

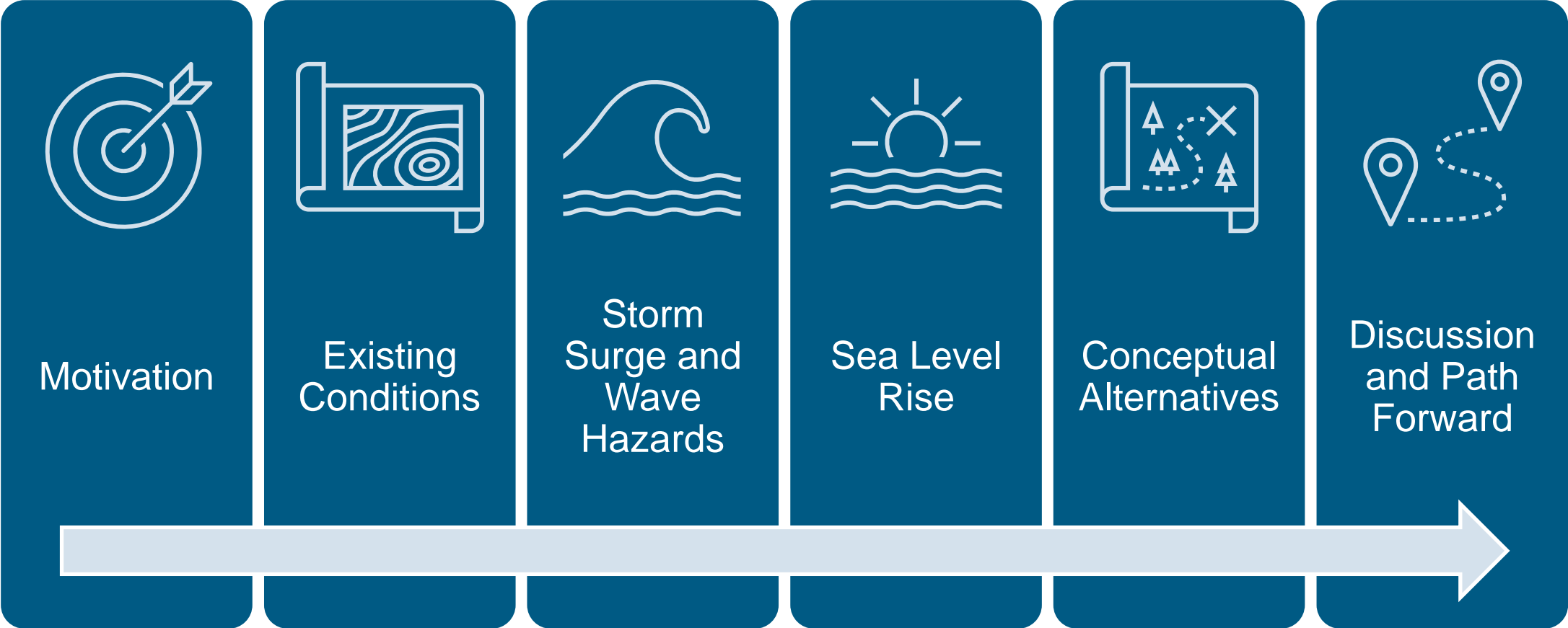


# Courtney Campbell Causeway Vulnerability Assessment and Resiliency Study

November 6, 2023



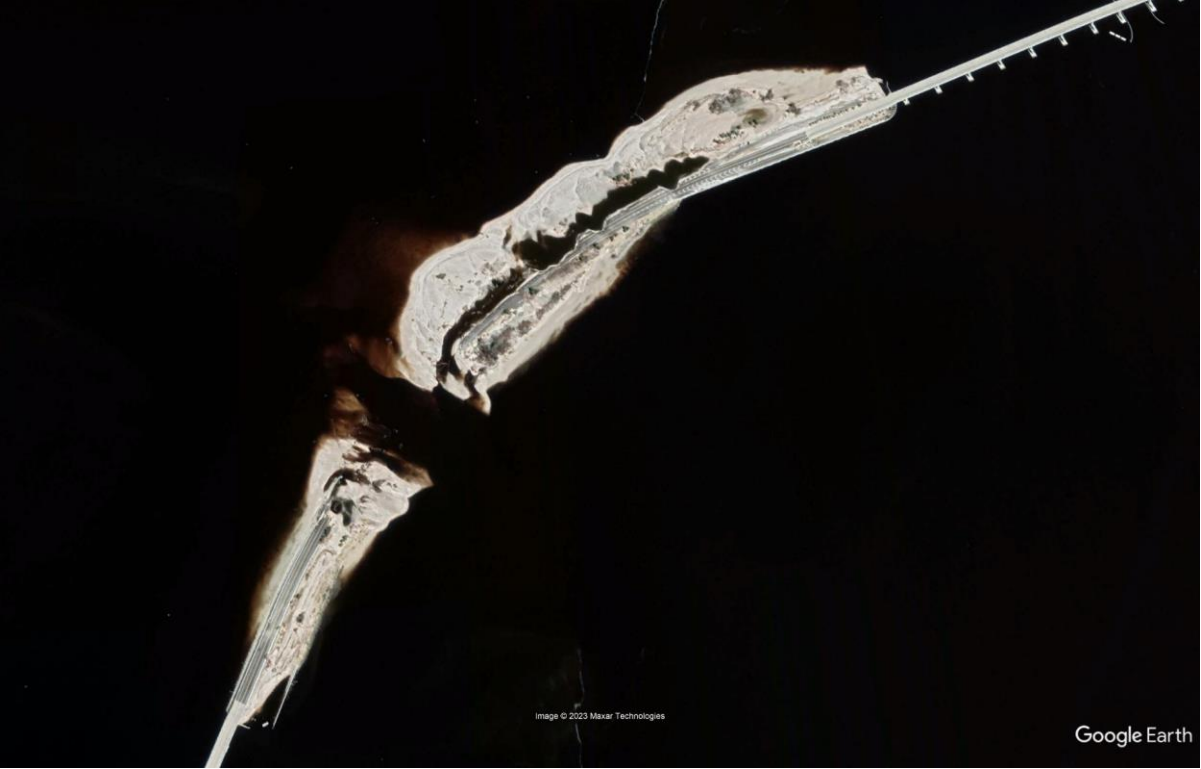
# Agenda



# Motivation – Hurricane Ian Damage to Sanibel Causeway



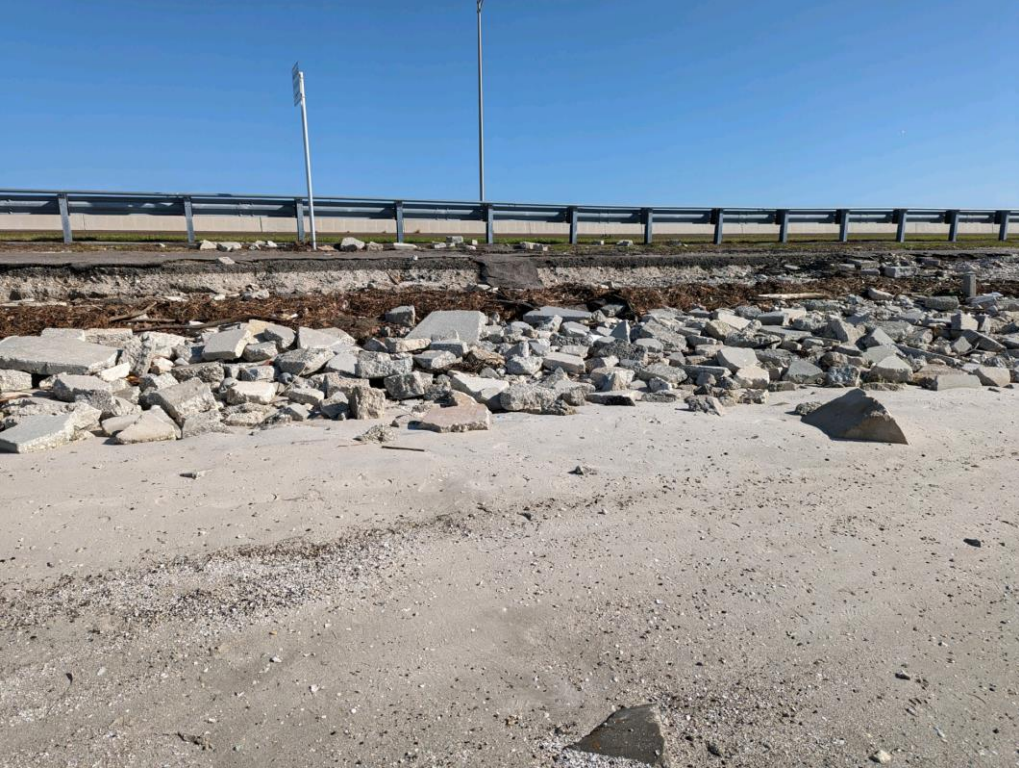
Before Hurricane Ian



After Hurricane Ian



# Motivation – Existing Erosion near Ben T Davis Beach



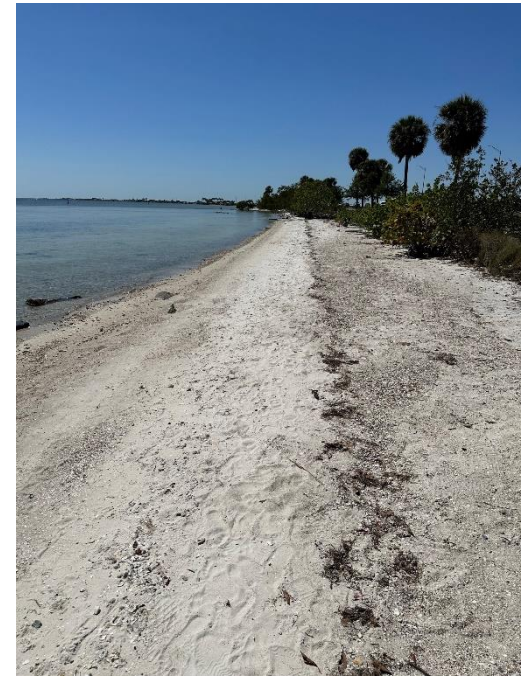
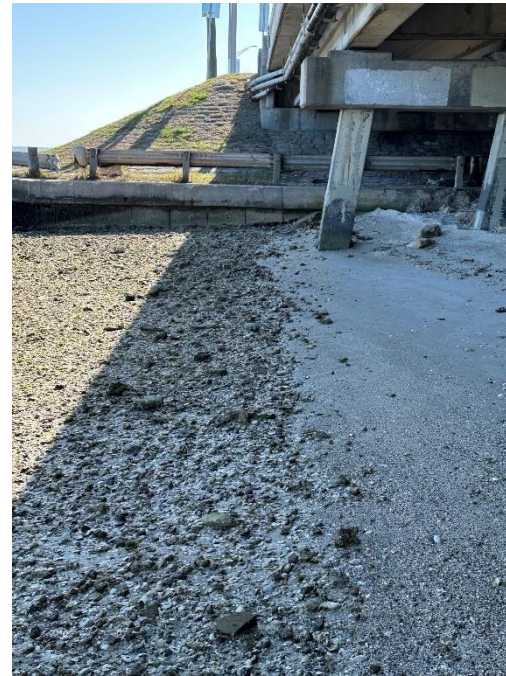
Photos taken October 26, 2023



# Vulnerability Assessment

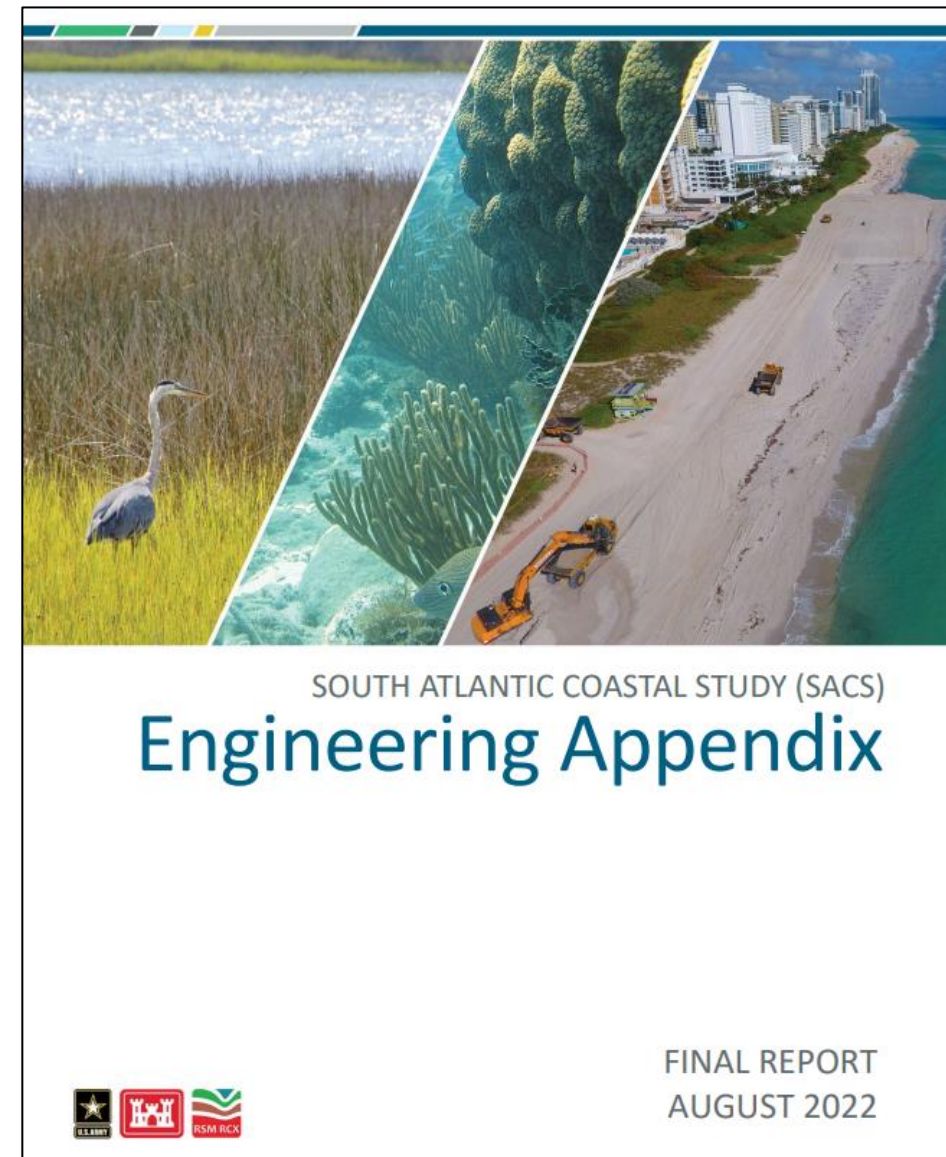
# Field Reconnaissance

- Drone imagery and mapping performed for most of causeway (3,500+ aerial images)
- Visited critical areas and took pictures (beach areas, boat ramp, and west bridge)
- Measured sample rock sizes at various locations (typical stone size 1.5-2 ft)



# Coastal Hazard Data Sources

- NOAA tide gauge data
  - Nearest long-term gauge is located at Old Port Tampa
  - Limited spatial coverage; no wave data
- FDOT District 7 Wave Vulnerability Study
  - Study completed in 2010
  - Provides extreme water level and wave data at bridge locations
- FEMA Flood Insurance Studies
  - Published in 2021
  - Provides range of water level data, but only one set of wave conditions
- USACE South Atlantic Coastal Study
  - State-of-the-art study
  - Data released October 2022
  - Provides water level and wave data along entire causeway (both sides)

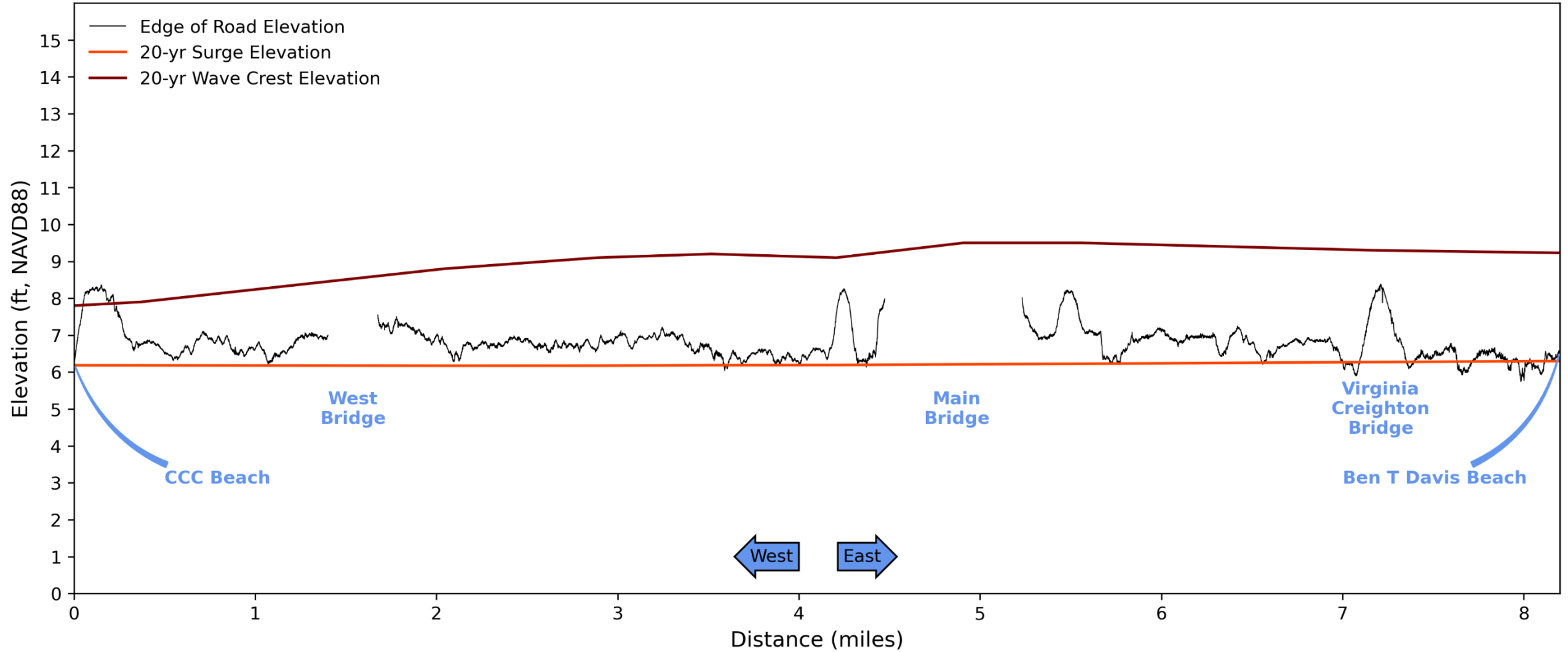


# Profile View of Storm Surge and Wave Hazards





# Profile of Storm Surge and Wave Hazards along Courtney Campbell Causeway (looking south to north)



# Sea Level Rise

- NOAA published updated sea level rise projections in 2022
- Five scenarios available
  - Low
  - Intermediate-Low
  - Intermediate
  - Intermediate-High
  - High
- Resilient Florida Vulnerability Assessment Criteria
  - Projections to years 2040 and 2070 required
  - Year 2100 a common benchmark for SLR analysis
  - Intermediate-Low and Intermediate-High scenarios required

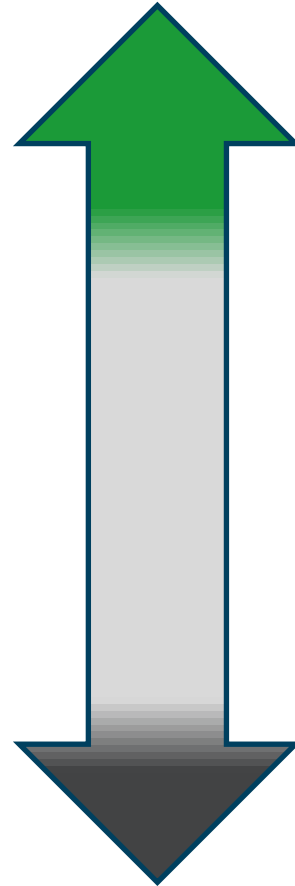
SLR Projections for Courtney Campbell Causeway (ft)			
Scenario	Year 2040	Year 2070	Year 2100
Intermediate-Low	0.70	1.39	2.08
Intermediate-High	0.83	2.50	5.23



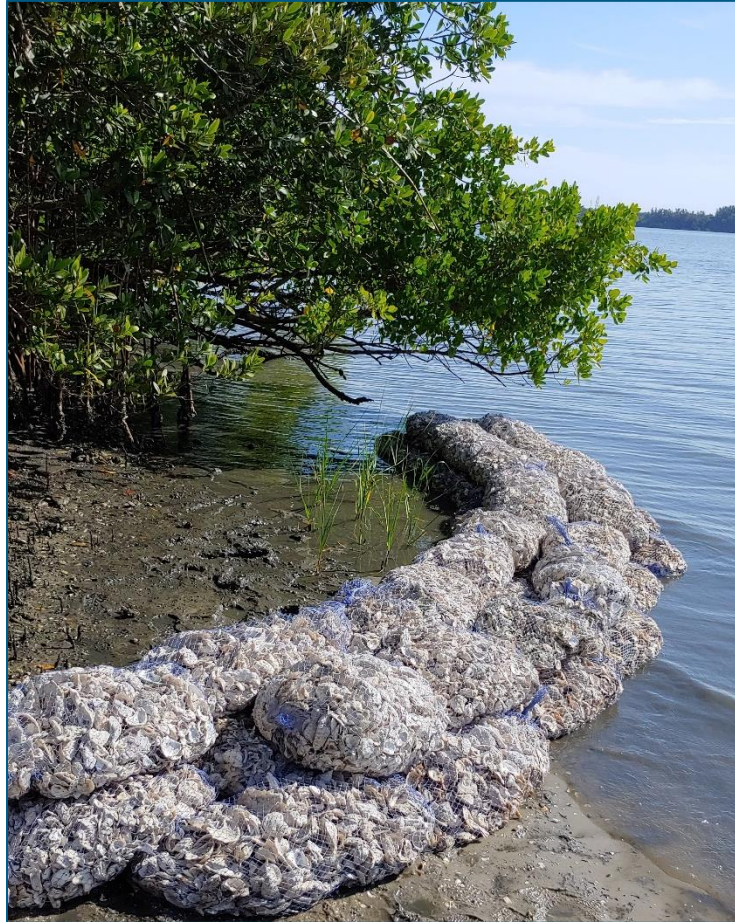
# Resiliency Solutions

# Conceptual Alternatives

- Vegetative plantings
- Marsh sills
- Bank grading with vegetative plantings
- Articulated concrete blocks (ACBs) with vegetative plantings
- Wave attenuation devices (WADs)
- Oyster breakwater
- Breakwater with vegetative plantings
- Planted revetment or terrace
- Stone revetment
- Seawall (concrete or steel sheet pile)



# Conceptual Alternatives



Marsh sills



<https://www.coastalreview.org/wp-content/uploads/CRO/2014/2014-10/LS-after-400.jpg>

Vegetative plantings



Immediately post-construction



One year after construction

Bank grading with vegetative plantings



# Conceptual Alternatives



Articulated concrete blocks (ACBs) with vegetative plantings



Reefmaker

Wave attenuation devices (WADs)



Reef Innovations; Reef Balls

Oyster breakwater



# Conceptual Alternatives



Breakwater with vegetative plantings



Pre-planting establishment



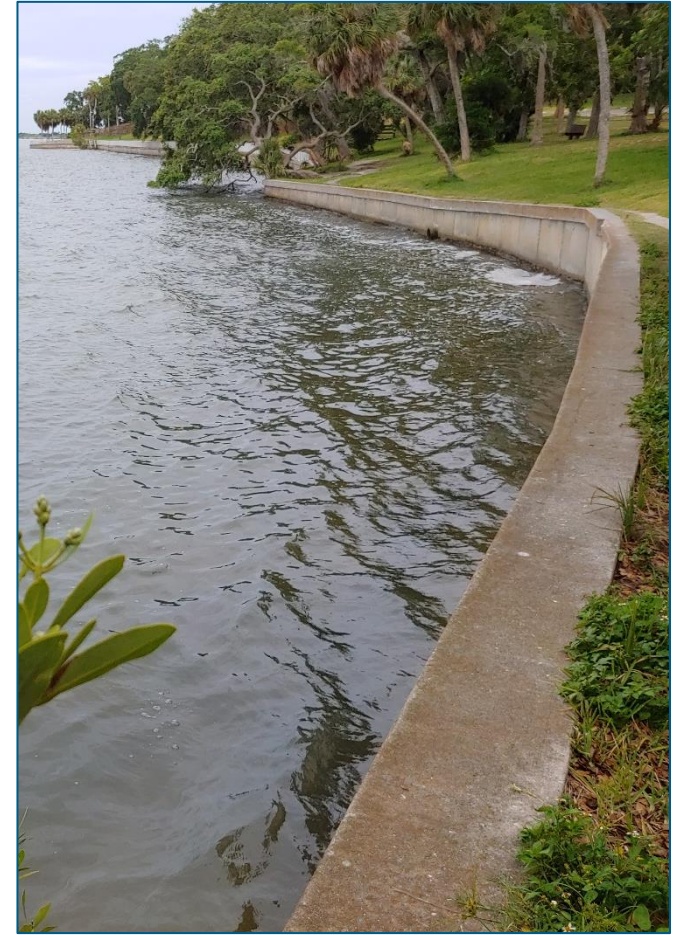
Post-planting establishment

Planted revetment

Ulele Springs – Seawall Enhancements  
Tampa, FL (Photos: ESA)



Stone revetment



Seawall



Alternative	Moderate/High Waves?	Cost Efficient?	Easier Permitting?	Soft Soils?	Firm Soils?	Steep Slopes?	Shallow Bathymetry?	Deep Bathymetry?	Vegetative Habitat?	Oyster Habitat?
Vegetative Plantings	✗	✓	✓	✓	✓	✗	✓	✗	✓	✗
Marsh Sills	✗	✓	✓	✓	✓	✗	✓	✗	✓	✗
Bank Grading w/ Plantings	✗	✓	✓	✓	✓	✓	✓	✗	✓	✗
ACBs with Plantings	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓
WADs	✓	-	✗	✗	✓	✓	✓	✓	✗	✓
Oyster Breakwater	-	-	✗	✗	✓	✓	✓	✗	✗	✓
Breakwater w/ Plantings	✓	✗	✗	✗	✓	✓	✓	✓	✓	✓
Planted Revetment	✓	✗	✗	✗	✓	✓	✓	✗	✓	✓
Stone Revetment	✓	✗	✗	✗	✓	✓	✓	✓	✗	✓
Seawall	✓	✗	✓	✗	✓	✓	✓	✓	✗	✓





# Path Forward

- Ideal solution may vary along causeway
- Currently performing preliminary engineering calculations
- Develop conceptual plan views and cross sections for each segment
- Present results to FDOT leadership for consideration



# Questions?