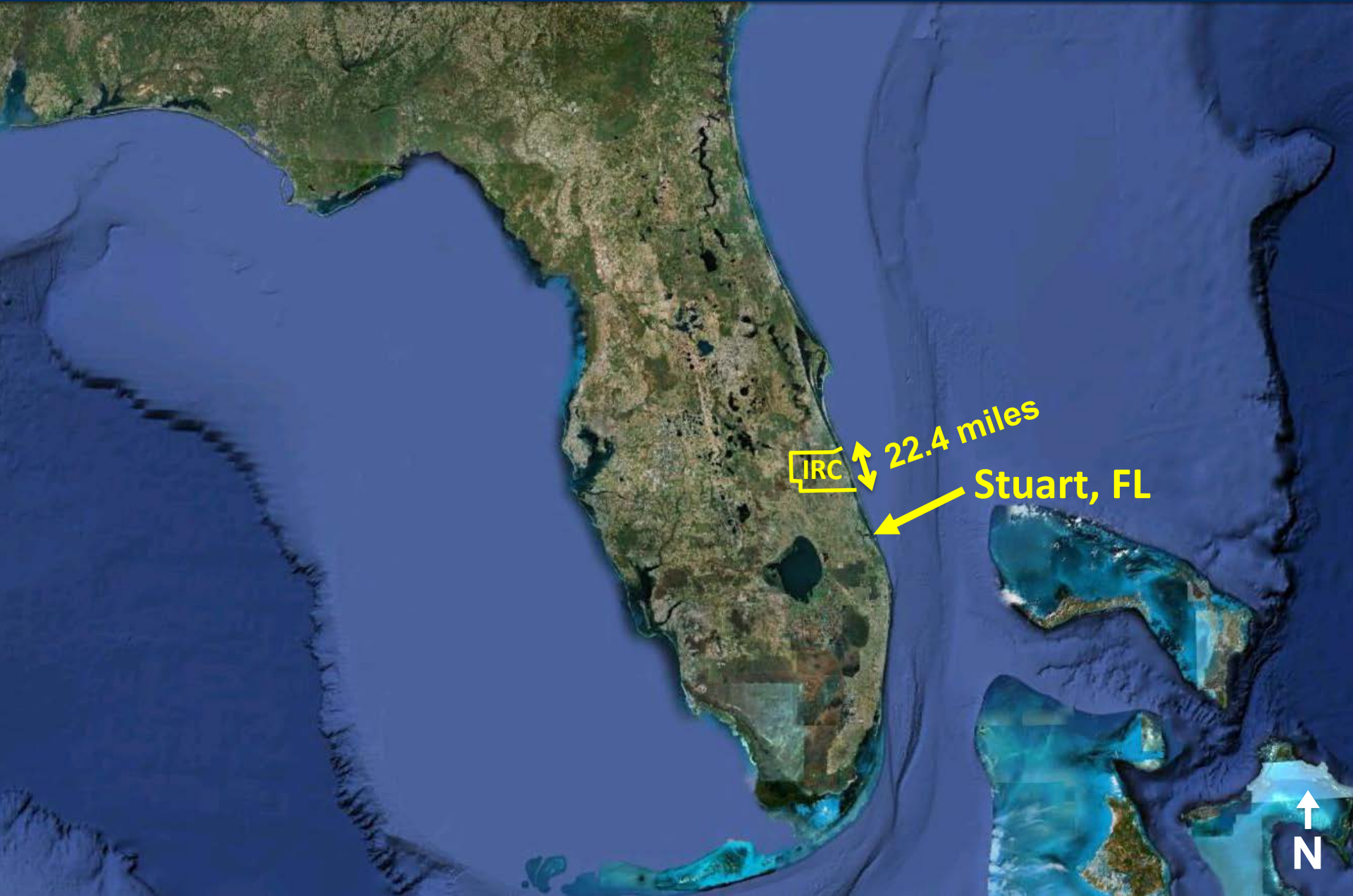
<sup>1</sup> CB&I; [william.reilly@cbi.com](mailto:william.reilly@cbi.com) and [michelle.pfeiffer@cbi.com](mailto:michelle.pfeiffer@cbi.com)

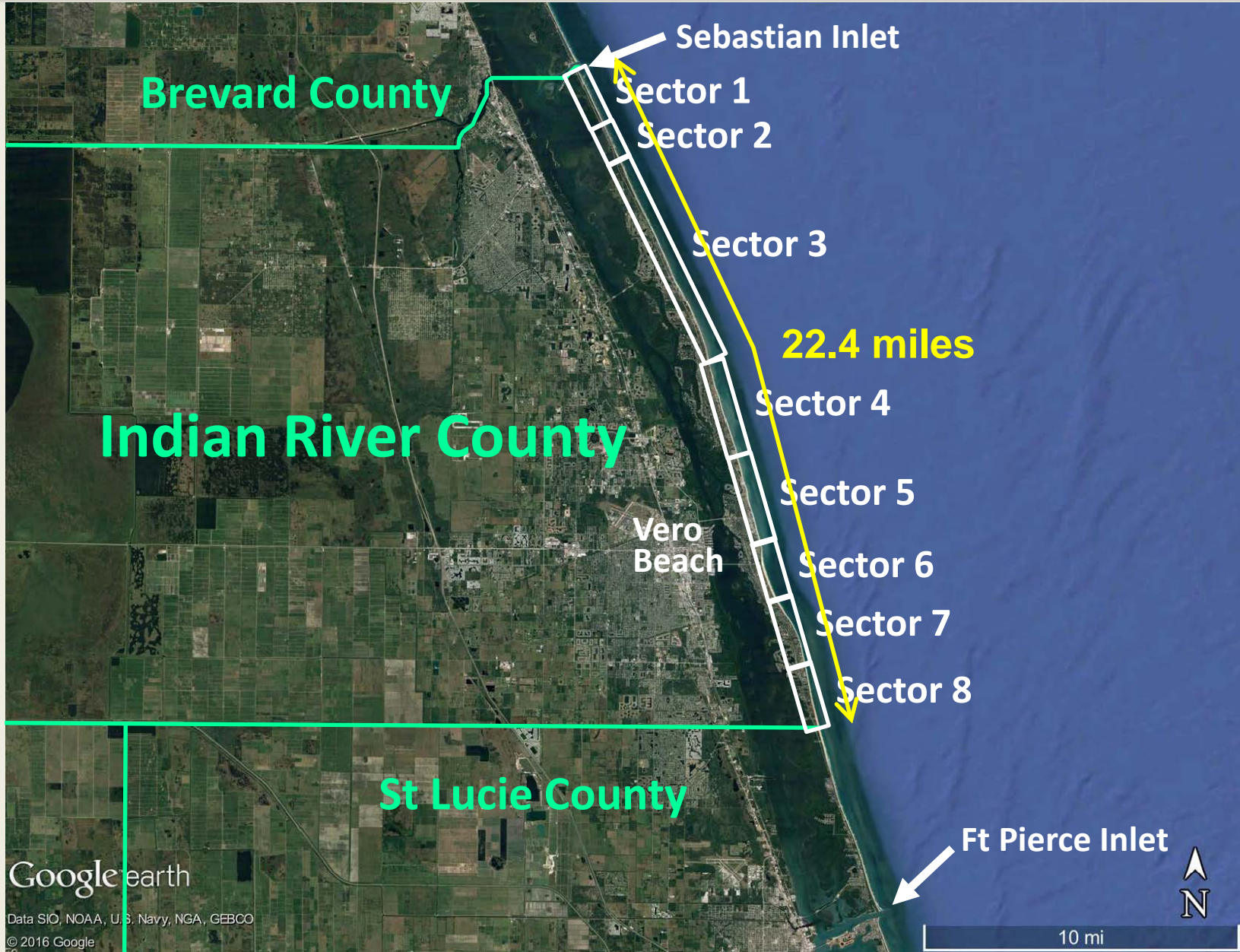
<sup>2</sup> Indian River County Public Works; [jgray@ircgov.com](mailto:jgray@ircgov.com)

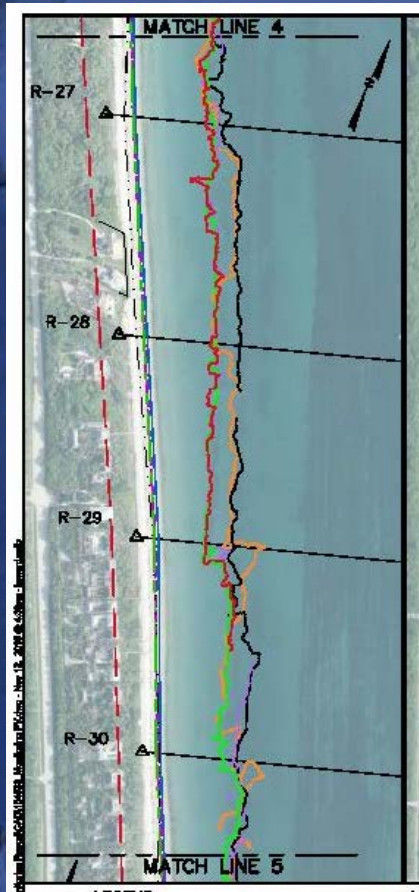


- Location and Background
- Hurricane Matthew
- Response
- Effects to the Beach
- Recovery
- Future Efforts

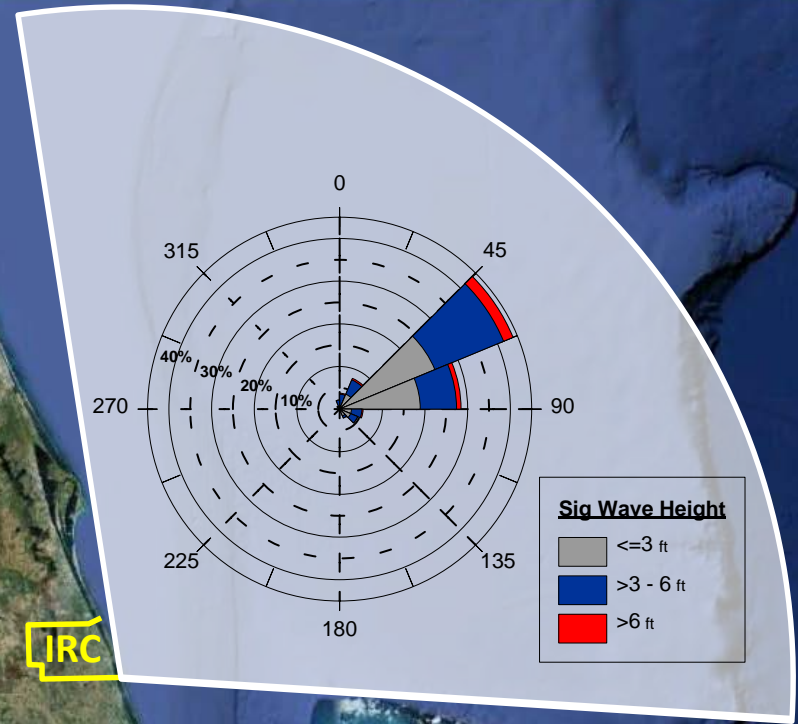






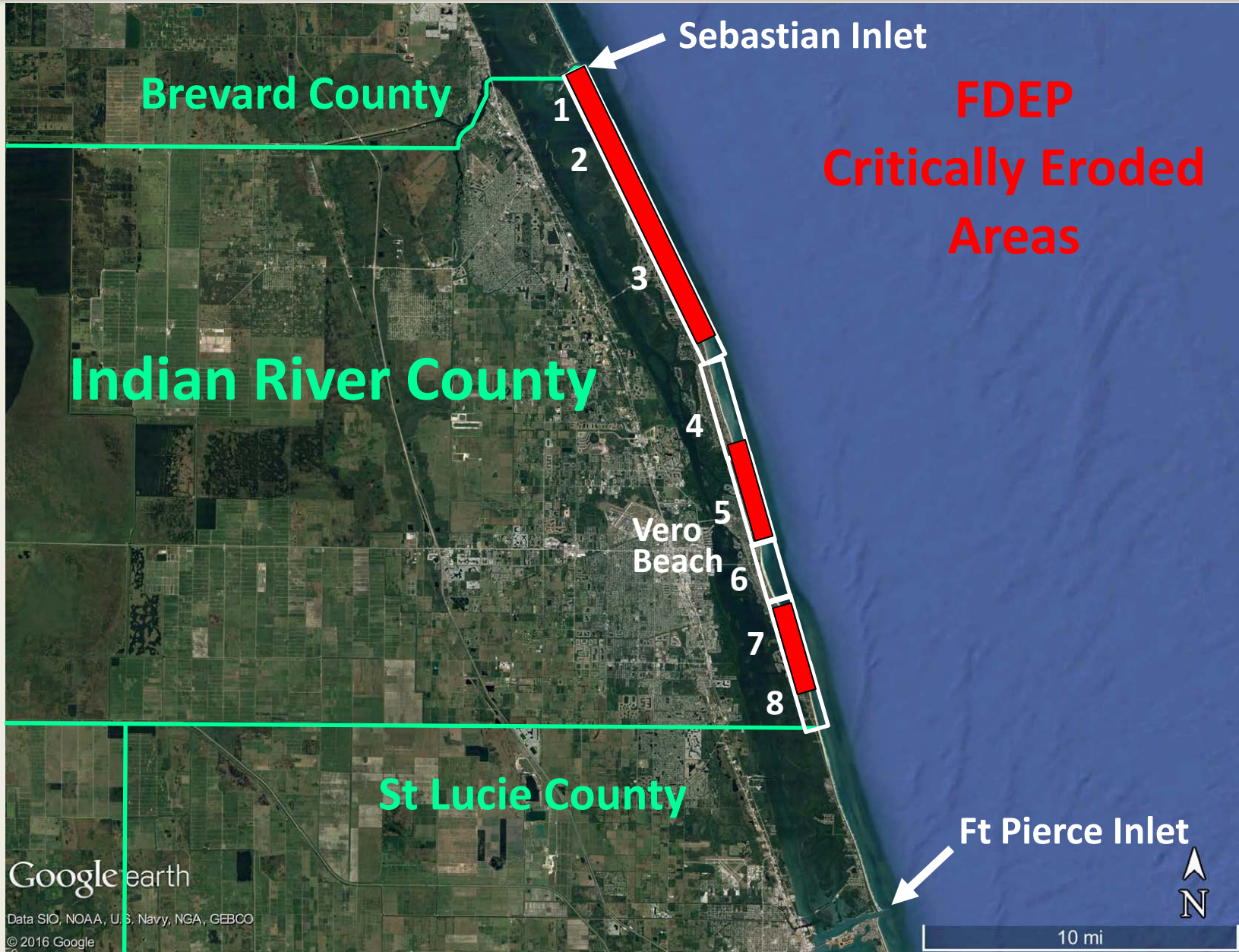


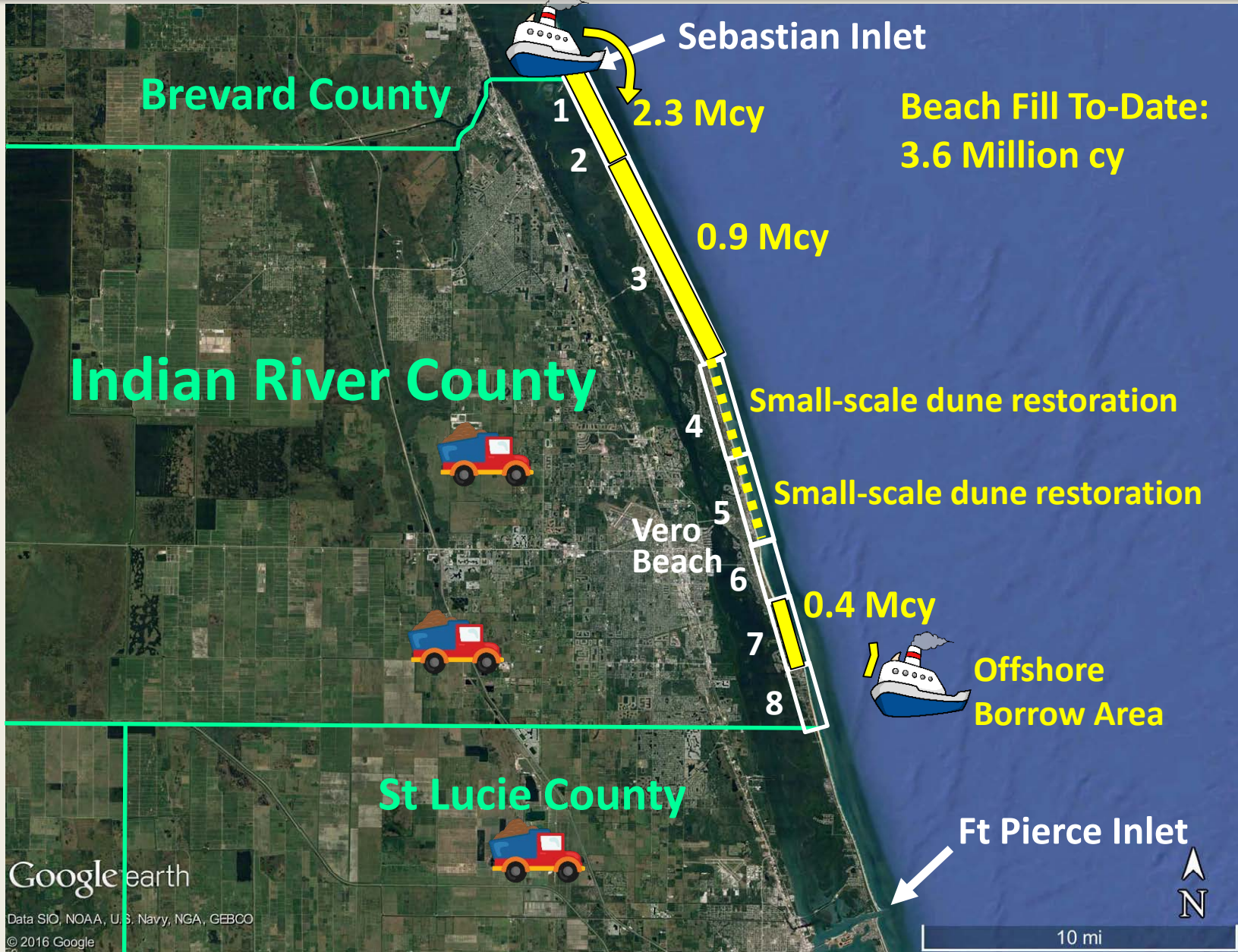
IRC





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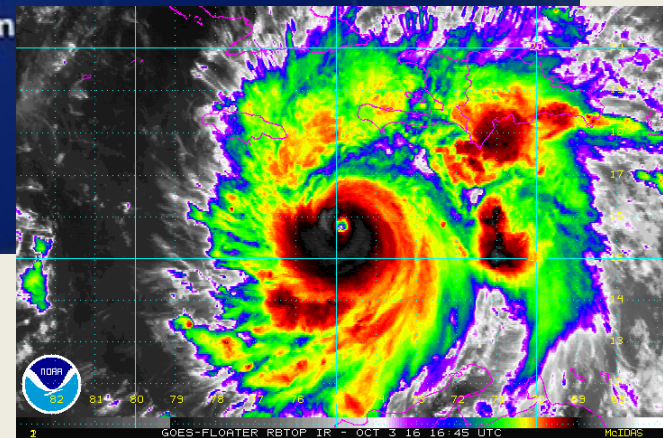
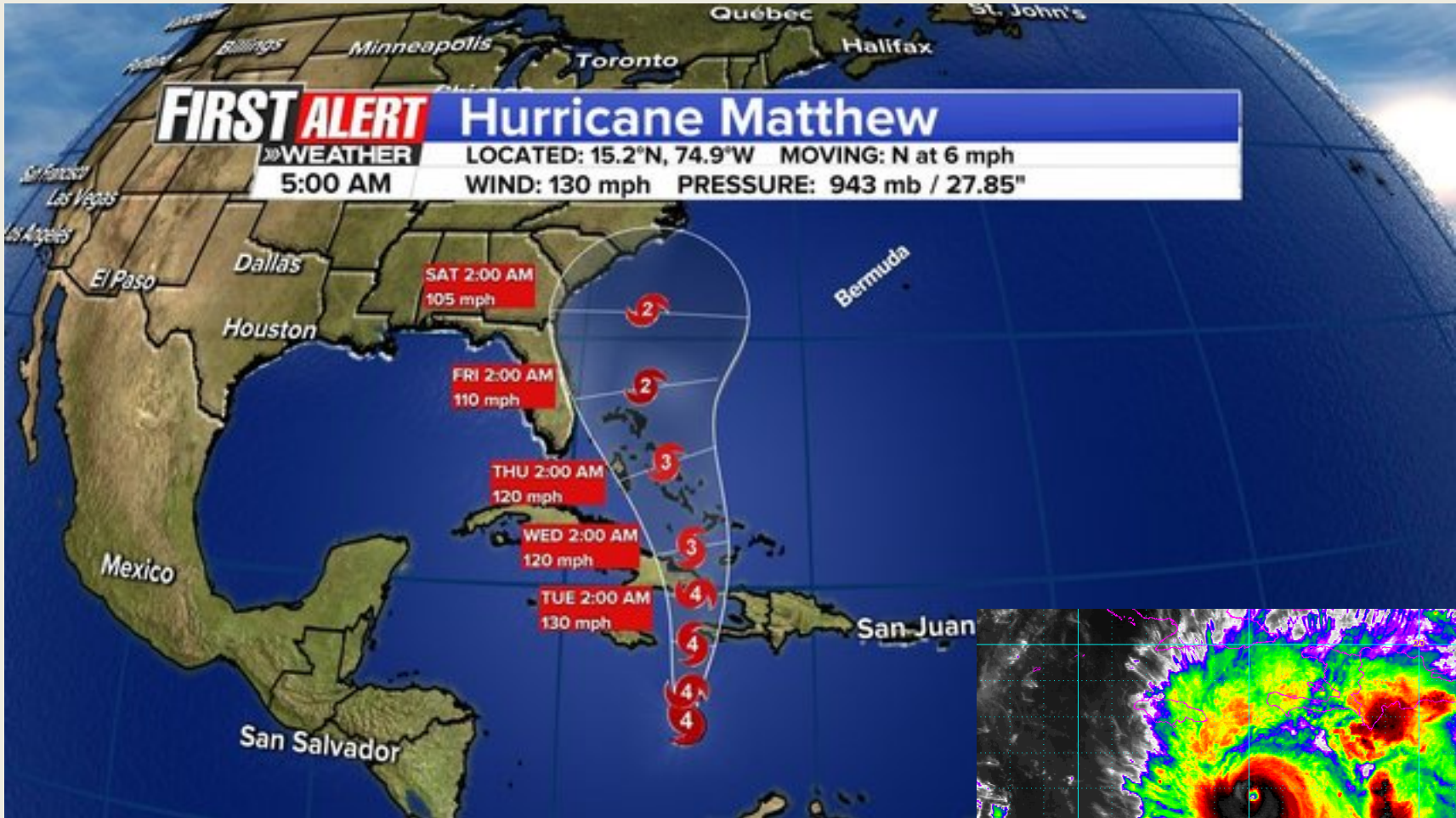


Google earth

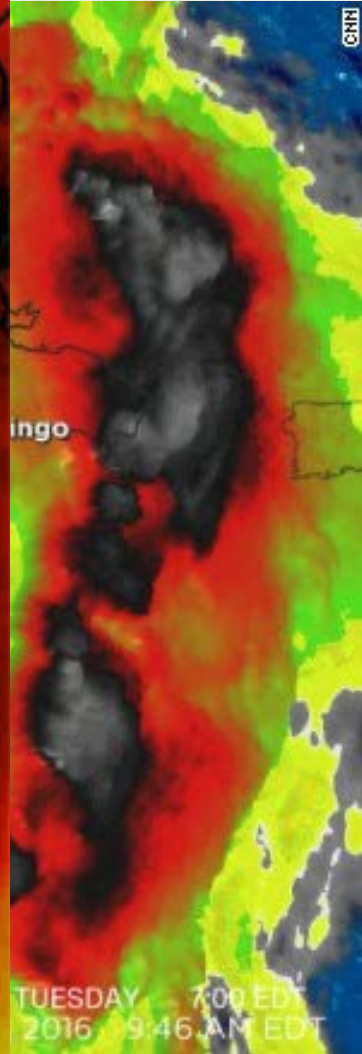
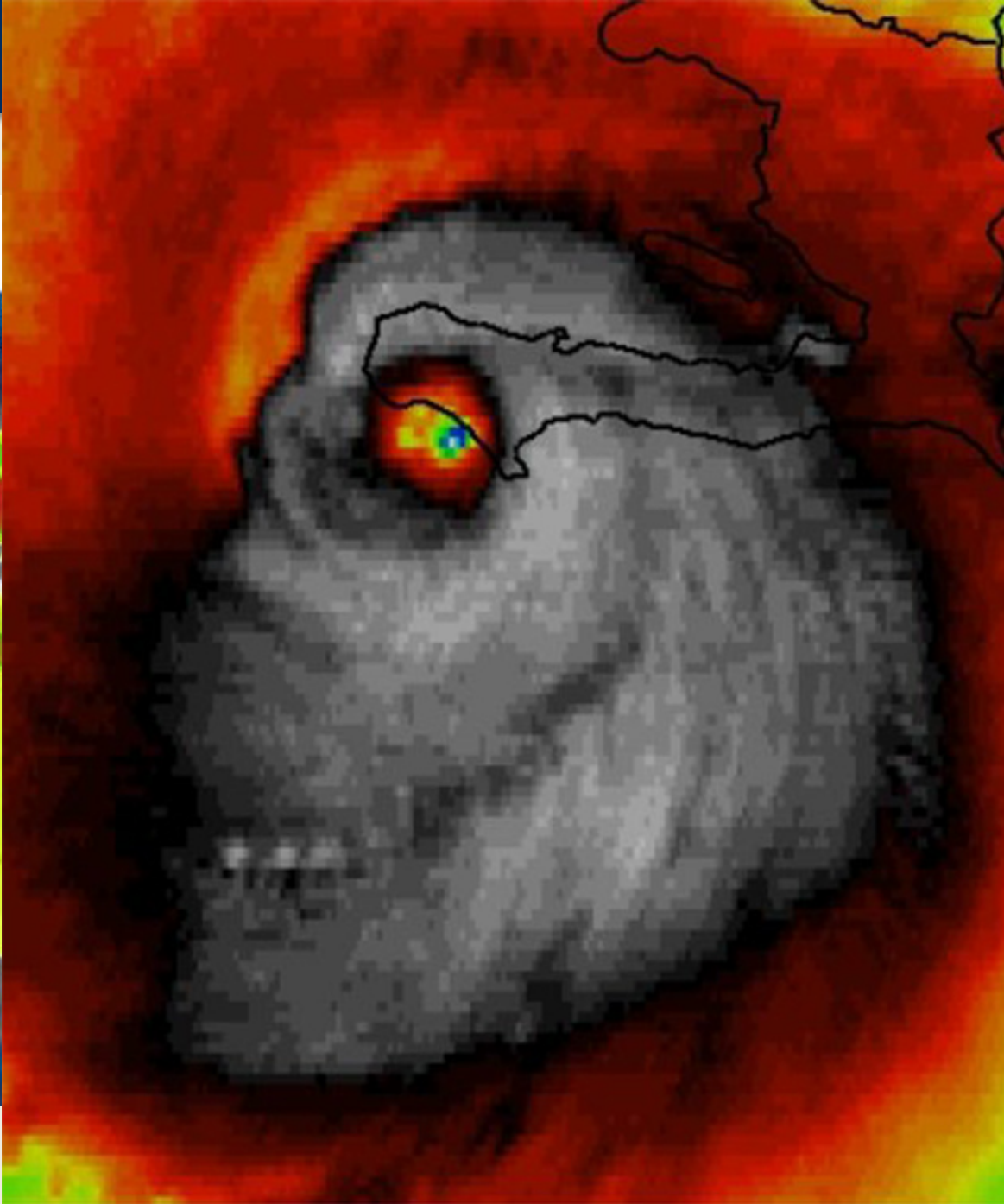
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

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CNN WEATHER

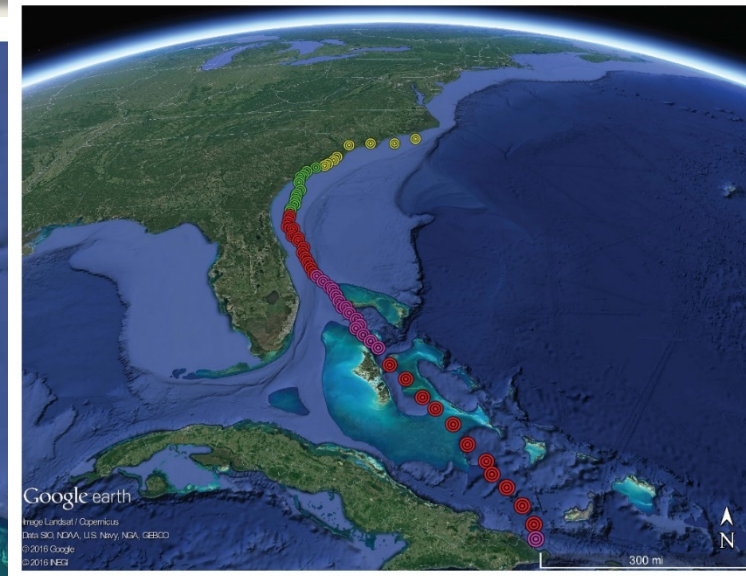
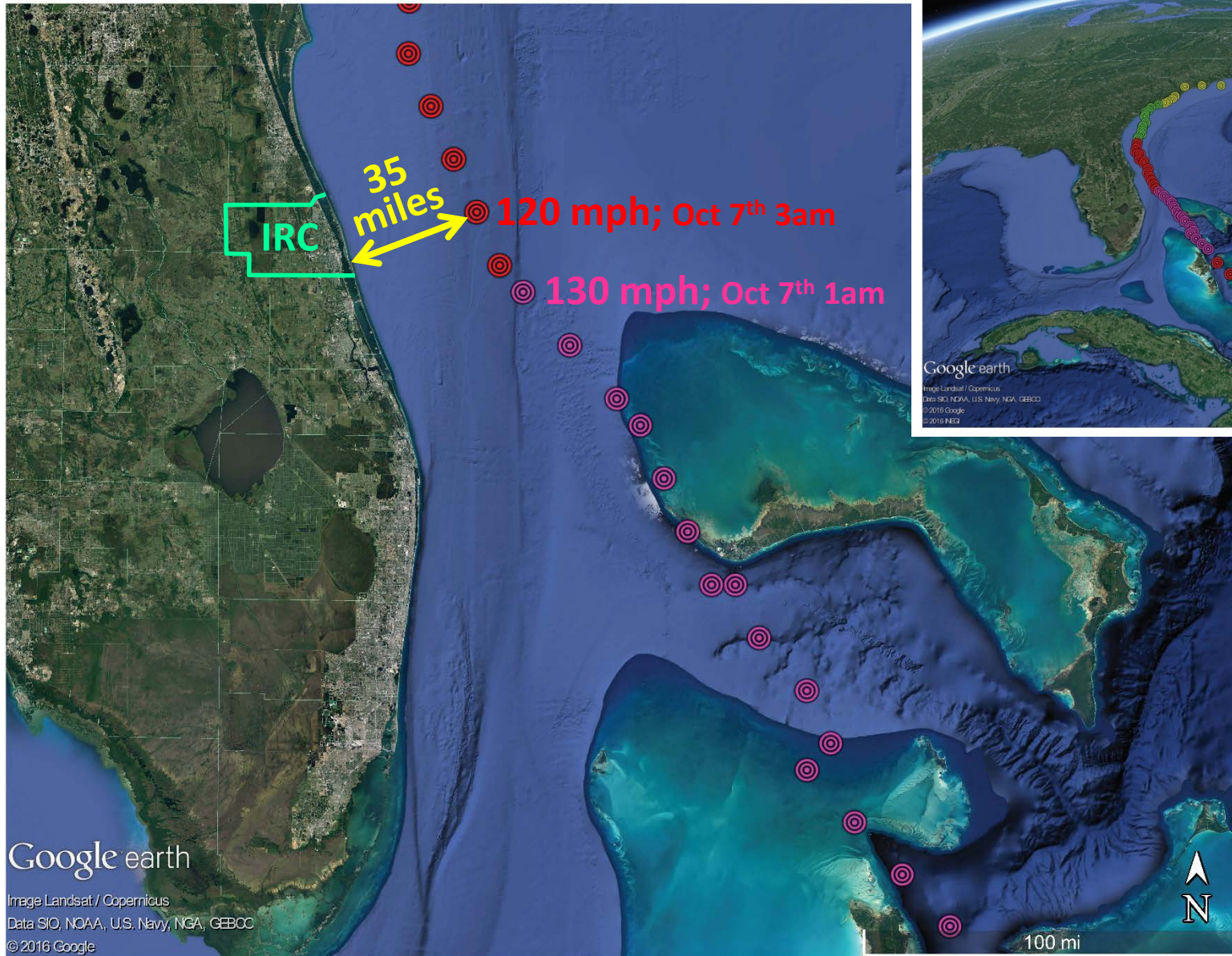


## Sequence of Events (Pre-Storm)

- **Oct 3<sup>rd</sup>**: Governor Declares State of Emergency in all 67 counties of Florida
- **Oct 6<sup>th</sup>**: President Declares State of Emergency in Florida
- **Oct 6<sup>th</sup>/7<sup>th</sup>**:  Hurricane Matthew









TCPalm.com

## Sequence of Events (Post-Storm)

- **Oct 8<sup>th</sup>**: Presidential Declaration Federal Assistance Categories A & B
- **Oct 10<sup>th</sup>**: Beach Damage Assessment Report Submitted

### PRELIMINARY BEACH DAMAGE ASSESSMENT

#### HURRICANE MATTHEW



INDIAN RIVER COUNTY  
COASTAL ENGINEERING DIVISION

OCTOBER 10, 2016  
REVISED OCTOBER 11, 2016

## County Coastal Division Hurricane Response Plan

### IEW

County Coastal Division Hurricane Response Plan is the County's for coordinating and managing staff in the event a major coastal (easter, etc.) causes erosion of the beach-dune system. The Plan nsibilities and incorporates best practices to comply with County ement, FDEP, FEMA, FWC, and County sea turtle Habitat uidelines following a major coastal storm event.

## Sequence of Events (Post-Storm)

- **Oct 12<sup>th</sup>**: Preliminary Damage Assessment (PDA) Meeting with FDEP and USACE
- **Oct 13<sup>th</sup>**: PDA Meeting with FEMA
- **Oct 13<sup>th</sup>**: Request for Public Assistance
- **Oct 13-20<sup>th</sup>**: Post-Storm Survey by M&E



## Tools to Estimate Beach Volume Losses

### 1. Pre & Post Photos

- Profile Translation Estimate
- Cross-Sectional Volume Loss Estimate

### 2. Beach Profile Surveys

- Wading Depth
- Wider-Spaced Surveys (i.e. 2000' or 3000')

# Tools to Estimate Beach Volume Losses

## 1. Pre & Post Photos

- Profile Translation Estimate
- Cross-Sectional Volume Loss Estimate



10-3-16



10-7-16

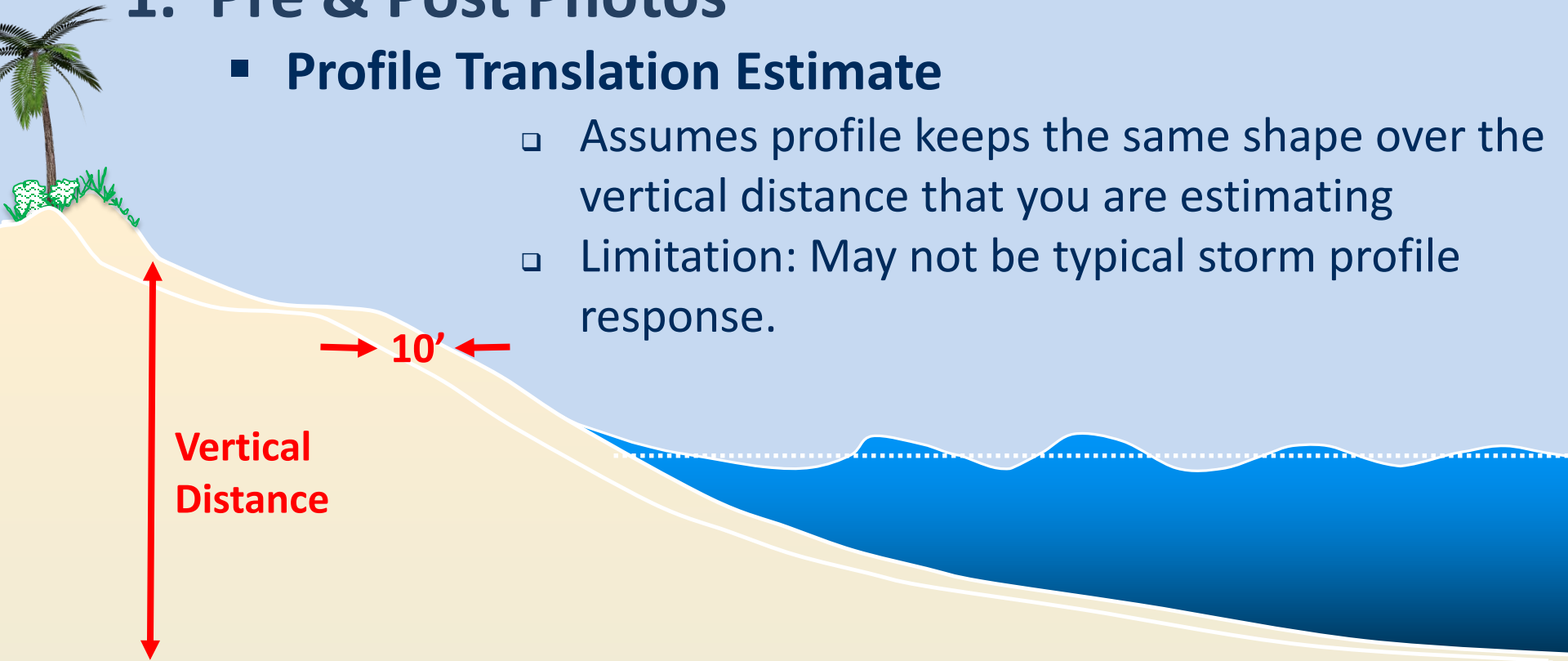
- Rapid Response
- Set up protocol
- GPS or Visual Landmarks

Golden Sands Beach Park Looking South R-32 (GPS -80.406453, 27.7824131)

## 1. Pre & Post Photos

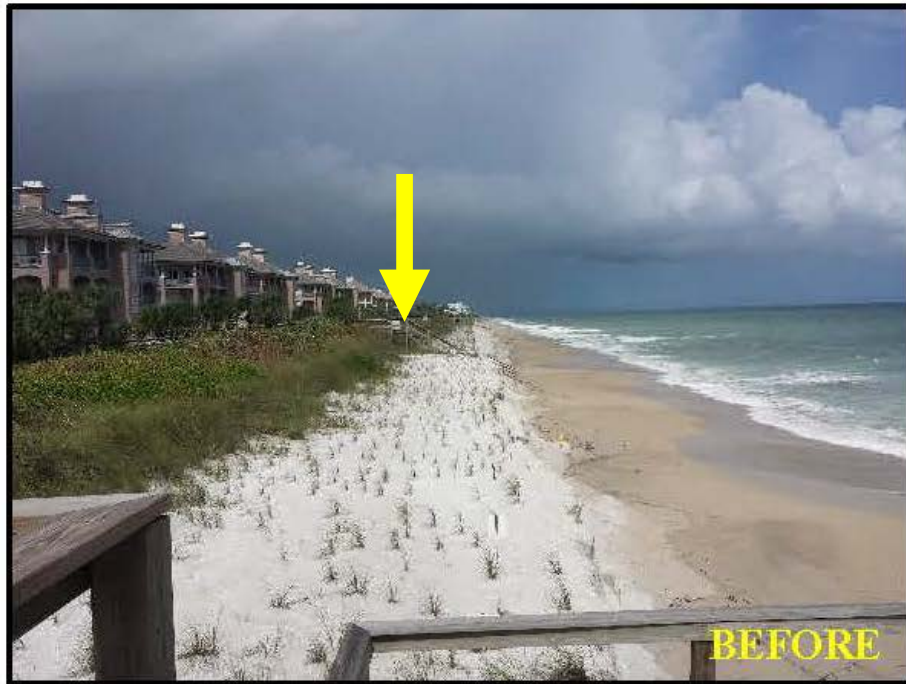
### ▪ Profile Translation Estimate

- Assumes profile keeps the same shape over the vertical distance that you are estimating
- Limitation: May not be typical storm profile response.

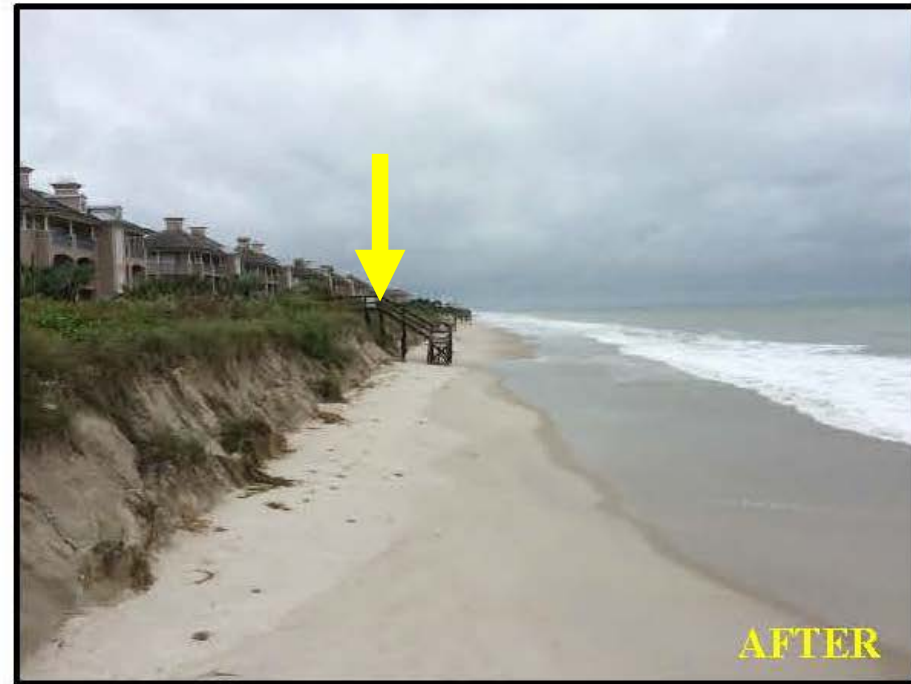


## 1. Pre & Post Photos

- Profile Translation Estimate



10-5-16



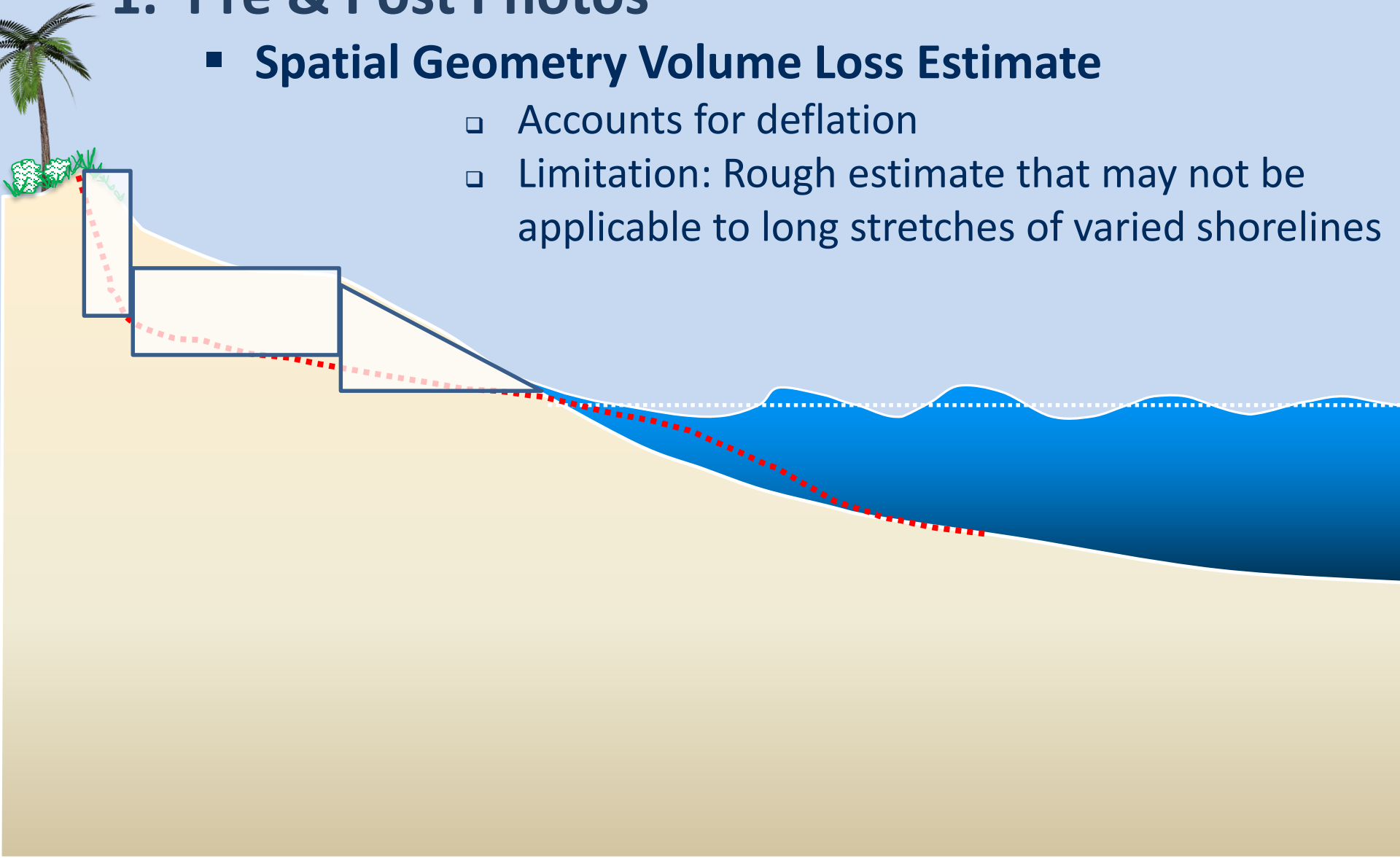
10-7-16

Orchid Looking North R-36 (GPS -80.4017105, 27.7726545)

## 1. Pre & Post Photos

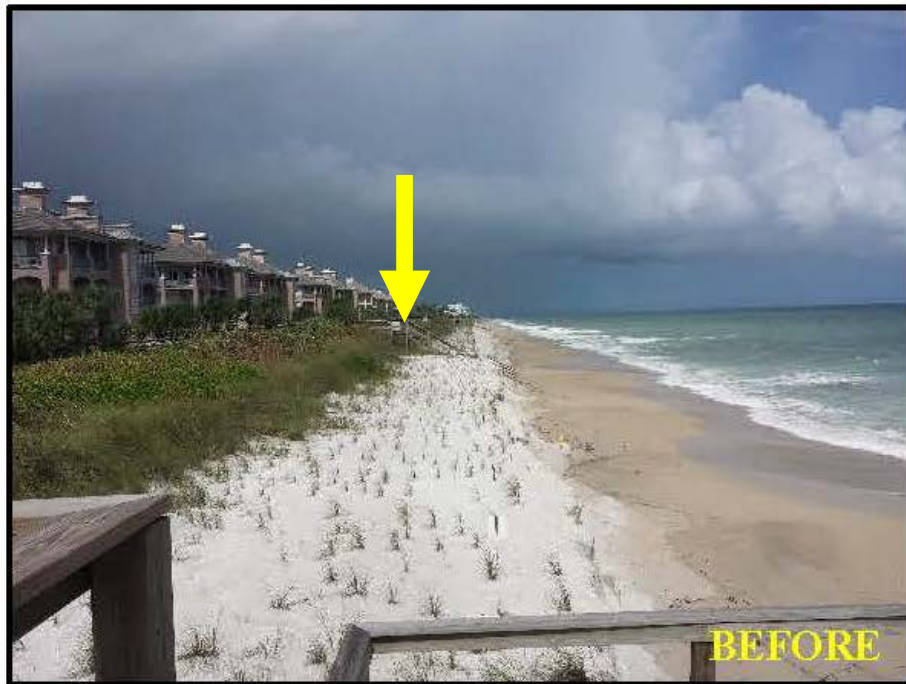
### ▪ Spatial Geometry Volume Loss Estimate

- Accounts for deflation
- Limitation: Rough estimate that may not be applicable to long stretches of varied shorelines



## 1. Pre & Post Photos

- Spatial Geometry Volume Loss Estimate



10-5-16



10-7-16

Orchid Looking North R-36 (GPS -80.4017105, 27.7726545)

## 1. Pre & Post Photos



- ❑ Similar estimates to ground photos
- ❑ Can cover large portions of the coast
- ❑ Relatively inexpensive
- ❑ Some have surface mapping capability

# Tools to Estimate Beach Volume Losses

## 2. Beach Profile Surveys

- Wading Depth
- Wider-Spaced Surveys (i.e. 2000' or 3000')



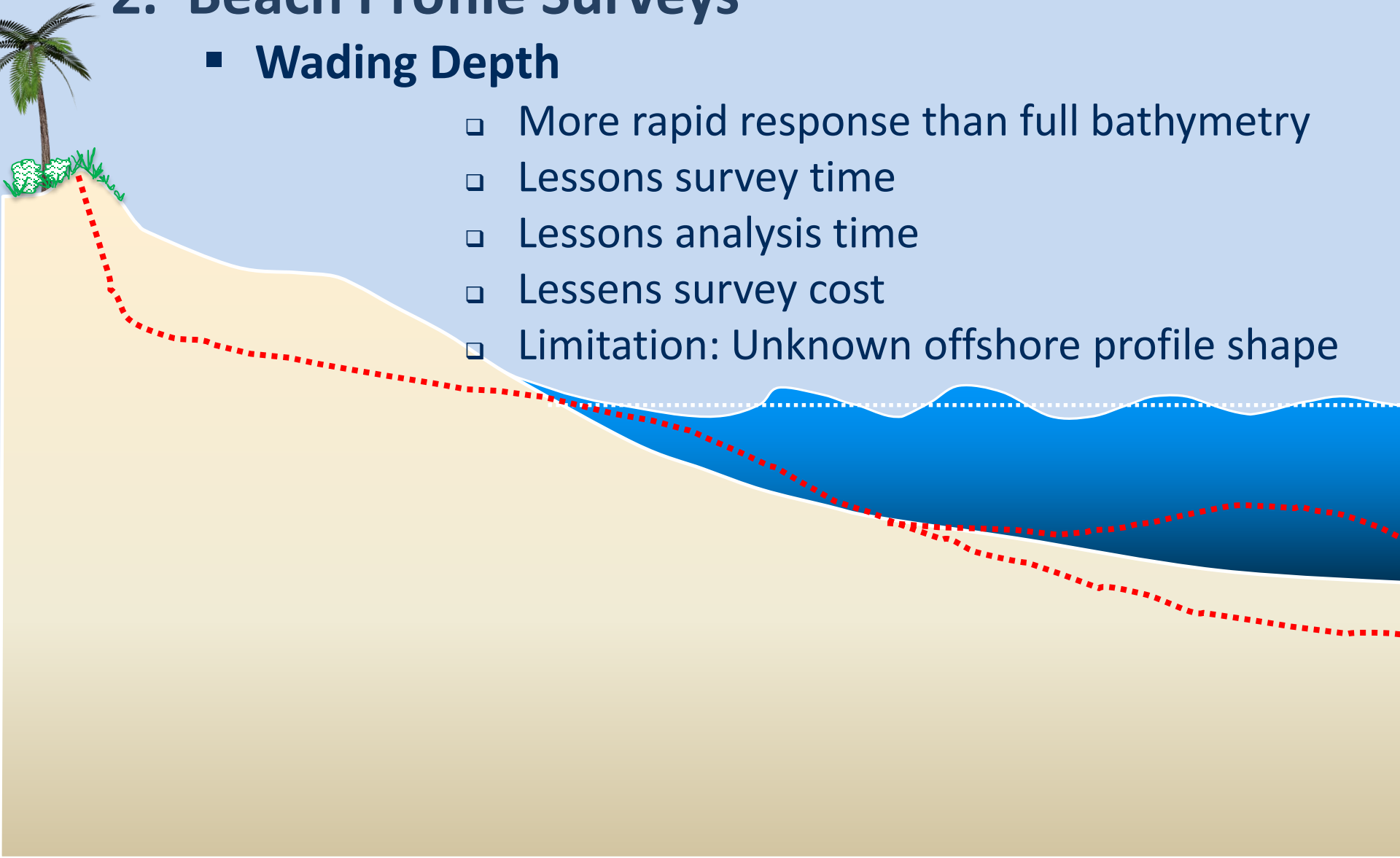
- After PDA (it takes time to mobilize a survey team)
- Cost-saving measures
- Be aware of limitations!
- Must know how your particular beach responds



## 2. Beach Profile Surveys

### ▪ Wading Depth

- ❑ More rapid response than full bathymetry
- ❑ Lessens survey time
- ❑ Lessens analysis time
- ❑ Lessens survey cost
- ❑ Limitation: Unknown offshore profile shape

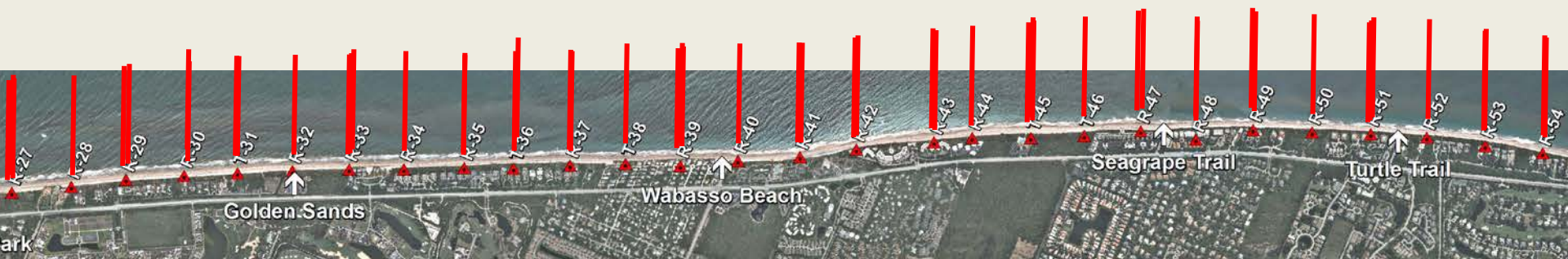


## 2. Beach Profile Surveys

- **Wider-spaced surveys (i.e. 2000' or 3000')**

- Lessons survey time
- Lessons analysis time
- Lessons survey cost
- Limitation: Unknown changes between profiles

➤ Bodge/Reilly (2014) showed that you have roughly a 75% of getting within 2 cy/ft whether you space 2000' or 3000'



## Preliminary Beach Damage Assessment

### PRELIMINARY BEACH DAMAGE ASSESSMENT

#### HURRICANE MATTHEW



INDIAN RIVER COUNTY  
COASTAL ENGINEERING DIVISION

OCTOBER 10, 2016  
REVISED OCTOBER 11, 2016

- **Sectors 1 and 2**  
-40,000 cy
- **Sector 3**  
-200,000 cy
- **Sector 5**  
-90,000 cy
- **All others including Sector 7**  
-200,000 cy

## Beach Volume Estimates vs. Calculation

- Sectors 1 and 2  
-40,000 cy
- Sector 3  
-200,000 cy
- Sector 5  
-90,000 cy
- Sector 7  
-80,000



## Beach Volume Estimates vs. Calculation

- Sectors 1 and 2

-40,000 cy (estimates)      -40,000 cy (calculations)

- Sector 3

-200,000 cy

**ENTIRE COUNTY LOST  
APPROXIMATELY  
600,000 cy**

- Sector 5

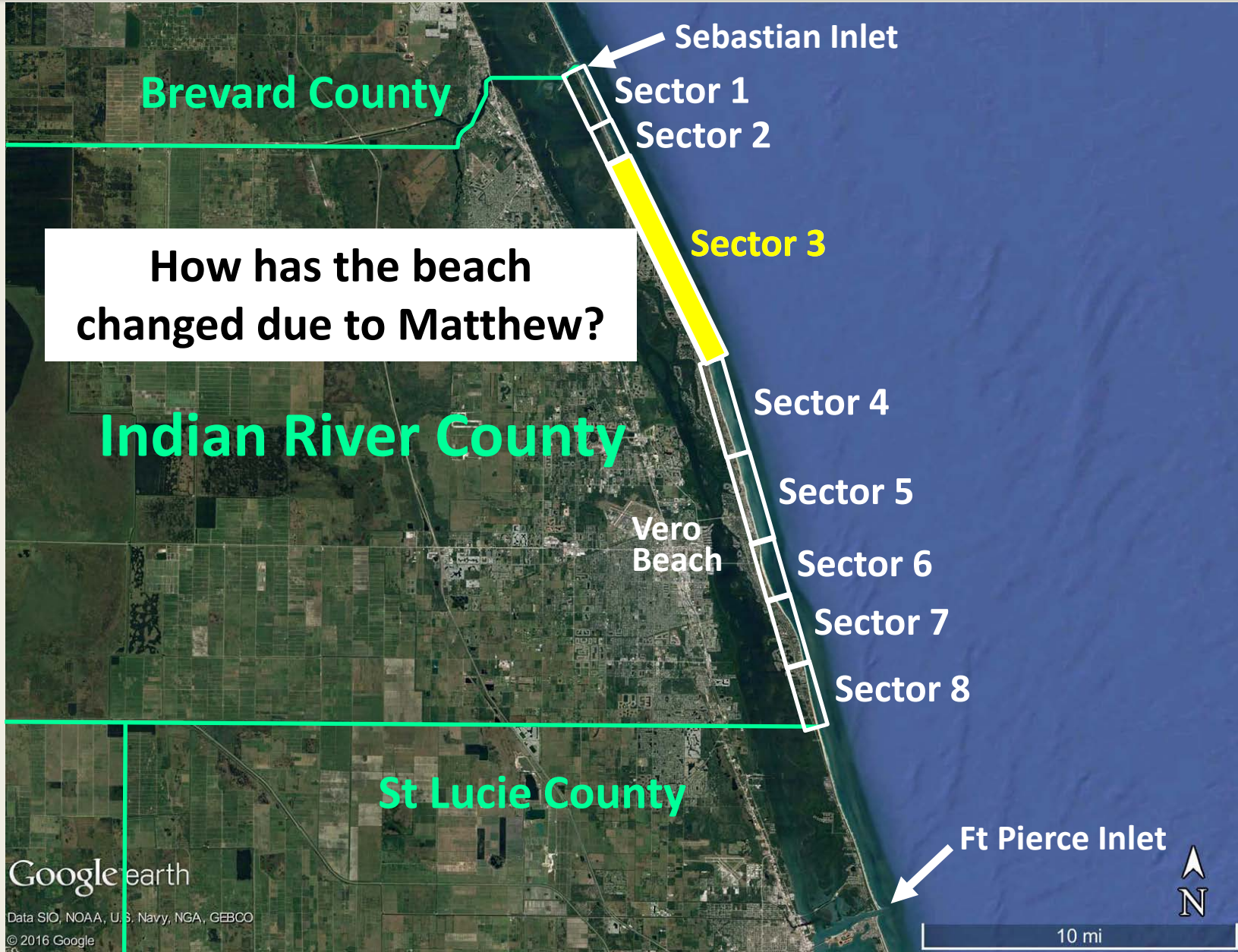
-90,000 cy

-90,600 cy

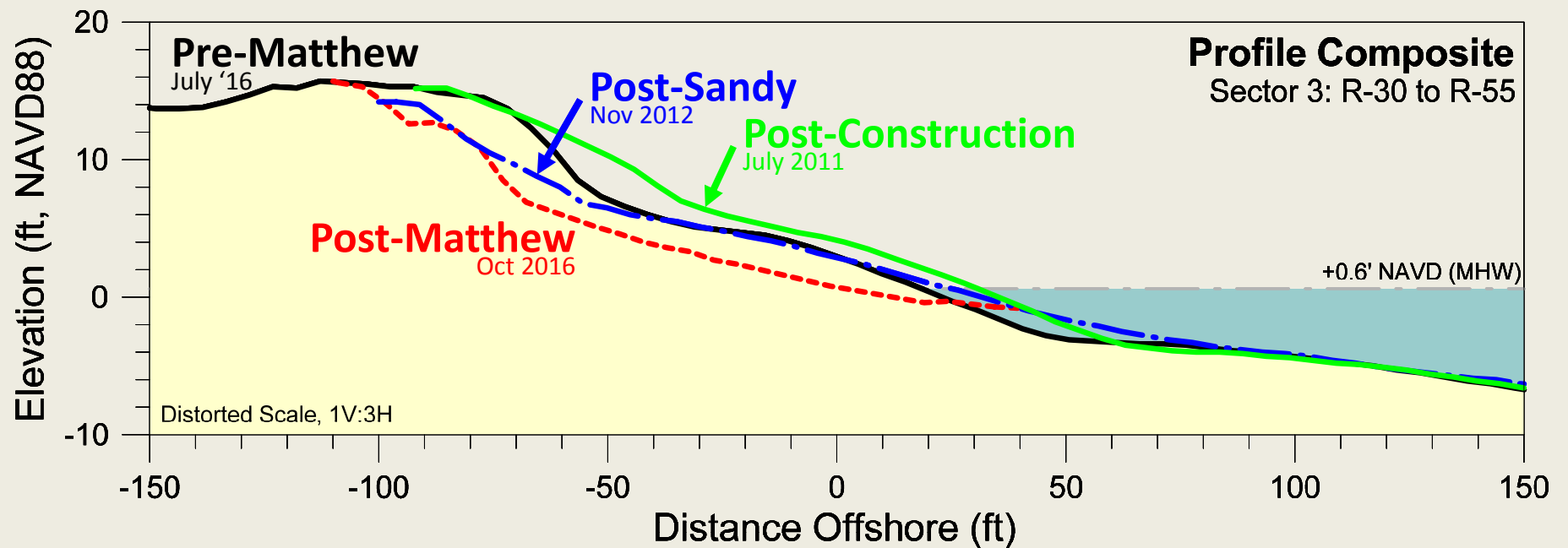
- Sector 7

-80,000 cy

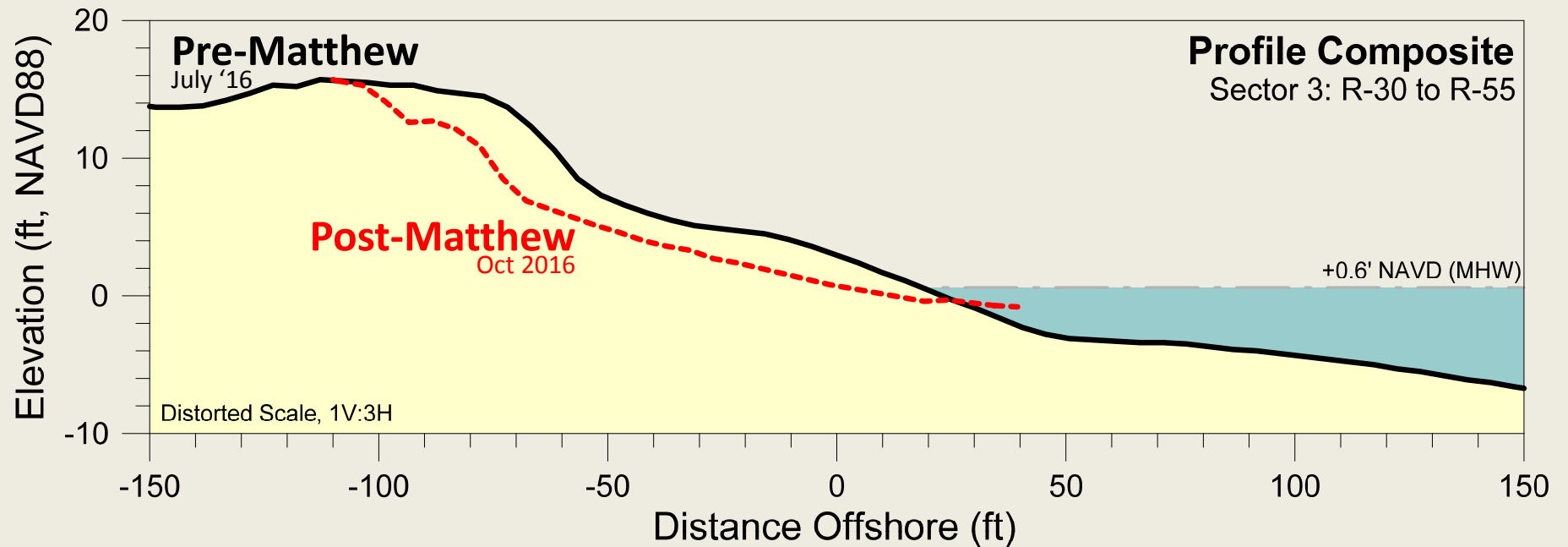
-81,800 cy



## Composite Beach Profile

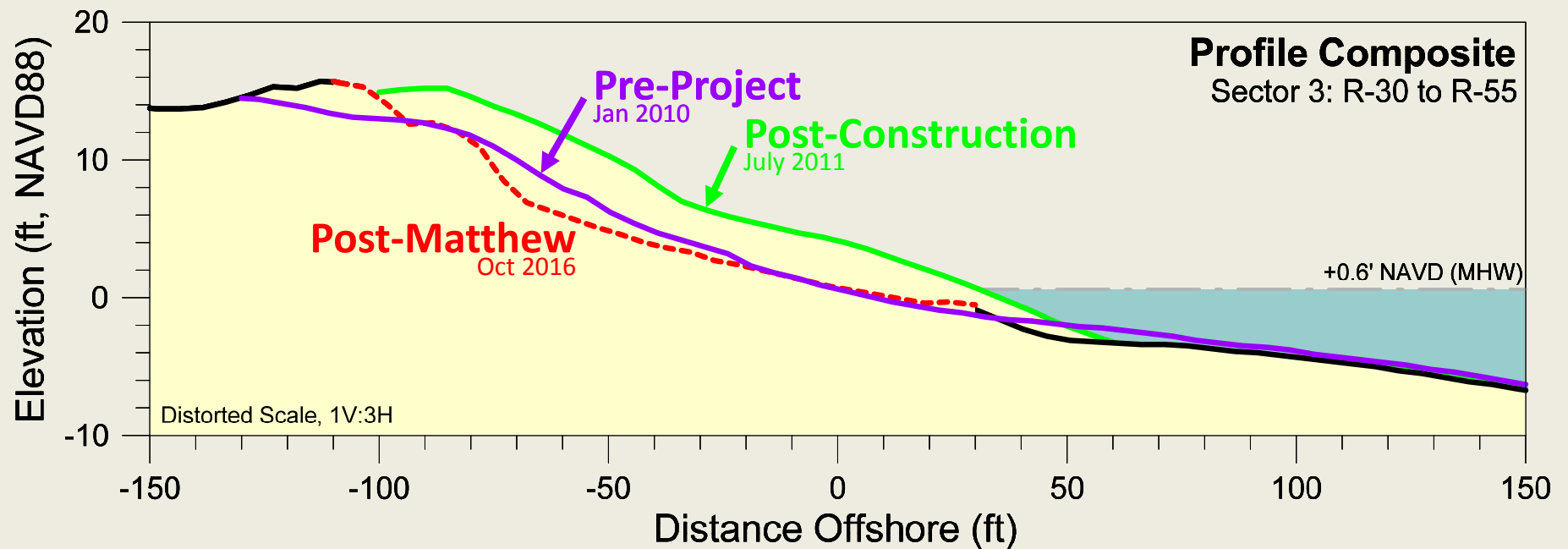


## Composite Beach Profile





## Composite Beach Profile



## Dune Repairs (<6 cy/ft)

### ➤ 29 Field Permits Issued

#### ■ County E

- 8,500 cy

**REPAIRS (To-Date)**

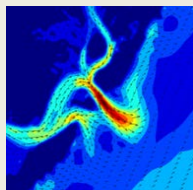
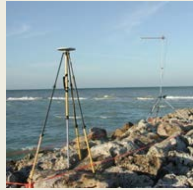
**100,000 cy**

#### ■ Private Parcels (Disney, Sea Oaks POA, etc.)

- 27,700 cy

#### ■ Other Initiated Projects (S.I.D., Town, City)

- 57,000 cy



**Tracking Station  
(R-78)**

**Pre-Matthew**



**Tracking Station**  
(R-78)

**Post-Matthew**



**Tracking Station**  
(R-78)

**Dune Repair**



**Tracking Station**  
(R-78)

**Last Week**



- Effects of Hurricane Matthew to the Beach
- Hurricane Response Plan
- Tools for Estimating Beach Volume Loss
- Recovery Efforts
- Future Work
  - Reformulate with data from Matthew

